AFH

Africana Studies/Humanities

AFH 520: The Caribbean and the Literary Imagination
An examination of the literary representation of the Caribbean through an extensive study of selected fictional and theoretical writings. This seminar will include an examination of the representations of the Caribbean by African American as well as Caribbean writers.
3 credits, Letter graded (A, A-, B+, etc.)

AFH 524: Contemporary African Diasporic Literature and Film
Contemporary African American Diasporic Literature and Film offers a comparative analysis of twentieth and twenty-first century African Diasporic writers and filmmakers and their explorations of race, class, and gender. To establish the shifting nature of African Diasporic intellectual thought, we shall consider how each successive generation of writers and filmmakers builds upon discussions of racial identity, black sexuality, and social mobility. To demonstrate how discussions of race have evolved over time texts will be read in conjunction with each other. So for example, Fanon's seminal test Black Skin White Masks, a text that seeks to explain the racialization of society, the double consciousness of black people, and the superiority complex of white people will be read against Paul Gilroy's Against Race, a text arguing for the deconstruction and recognition of race as a cultural construct. Other topics for discussion focus on how "newer" writers delve into questions of sexuality from a fresh perspective. Comparing Morrison's Sula with Cheryl West's play Before it Hits Home, for example, demonstrates that writers are now exploring questions of sexuality in more provocative ways. West's uncovering of the "downlow" life-style lived by Black men, and the health concerns related and the dangers of sexually transmitted diseases such as HIV/AIDS. Permission from advisor required.
3 credits, Letter graded (A, A-, B+, etc.)

AFH 528: Contemporary Black Literature and Cultural Criticism
This course introduces students to some of the major contemporary literary and cultural theorists from the twentieth and twenty-first centuries (Fanon, Baker, Christian, Gilroy, Mercer, Morrison, Gates, Patterson, CLR James, etc). Earlier scholars from the nineteenth century such as Anna Julia Cooper or Du Bois will also be referenced. Through an examination of major literary and cultural movements such as Negritude, the Caribbean Artists Movement, The Black Arts Movement, and the Post-Black Artists Movement, students will gain insight into how black scholars both critique and contribute to the artistic, political, and social discourse of the day. An application of Postcolonial, Feminist/Womanist, and Cultural Criticism will aid the students in their reading of the critical materials.
Offered Fall, 3 credits, Letter graded (A, A-, B+, etc.)

AFH 564: Seminar in Francophone Literature
Close examination of the literature written in French of the Francophone world outside of France, with special emphasis on the literature of the Caribbean and Africa. This course will pose and explore questions such as: What is Francophone literature and what are the implications of a literature considered as "Francophone"? What are the functions of writing in French in a "postcolonial" context? Permission of advisor required.
3 credits, Letter graded (A, A-, B+, etc.)

AFH 585: Independent Studies
Specialized in-depth exploration of topics related to Africana Studies core themes based on a contractual relationship between individual student and faculty. Student must gain permission of selected faculty to enroll in their section of this course. The course can be taken only twice in fulfillment of requirements for the M.A.
3 credits, Letter graded (A, A-, B+, etc.)

AFH 599: Thesis
This course is intended to prepare students in developing a sustained and mature (nuanced) argument for their M.A. thesis. The class is for credit with flexible attendance requirements. The student must have an AFH faculty sponsor (thesis director) who will be responsible for assigning a course grade. The class is available beginning in the second term of a student's enrollment in the M.A. program and in the summer upon approval of the Director of Graduate Studies.
6 credits, Letter graded (A, A-, B+, etc.)

AFS

Africana Studies/Social and Behavioral Sciences

AFS 500: Foundations in Africana Studies, I
Core course required of all students pursuing a master's degree in Africana Studies. The two-semester foundations sequence will introduce students to the theoretical issues and historiography of the Africana Diaspora. The parameters of Africana Diaspora studies and will cover the historical, literary, sociopolitical, cultural, and economic themes of the black experience. This course will provide critical examination of the global experience and promote an understanding of the Africana Diaspora. Students will read the works of scholars who shaped the broad intellectual world. The required readings will emphasize the canons of Diaspora literature, including works by and about W.E.B. Du Bois, George Padmore, C.L.R. James, Marcus Garvey, and others.
Permission of advisor required.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
AFS 504: Racialized Oppressions and the Idea of Humanity
When one reads accounts of slavery, genocide, the systematic denial of rights to a group because of a racial identity, the question always arises whether the oppressors view the racialized other as fully human? This course will explore this question and what it means to view an individual or group as "fully human." How have philosophical understandings of the moral importance and the moral meaning of "humanity" served to exacerbate, moderate or fight against racial oppression? How does racial and gender oppression compare in this respect? Is there a comparison to be made between racial oppression and the treatment accorded to disabled people with respect to the understanding of what it is to be human? Does shifting the ground from a biologically-based concept such as "humanity" to a philosophical concept of "personhood" serve to justify or serve as a tool against these identity-based oppressions? Does shifting the ground justify the analogy of racism with the abuse of animals, as in the idea of "speciesism"? We will explore many of these questions as interest dictates and time permits. Permission from advisor required.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

AFS 507: African Music
This is a selective introduction to African music, and the music of the African Diaspora. We will read from major scholars in the field of African music studies such as Simha Arom, Christopher Waterman, Gerhard Kubik, Michele Kisliuk, Ruth Stone, Kofi Agawu, and others. Students will get a broad overview of the music of the major regional subdivisions of Africa (for instance North Africa, Central Africa, South Africa, etc.), as well as a historical perspective on the musicological issues that have been central to Africanist musicology and ethnomusicology. There will be regular reading, listening, and short writing assignments, occasional quizzes, a book review, and a final research project of 16-18 pages. For the book review, students will write about a monograph on African Music such as John Miller Chernoff's African Rhythm and African Sensibility or Paul Berliner's The Soul of Mbira. Students will present their research to class towards the end of the term. Permission from course instructor required.
3 credits, Letter graded (A, A-, B+, etc.)

AFS 530: Slavery and the Atlantic World
This course will examine the experiences of people of African descent as participants in a coerced migration that created the African Diaspora. The transatlantic slave trade led to an enduring image of black men and women as transported commodities. Therefore, it has had the greatest impact on the construction of the African Diaspora giving rise to new communities of people across the globe.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

AFS 533: Race, Gender, and Globalization
This seminar explores current issues and debates relating to the racialized and gendered effects of globalization. Topics include an overview of the sociology of globalization and theories of globalization/the global system, transnational classes and a transnational state, global culture and ideology, transnational migrations and the new global labor market, globalization and race/ethnicity, women and globalization, local-global linkages, and resistance to globalization.
Offered Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AFS 540: The Black Power Movement
This course examines the Black Power Movement. Stokely Carmichael's call for "Black Power!" broke through the commotion of everyday politics during 1966's Meredith March Against Fear. Soon after, and for the next decade, Black Power galvanized African American politics, engendering radical movements for social, political, and cultural transformation that impacted blacks in the United States and beyond. An emerging historiography traces the roots of Black Power in the postwar black freedom movement, finding cultural and political touchstones for future Black Power activism among civil rights renegades, trade unionists, and black nationalists. We will examine works produced during the Black Power era and new scholarship to analyze the Black Power Movement's legacy in the politics and culture of African Americans. Permission of advisor is required. This course is offered as both HIS 540 and AFS 540.
3 credits, Letter graded (A, A-, B+, etc.)

AFS 541: Music and Race: Black Music (Cross Cultural Study of Music)
This seminar will examine how certain widely held conceptualizations about race (and in some instances ethnicity) are articulated, reinforced, or challenged in music making and consumption, on the one hand, and in scholarship about music on the other. Writings on race and music have tended to be about "black" culture(s). In this course we will critique this focus and the construct of black music in great detail. The course requires extensive readings on these topics; listening to musical examples (in-depth knowledge of music theory is not necessary); vigorous class discussion and written reaction papers; a final research paper and class presentation. Students may choose to explore other aspects of music and race besides black music in their final papers (for example, how Orientalism has been constituted in music and musical criticism and scholarship). Permission of advisor required.
3 credits, Letter graded (A, A-, B+, etc.)

AFS 542: Caribbean Transnational Identity in the US
This course seeks to examine the strategies some immigrants from the Caribbean utilize to live their lives simultaneously in the US and the country of origin. To do so, it sheds light on the ways in which the US construction of race and ethnicity influences the immigrants' search for an identity in the United States.
Prerequisite: Enrollment in the Graduate Certificate Program
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

This course explores the various ways in which gender, race, and class, along with other aspects of identity, shape the lives and experiences of women of color in the United States and globally. It presents the ongoing debates concerning the interconnections of gender, race, and shifting identities. It will examine the relationships between the construction of personal identities, identity statuses, cultural and ideological meaning systems, and the search for alternative images. Permission from advisor required.
3 credits, Letter graded (A, A-, B+, etc.)

AFS 555: Sociology of Gender and Development
The 1960's marked a transition in global economic relations from one characterized by colonial extraction and exploitation, to sustainable development emphasizing economic growth and the alleviation of poverty. It was quickly discovered, however, that the effects of development were beneficial for some but devastating for others, especially poor women. The discovery led many scholars and practitioners, especially those who embrace feminist ideologies, to demand that development agencies and policies be sensitive to gender issues. This seminar will focus on gender and development, in theory and practice, in the global South. It will promote students'
understanding of the central role that gender plays in the success and assessment of development strategies.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**AFS 560: Sexualities: African and Caribbean Perspectives**
This seminar is designed to introduce students to the complexities of human sexuality from a perspective that places subaltern individuals at the center of the analysis. It locates these individuals, and their sexual practices, in the Tropics (particularly in Africa and the Caribbean) first in those man-made communities where sexuality was one of the (unspoken) exigencies of the slave and colonial economies, and later in the modern era where these economies have given way to neo-colonies.

**Offered**
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**AFS 570: The Black Radical Tradition**
This course examines the black radical tradition from slavery to the present, paying particular attention of twentieth-century social movements and the intersection between trade unionism, black nationalism, internationalism, and Marxism. Black radicalism has a long history in the United States and beyond. At its core, this tradition has housed diverse, at times conflicting, ideological strains, personalities, and organizations ranging from black feminists, Marxists, socialists, liberals, trade unionists, artists, and intellectuals. In the process this tradition has run afoul of more mainstream expressions of Black protest (although in certain eras, such as during the Black Power Movement, it has represented the mainstream), and black radicals are often marginalized as wild-eye dreamers, naive to the ways of the world.

3 credits, Letter graded (A, A-, B+, etc.)

**AFS 585: Independent Studies**
Specialized in-depth exploration of topics related to Africana Studies core themes based on a contractual relationship between individual student and faculty. Student must gain permission of selected faculty to enroll in their section of this course. The course can be taken only twice in fulfillment of requirements for the M.A.

3 credits, Letter graded (A, A-, B+, etc.)

**AFS 599: Thesis**
This course is intended to prepare students in developing a sustained and mature (nuanced) argument for their M.A. thesis. The class is for credit with flexible attendance requirements.

The student must have an AFS faculty sponsor (thesis director) who will be responsible for assigning a course grade. The class is available beginning in the second term of a student's enrollment in the M.A. program and in the summer upon approval of the Director of Graduate Studies.

6 credits, Letter graded (A, A-, B+, etc.)

**AFS 616: Twentieth Century African Political History**
This seminar is an extensive exploration of African political history in the twentieth-century. It examines the major themes that have shaped the formation and the decline of the modern African state since the imposition of colonial rule in the late nineteenth century. Drawing from monographs and journal articles on twentieth century African social and political history, and the recent scholarship on state/society relations, the seminar will explore the interactions between state institutions and structures of society in colonial and post-colonial Africa. The seminar is broadly structured around key themes which are presented in chronological order. These themes are divided into three major sections. The first section which deals with the colonial period will examine the following themes: partition and conquest; African resistance to early colonialism; the historical processes of state formation in Africa; the colonial economy; and the interaction between the world religion (Christianity and Islam) and colonial rule. The second section on the postcolonial era examines the following themes: the historical processes of state formation in Africa; communal identities and social change since decolonization; the patriarchal society and the crisis of the state; and the new debates on democratization and civil society in the post-Cold War era. The final section examines the international politics of African states from both theoretically and historical perspectives. The relevant themes here include the impact of the major powers on African subregions in the Cold War and post-containment eras; the impact of multilateral agencies on African political, economic and social developments; regional organizations and African states. The structure of the course is intended to be coherent but flexible, so that we can identify some basic trends in the reading assignments and construct consistent themes on the interplay of political transformation in the twentieth century. Permission of advisor is required.

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 500: Responsible Conduct of Research and Scholarship (CRS)**
This course is designed to introduce students to the major issues in the ethics of science and research. Using a combination of readings-written and web-based-videos, and case discussion, students will investigate the moral values intrinsic to science and the professional and social values with which scientists must comply. Each class will begin with an introductory lecture or video followed by discipline-based, small group discussions with the participation of an AMS faculty member.

**S/U grading**

**AMS 501: Differential Equations and Boundary Value Problems I**

**Prerequisite:** AMS 505

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**AMS 502: Differential Equations and Boundary Value Problems II**
Analytic solution techniques for, and properties of solutions of, partial differential equations, with concentration on second order PDEs. Techniques covered include: method of characteristics, separation of variables, eigenfunction expansions, spherical means. Green's functions and fundamental solutions, and Fourier transforms. Solution properties include: energy conservation, dispersion, dissipation, existence and uniqueness, maximum and mean value principles.

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 503: Applications of Complex Analysis**
A study of those concepts and techniques in complex function theory that are of interest for their applications. Pertinent material is selected from the following topics: harmonic functions, calculus of residues, conformal mapping, and the argument principle. Application is made to problems in heat conduction, potential theory, fluid dynamics, and feedback systems.

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**AMS 504: Foundations of Applied Mathematics**
An introductory course for the purpose of developing certain concepts and techniques that are fundamental in modern approaches to the solution of applied problems. An appropriate selection of topics is based on the concepts of metric spaces, compactness, sequences and convergence, continuity, differentiation and integration, function sequences, contraction mapping theorem. Strong emphasis on proofs.

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**AMS 505: Applied Linear Algebra**
Review of matrix operations. Elementary matrices and reduction of general matrices by elementary operations, canonical forms, and inverses. Applications to physical problems. Offered as AMS 505 or HPH 695.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**AMS 506: Finite Structures**
Problem solving in combinatorial analysis and graph theory using generating functions, recurrence relations, Polya's enumeration formula, graph coloring, and network flows.

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 507: Introduction to Probability**
The topics include sample spaces, axioms of probability, conditional probability and independence, discrete and continuous random variables, jointly distributed random variables, characteristics of random variables, law of large numbers and central limit theorem, Markov chains.

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 510: Analytical Methods for Applied Mathematics and Statistics**
Review of techniques of multivariate calculus, convergence and limits, matrix analysis, vector space basics, and Lagrange multipliers.

Prerequisite: A course in linear algebra and in multivariate calculus

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**AMS 511: Foundations of Quantitative Finance**
Introduction to capital markets, securities pricing and modern portfolio theory, including the organization and operation of securities market, the Efficient Market Hypothesis and its implications, the Capital Asset Pricing Model, the Arbitrage Pricing Theory and more general factor models. Common stocks and their valuation, statistical analysis, and portfolio selection in a single-period, mean-variance context will be explored along with its solution as a quadratic program. Fixed income securities and their valuation, statistical analysis, and portfolio selection.

Discussion of the development and use of financial derivatives. Introduction to risk neutral pricing, stochastic calculus and the Black-Scholes Formula. Whenever practical examples will use real market data. Numerical exercises and projects in a high-level programming environment will also be assigned.

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 512: Capital Markets and Portfolio Theory**
Development of capital markets and portfolio theory in both continuous time and multi-period settings. Utility theory and its application to the determination of optimal consumption and investment policies. Asymptotic growth under conditions of uncertainty. Applications to problems in strategic asset allocation over finite horizons and to problems in public finance. Whenever practical, examples will use real market data. Numerical exercises and projects in a high-level programming environment will also be assigned.

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 513: Financial Derivatives and Stochastic Calculus**
Further development of derivative pricing theory including the use of equivalent martingale measures, the Girsanov Theorem, the Radon-Nikodym Derivative, and a deeper, more general understanding of the Arbitrage Theorem. Numerical approaches to solving stochastic PDE's will be further developed. Applications involving interest rate sensitive securities and more complex options will be introduced. Whenever practical examples will use real market data. Numerical exercises and projects in a high-level programming environment will also be assigned. Prerequisite: AMS 511. 3 Credits

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 514: Computational Finance**
Review of foundations: stochastic calculus, martingales, pricing, and arbitrage. Basic principles of Monte Carlo and the efficiency and effectiveness of simulation estimators. Generation of pseudo- and quasi-random numbers with sampling methods and distributions. Variance reduction techniques such as control variates, antithetic variates, stratified and Latin hypercube sampling, and importance sampling. Discretization methods including first and second order methods, trees, jumps, and barrier crossings. Applications in pricing American options, interest rate sensitive derivatives, mortgage-backed securities and risk management. Whenever practical examples will use real market data. Extensive numerical exercises and projects in a general programming environment will also be assigned.

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 515: Case Studies in Computational Finance**
Actual applications of Quantitative Finance to problems of risk assessment, product design, portfolio management and securities pricing will be covered. Particular attention will be paid to data collection and analysis, the design and implementation of software, and, most importantly, to differences the occur between "theory and practice" in model application, to the development of practical strategies for handling cases in which "model failure" makes the naive use of quantitative techniques dangerous. Extensive use of guest lecturers drawn from the industry will be made.

3 credits, Letter graded (A, A-, B+, etc.)

**AMS 516: Statistical Methods in Finance**
The course introduces statistical methods in quantitative finance. Financial applications and statistical methodologies are intertwined in all lectures. The course will cover regression analysis and applications to the Capital Asset Pricing Model and multifactor pricing models, principal components and multivariate analysis, statistical methods for financial time series; value at risk, smoothing techniques and estimation of yield curves, and estimation and modeling volatilities.

Prerequisite: AMS 586 or permission of the instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 2 times FOR credit.

**AMS 517: Quantitative Risk Management**
Quantitative Methods for risk management problems including market risk, credit risk, operational risk and Basel II accord. Multivariable models; extreme value theory; structure and reduced-form models of default; and copula-based models.

3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 2 times FOR credit.

**AMS 518: Advanced Stochastic Models, Risk Assessment, and Portfolio Optimization**
The course provides a thorough treatment of advanced risk measurement and portfolio optimization, extending the traditional approaches to these topics by combining distributional models with risk or performance measures into one framework. It focuses on,
among others, the fundamentals of probability metrics and optimization, new approaches to portfolio optimization, and a variety of essential risk measures. Numerical exercises and projects in a high-level programming environment will be assigned.

AMS 519: Internship in Quantitative Finance
Supervised internship in financial institution. Students will typically work at a trading desk, in an asset management group, or in a risk management group. Students will be supervised by a faculty member and a manager at their internship site. Written and oral reports will be made to both supervisors.

3-6 credits, May be repeated 1 times FOR credit.

AMS 522: Bayesian Methods in Finance
The course explores in depth the fundamentals of the Bayesian methodology and the use of the Bayesian theory in portfolio and risk management. It focuses on, among other topics, incorporating the prior views of analysts and investors into the asset allocation process, estimating and predicting volatility, improving risk forecasts, and combining the conclusions of different models. Numerical exercises and projects in a high-level programming environment will be assigned.

3 credits, Letter graded (A, A-, B+, etc.)

AMS 523: Mathematics of High Frequency Finance
Elements of real and complex linear spaces. Fourier series and transforms, the Laplace transform and z-transform. Elements of complex analysis including Cauchy theory, residue calculus, conformal mapping and Mobius transformations. Introduction to convex sets and analysis in finite dimensions, the Legendre transform and duality. Examples are given in terms of applications to high frequency finance.

Offered Fall, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 526: Numerical Analysis I

Corequisite: AMS 505 and AMS 595

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 527: Numerical Analysis II
Numerical methods based upon functional approximation: polynomial interpolation and approximation; and numerical differentiation and integration. Solution methods for ordinary differential equations. AMS 527 may be taken whether or not the student has completed AMS 526.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 528: Numerical Analysis III
An introduction to scientific computation, this course considers the basic numerical techniques designed to solve problems of physical and engineering interest. Finite difference methods are covered for the three major classes of partial differential equations: parabolic, elliptic, and hyperbolic. Practical implementation will be discussed. The student is also introduced to the important packages of scientific software algorithms. AMS 528 may be taken whether or not the student has completed AMS 526 or AMS 527.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 530: Principles in Parallel Computing
This course is designed for both academic and industrial scientists interested in parallel computing and its applications to large-scale scientific and engineering problems. It focuses on the three main issues in parallel computing: analysis of parallel hardware and software systems, design and implementation of parallel algorithms, and applications of parallel computing to selected problems in physical science and engineering. The course emphasizes hands-on practice and understanding of algorithmic concepts of parallel computing.

Prerequisite: A course in basic computer science such as operating systems or architectures or some programming experience.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 532: Journal Club in Computational Biology
The goal of this course is for students to hone critical reading and analytic skills through discussions of literature in the area of Computational Biology. Participants take turn being a discussion leader who informally guides the group through a peer-reviewed manuscript for which all Journal Club members will have to read in advance of the meeting. Meetings in the Spring semester will include in Person Training (IPT) in Responsible conduct of Research and Scholarship (RCRS) on topics that comprise (1) Integrity in Scholarship, (2) Scientific Misconduct, (3) Mentoring, (4) Ownership and Authorship, (5) Plagiarism, (6) Data Management, (7) Journalism and Science, (8) Human Subjects, and (9) Laboratory Animals.

0-1 credits, S/U grading
May be repeated for credit.

AMS 533: Numerical Methods and Algorithms in Computational Biology
An in-depth survey of many of the key techniques used in diverse aspects of computational biology. A major focus of this class is on how to successfully formulate a statement of the problem to be solved, and how that formulation can guide in selecting the most suitable computational approach. Examples will be drawn from a wide range of problems in biology, including molecular modeling, biochemical reaction networks, microscopy and systems biology. No prior knowledge of biology is required.

3 credits, Letter graded (A, A-, B+, etc.)

AMS 534: Introduction to Systems Biology
This course is geared towards teaching essential concepts and computational skills in Systems Biology. The course is centered upon two key programming languages: Matlab for modeling applications and the R language for statistical analysis and sequence manipulation.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 535: Introduction to Computational Structural Biology and Drug Design
This course will provide an introduction to Computational Structural Biology with application to Drug Design. Methods and applications that use computation to model biological systems involved in human disease will be emphasized. The course aims to foster collaborative learning and will consist of presentations by the instructor, guest lecturers, and by course participants with the goal of summarizing key, methods, topics, and papers relevant to Computational Structural Biology. Grades are based on the quality of the presentations, participation in class discussion, attendance, quizzes, and a final exam.

3 credits, Letter graded (A, A-, B+, etc.)

AMS 536: Molecular Modeling of Biological Molecules
AMS 537: Dynamical Models of Gene Regulation and Biological Pattern Formation
This is a graduate course in the fundamental theory of genetic function and biological pattern formation in animal development. The course covers dynamical (sometimes called "physiological") models of these processes at a variety of mathematical levels. Biologically, the emphasis will be on E. coli and the fruit fly Drosophila, with a careful discussion of key experimental results for non-specialists. We will study the use of both deterministic and stochastic differential equations to solve fundamental scientific problems such as the phage lambda lysis/lysogeny decision, the engineering of artificial gene circuits, and the determination and regulation of the morphogenetic field in animal development, particularly the segmentation field in Drosophila.
3 credits, Letter graded (A, A-, B+, etc.)

AMS 538: Methods in Neuronal Modeling
Presentation of the mathematical modeling approach to information processing in nervous systems, from the level of individual ionic channels to large-scale neuronal networks. The course covers kinetic models of synaptic transmission, cable theory and compartment models for neurons, multiple channels and calcium dynamics, spike-train analysis and modeling small neuron networks.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 540: Linear Programming
3 credits, Letter graded (A, A-, B+, etc.)

AMS 542: Analysis of Algorithms
Techniques for designing efficient algorithms, including choice of data structures, recursion, branch and bound, divide and conquer, and dynamic programming. Complexity analysis of searching, sorting, matrix multiplication, and graph algorithms. Standard NP-complete problems and polynomial transformation techniques. This course is offered as both AMS 542 and CSE 548.
Prerequisite for CSE 548: CSE 373 recommended
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 544: Discrete and Nonlinear Optimization
Theoretical and computational properties of discrete and nonlinear optimization problems: integer programming, including cutting plane and branch and bound algorithms, necessary and sufficient conditions for optimality of nonlinear programs, and performance of selected nonlinear programming algorithms.
3 credits, Letter graded (A, A-, B+, etc.)

AMS 545: Computational Geometry
Study of the fundamental algorithmic problems associated with geometric computations, including convex hulls, Voronoi diagrams, triangulation, intersection, range queries, visibility, arrangements, and motion planning for robotics. Algorithmic methods include plane sweep, incremental insertion, randomization, divide-and-conquer, etc. This course is offered as both AMS 545 and CSE 555.
Prerequisite for CSE 555: CSE 373 or CSE 548
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 546: Network Flows
Theory of flows in capacity-constrained networks. Topics include maximum flow, feasibility criteria, scheduling problems, matching and covering problems, minimum-length paths, minimum-cost flows, and associated combinatorial problems.
Prerequisite: AMS 540 or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 547: Discrete Mathematics
This course introduces such mathematical tools as summations, number theory, binomial coefficients, generating functions, recurrence relations, discrete probability, asymptotics, combinatorics, and graph theory for use in algorithmic and combinatorial analysis. This course is offered as both CSE 547 and AMS 547.
Prerequisite for CSE 547: AMS 301
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 550: Operations Research: Stochastic Models
Includes Poisson processes, renewal theory, discrete-time and continuous-time Markov processes, Brownian motion, applications to queues, statistics, and other problems of engineering and social sciences.
3 credits, Letter graded (A, A-, B+, etc.)

AMS 552: Game Theory I
Elements of cooperative and non-cooperative games. Matrix games, pure and mixed strategies, and equilibria. Solution concepts such as core, stable sets, and bargaining sets. Voting games, and the Shapley and Banzhaff power indices. This course is offered as both ECO 604 and AMS 552. Prerequisite for ECO 604: Graduate standing in the Economics Department or permission of the Graduate Director.
3 credits, Letter graded (A, A-, B+, etc.)

AMS 553: Simulation and Modeling
A comprehensive course in formulation, implementation, and application of simulation models. Topics include data structures, simulation languages, statistical analysis, pseudo-random number generation, and design of simulation experiments. Students apply simulation modeling methods to problems of their own design. This course is offered as CSE 529, AMS 553 and MBA 553.
3 credits, Letter graded (A, A-, B+, etc.)

AMS 554: Queuing Theory
Prerequisite: AMS 507
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 555: Game Theory II
Refinements of strategic equilibrium, games with incomplete information, repeated games with and without complete information, and stochastic games. The Shapley value of games with many players, and NTU-values. This course is offered as both ECO 605 and AMS 555.
AMS 556: Dynamic Programming

AMS 562: Numerical Hydrology
Numerical solution methods for the equations of incompressible flow in porous media with special emphasis on groundwater flow. Finite difference and finite element methods for steady-state and transient flows-boundary conditions, range of validity and stability of the numerical schemes, and numerical artifacts. The approach is hands on, with example problems being computed. This course is offered as both GEO 564 and AMS 562.

AMS 565: Wave Propagation

AMS 566: Compressible Fluid Dynamics
Physical, mathematical, and computational description in compressible fluid flows. Integral and differential forms of the conservation equations, one-dimensional flow, shocks and expansion waves in two and three dimensions, quasi-one-dimensional flow, transient flow, numerical methods for steady supersonic flow, numerical methods for transient flow.

AMS 569: Probability Theory I

AMS 570: Introduction to Mathematical Statistics
Probability and distributions; multivariate distributions; distributions of functions of random variables; sampling distributions; limiting distributions; point estimation; confidence intervals; sufficient statistics; Bayesian estimation; maximum likelihood estimation; statistical tests.

AMS 571: Mathematical Statistics
Sampling distribution; convergence concepts; classes of statistical models; sufficient statistics; likelihood principle; point estimation; Bayes estimators; consistency; Neyman-Pearson Lemma; UMP tests; UMPU tests; Likelihood ratio tests; large sample theory. Offered as HPH 697 or AMS 571.

AMS 572: Data Analysis I
Introduction to basic statistical procedures. Survey of elementary statistical procedures such as the t-test and chi-square test. Procedures to verify that assumptions are satisfied. Extensions of simple procedures to more complex situations and introduction to one-way analysis of variance. Basic exploratory data analysis procedures (stem and leaf plots, straightening regression lines, and techniques to establish equal variance).

AMS 573: Design and Analysis of Categorical Data
Measuring the strength of association between pairs of categorical variables. Methods for evaluating classification procedures and interrater agreement. Analysis of the associations among three or more categorical variables using log linear models. Logistic regression.

AMS 574: Internship in Statistical Consulting
Directed quantitative research problem in conjunction with currently existing research programs outside the department. Students specializing in a particular area work on a problem from that area; others work on problems related to their interests, if possible. Efficient and effective use of computers. Each student gives at least one informal lecture to his or her colleagues on a research problem and its statistical aspects.

AMS 577: Multivariate Analysis

AMS 578: Regression Theory

AMS 580: Analysis of Variance
Analysis of models with fixed effects. The Gauss-Markov theorem; construction of confidence ellipsoids and tests with Gaussian observations. Problems of multiple tests of hypotheses. One-way, two-way, and higher-way layouts. Analysis of incomplete designs such as Latin squares and incomplete blocks. Analysis of covariance problems.

AMS 581: Analysis of Variance
Discussion of the accuracy of experiments, partitioning sums of squares, randomized designs, factorial experiments, Latin squares, confounding and fractional replication, response surface experiments, and incomplete block designs. Offered as AMS 582 or HPH 699.

AMS 582: Design of Experiments

AMS 586: Time Series
Analysis of models with fixed effects. The Gauss-Markov theorem; construction of confidence ellipsoids and tests with Gaussian observations. Problems of multiple tests of hypotheses. One-way, two-way, and higher-way layouts. Analysis of incomplete designs such as Latin squares and incomplete blocks. Analysis of covariance problems.

AMS 587: Nonparametric Statistics
This course covers the applied nonparametric statistical procedures: one-sample Wilcoxon tests, two-sample Wilcoxon tests, runs test, Kruskal-Wallis test, Kendall's tau, Spearman's rho, Hodges-Lehman estimation, Friedman analysis of variance on ranks. The
course gives the theoretical underpinnings to these procedures, showing how existing techniques may be extended and new techniques developed. An excursion into the new problems of multivariate nonparametric inference is made.

Prerequisites: AMS 312 and AMS 572 or equivalents

AMS 588: Biostatistics
Statistical techniques for planning and analyzing medical studies. Planning and conducting clinical trials and retrospective and prospective epidemiological studies. Analysis of survival times including singly censored and doubly censored data. Quantitative and quantal bioassays, two-stage assays, routine bioassays. Quality control for medical studies.

Prerequisite: AMS 572 or permission of instructor

AMS 589: Quantitative Genetics
Definition of relevant terminology. Statistical and genetic models for inheritance of quantitative traits. Estimation of effects of selection, dominance polygenes, epistasis, and environment. Linkage studies and threshold characteristics.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 591: Topics for M.S. Students
Various topics of current interest in applied mathematics will be offered if sufficient interest is shown. Several topics may be taught concurrently in different sections.

3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

AMS 592: Mathematical Methods of Finance and Investments I
A broad-based course in mathematical modeling and quantitative analysis of financial transactions and investment management issues such as debt and equity, measures of risk and returns, efficient markets and efficient set mathematics, asset pricing, one-factor and multiple-factor models, portfolio selection, futures and options.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 593: Financial Mathematics
Accumulation functions, yield rates, annuities, loan repayment, term structure of interest rates/spot rates/forward rates, options, duration/convexity. This course follows the syllabus for Financial Mathematics (FM) Exam of the Society of Actuaries and prepares students to pass the FM Exam.

Offered Fall and Summer, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 594: Mathematical Methods of Finance and Investments II
This course employs the techniques of mathematical statistics and empirical finance, e.g., estimation theory, linear and nonlinear regression, time series analysis, modeling and simulation to examine critically various models of prediction for asset-pricing, pricing of derivative products and term-structure of interest rates assuming stochastic volatility. Statistics necessary for analysis is incorporated in the course.

Prerequisite: AMS 592

AMS 595: Fundamentals of Computing
Introduction to UNIX operating system, C language, graphics, and parallel supercomputing.

Fall, 1 credit, Letter graded (A, A-, B+, etc.)

AMS 596: Fundamentals of Large-Scale Computing
Overview of the design and maintenance of large scale computer projects in applied mathematics, including basic programming techniques for massively parallel supercomputers.

Prerequisite: AMS 595 or permission of instructor

Spring, 1 credit, Letter graded (A, A-, B+, etc.)

AMS 597: Statistical Computing
Introduction to statistical computing using SAS and S plus.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

AMS 598: Biostatistics
Statistical techniques for planning and analyzing medical studies. Planning and conducting clinical trials and retrospective and prospective epidemiological studies. Analysis of survival times including singly censored and doubly censored data. Quantitative and quantal bioassays, two-stage assays, routine bioassays. Quality control for medical studies.

Prerequisite: AMS 572 or permission of instructor

AMS 599: Research
May be repeated for credit.

AMS 600: Socially Responsible Investing
Introduction to a scope of investments which are socially responsible because of the nature of the business the company conducts, including but not limited to: avoiding investment in companies that produce or sell addictive substances (like alcohol, gambling, and tobacco) and seeking out companies engaged in environmental sustainability. The course includes analysis of investments strategies maximizing financial return as well as social goods, such as: (i) Negative Screening: excluding securities with potentially social and/or environmental harmful characteristics; (ii) Shareholder activism: activities steering the management towards enhancing the well being of the stockholders, customers, employees, vendors, and communities. (iii) Positive investing: making investments in activities and companies believed to have a positive impact on issues such as social justice and the environment through stock selection, that guarantees sustainability, in environmental and humanitarian sense, and providing a company's long term potential to compete and succeed. Offered in Fall.

3 credits, Letter graded (A, A-, B+, etc.)

AMS 601: Risk Management and Business Risk Control in BRIC Countries
Introduction to the challenges and opportunities in investing in the BRIC countries Brazil, Russia, India, and China, with emphasis in the risk assessment, control and management. Opportunities in investing in BRIC: growth in infrastructure, middle class demand, educated cheap workforce, potential for outsourcing work, high risk/high reward. Risks facing investors in BRIC: strategic, operational, political, market risk, credit risks. Cultural barriers: family owned businesses, lack of business professionalism, poor transparency and disclosures of business practices, shallow and volatile markets, unstable macro-economics policies, tardy legal system. Responsibilities of investors in the BRIC countries: helping the BRIC governments and corporations in smooth transition to global markets and to developed status, providing co-ordination and transfer of business knowledge and technology from risk professionals in developed countries to emerging markets. Offered in Fall.

3 credits, Letter graded (A, A-, B+, etc.)

AMS 605: Probability Theory II

3 credits, Letter graded (A, A-, B+, etc.)

AMS 621: Finite Element Methods for Partial Differential Equations
Variational form of the problem, Ritz Galerkins, collocation, and mixed methods; triangular, rectangular (2-D), and tetrahedral (3-D) elements; accuracy, convergence, and stability; solutions of linear, nonlinear steady-state, and dynamic problems; implicit and explicit time integration; equivalence of finite-element and finite-difference methods.

3 credits, Letter graded (A, A-, B+, etc.)
AMS 641: Special Topics in Mathematical Programming
The course is designed for second- and third-year graduate students with a strong foundation in linear algebra and analysis who wish to pursue research in applied mathematics. Varying topics from nonlinear programming and optimization to applied graph theory and applied combinatorics may be offered concurrently.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 644: Special Topics in Applied Probability
The course is designed for second- and third-year graduate students with a background in probability and stochastic modeling who wish to pursue research in applications of the probability theory. Several topics may be taught concurrently in different sections.

Prerequisites: AMS 550 and permission of instructor.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 651: Nonlinear Analysis and Optimization

3 credits, Letter graded (A, A-, B+, etc.)

AMS 652: Special Topics in Game Theory
The course is designed for second- and third-year graduate students who wish to specialize in the mathematical theory of games.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 670: Special Topics in Probability and Mathematical Statistics
The course is designed for second- and third-year graduate students with a strong foundation in analysis and statistics who wish to pursue research in mathematical statistics. Several topics may be taught concurrently in different sections.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 675: Special Topics in Applied Statistics
The course is designed for second- and third-year students with a strong foundation in statistical analysis who wish to pursue research in applied statistics.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 676: Internship in Applied Mathematics
Directed research and/or practical experience in industry, financial and consulting firms, and research institutions. Students are required to have a department faculty adviser who coordinates and supervises the internship. Submission of the final report is required.

0-9 credits, S/U grading

AMS 683: Biological Physics & Biophysical Chemistry: Theoretical Perspectives
This course will survey a selected number of topics in biological physics and biophysical chemistry. The emphasis is on the understanding of physical organization principles and fundamental mechanisms involved in the biological process. The potential topics include: Protein Folding, Protein Dynamics, Biomolecular Interactions and Recognition, Electron and Proton Transfer, Motors, Membranes, Single Molecules and Single Cells, Cellular Networks, Development and Differentiation, Brains and Neural Systems, Evolution. There will be no homework or exams. The grades will be based on the performance of the term projects. Crosslisted with PHY 680 and CHE 683.

0-3 credits, Letter graded (A, A-, B+, etc.)

AMS 690: Special Topics in Differential Equations and Applied Analysis
The course is designed for second- and third-year graduate students with a strong foundation in analysis who wish to pursue research in applied mathematics. Several topics may be taught concurrently in different sections.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 691: Topics in Applied Mathematics
Varying topics selected from the list below if sufficient interest is shown. Several topics may be taught concurrently in different sections: Advanced Operational Methods in Applied Mathematics Approximate Methods in Boundary Value Problems in Applied Mathematics Control Theory and Optimization Foundations of Passive Systems Theory Game Theory Mixed Boundary Value Problems in Elasticity Partial Differential Equations

Quantitative Genetics Stochastic Modeling

0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 695: Special Topics in Numerical Analysis and Scientific Computing
Analysis and Scientific Computing

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

AMS 696: Applied Mathematics Seminar

0-3 Credits, S/U Grading, May be repeated for credit.

AMS 698: Practicum in Teaching

May be repeated for credit.

AMS 699: Dissertation Research on Campus
Prerequisite: Must be advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

AMS 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

AMS 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The
charge will only be removed if other plan is deemed comparable.

All international students must receive clearance from an International Advisor. FALL, 1-9 credits, S/U grading. May be repeated for credit.

AMS 800: SUMMER RESEARCH
May be repeated for credit.

ANT

Anthropology, Cultural and Archaeology

ANT 501: Development of Anthropological Theory
Survey of the development of anthropological theory from the 19th century to the present. This course is offered as both ANT 501 and DPA 501.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 502: Social Ecology
This course explores theoretical and methodological issues in the study of human social activity and its relationship to ecological systems and the environment. Readings include both classic studies as well as contemporary research, with particular emphasis placed on the various dimensions and scales of social organization and activity, and on the role of cultural, religious, and political institutions in shaping ecological relationships as well as economic behavior.

3 credits, Letter graded (A, A-, B+, etc.)

ANT 503: Social Organization
This course explores theoretical models and empirical observations of human social organization in a comparative perspective, including such topics as demography and behavioral ecology, kinship and marriage, reciprocal exchange, and political dimensions of resource mobilization in small-scale as well as complex societies. Organized around different layers of human sociality, the course examines social dependence among humans and nonhuman primates, evolutionary explanations for human mating strategies, cooperation in child-rearing, paradigms of descent and affinity, and the dynamics of hierarchy and alliance in egalitarian cultures as well as stratified states.

3 credits, Letter graded (A, A-, B+, etc.)

ANT 509: Seminar in European Ethnography
Investigation and discussion of selected topics and problems concerning European societies and cultures. The perspectives of culture history and current fieldwork are employed. This course is offered as both ANT 509 and DPA 509.

Fall, 3 credits, S/U grading. May be repeated for credit.

ANT 511: Paleolithic Archaeology
A survey of the archaeological record of foraging peoples in Africa, Europe, and Asia prior to the emergence of agriculture. The course emphasizes particular problems including the relationship between behavioral and biological change, different adaptive strategies in temperate and tropical zones, the origins of modern humans, and the emergence of complex hunter-gatherer societies. This course is offered as both ANT 511 and DPA 511.

Prerequisite: Any other archaeology course.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 512: Comparative Civilizations
A comparative study of the processes of sociocultural evolution from the beginnings of sedentary life to the achievement of early civilization in the Near East, Egypt, the Indus Valley, China, Mesoamerica, and the Andean area. The seminar covers such topics as urbanization, demography, irrigation, craft specialization, militarism, and trade and exchange. This course is offered as both ANT 512 and DPA 512.

Prerequisite: Graduate standing or permission of instructor.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 513: Origins of Agriculture
This course will trace the history of anthropological thought on the origins of agriculture and will assess the evidence from the Old and New worlds for this economic revolution. The course will not only explore areas where early agriculture is evidenced, but will also contrast these areas with those where agriculture was a later development. Emphasis will be on the environmental, technological, biological, social, and cultural processes associated with the "Neolithic Revolution." This course is offered as both ANT 513 and DPA 513.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 515: Theory and Method in Archaeology
Theoretical and methodological approaches employed in archaeology. The goals of the course are to provide an historical perspective on the growth of theory and method in archaeology and to examine in detail some of the pertinent research topics being studied today. This course is offered as both ANT 515 and DPA 515.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 516: Research Design in Archaeology
An examination of the ways in which archaeologists develop successful research strategies for arriving at answers to the key questions in the field. Students will analyze grant proposals that received funding from the major sources of funding for archaeology before developing research proposals of their own. The aim of the course is to provide the class with the skills needed to plan their future and compete successfully for funding both for their thesis research and in their future careers.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 517: Primitive Technology
An introduction to the technology of hunter-gatherers. The course examines how archaeologists use both ethnographic and experimentation to shed light on prehistoric human technological adaptations. Techniques for making and using primitive tools are practiced in weekly laboratory sessions.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

ANT 518: Lithic Technology
A detailed overview of the methods archaeologists use to extract behavioral information from prehistoric stone tools. The course examines raw material economy, technological strategies, tool use, and discard behavior. Analytical methods are practiced through the computer-assisted analysis of stone tools from simulated archaeological sites.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 519: Archaeozoology
An introduction to the study of animal bones from archaeological sites. Special emphasis is on identification of fragmented bone, identification of bone surface modification, calculation of indexes of abundance, and measurement and metrical analysis of mammal bone. Computer analysis is stressed, and the class seeks to synthesize traditional archaeozoology and actualistic studies. This course is offered as both ANT 519 and DPA 519.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 520: Principles of Social and Cultural Anthropology
Concepts and principles of social and cultural anthropology; historical background, structure and function, social processes, transactions, culture, communication, continuity, and other change; topics and problems of contemporary interest. Some ethnographic monographs are discussed in terms of their relevance to the general concepts and principles treated in the seminar. This course is offered as both ANT 520 and DPA 520.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 526: The Use of Remote Sensing and GIS in Environmental Analysis
An introduction to the use of aerial and satellite imagery in environmental analysis and the manipulation of geographic data sets of all types using Geographic Information Systems. This course is designed to teach students in archaeology, physical anthropology, and related disciplines, how satellite imagery combined with various maps can be manipulated using GIS software to perform powerful geographic analysis. Although students are eventually likely to use these tools in many different parts of the world, this course focuses on Long Island as a research area, and each student designs and completes a research project on a particular section of the area, focusing on the habitats of local wildlife, the locations of archaeological sites, coastal regimes, etc. This course presumes computer literacy and familiarity with database management. Offered as ANT 526 and DPA 526 or HPH 658.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ANT 527: Field Methods and Techniques in Archaeology
The course will be held during the summer only. It consists of field and laboratory work on an aspect of Long Island's archaeological heritage. Students' time is divided between surveying and excavation in the field and artifact analysis in the laboratory. Such techniques as map and air photo reading, survey, instruments, stratigraphy, conservation, typology construction, etc. are taught. Students are exposed to the full range of excavation, survey, and laboratory methods and techniques. This course is offered as both ANT 527 and DPA 527.

Prerequisite: Graduate standing or permission of instructor
Summer, 3-9 credits, Letter graded (A, A-, B+, etc.)

ANT 550: Theory and Methodology in Primatology
Comprehensive overview of the theory and methodology used in the study of primate behavioral ecology. Includes ecological field methods, behavioral observations, analytical techniques, nonparametric statistics as well as planning, presenting, and reviewing research. Offered as both ANT 550 and DPA 550.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ANT 559: Archaeology of Food
Explores the archaeological study of food and foodways. The emphasis is on the social aspects of food, particularly its role in past power structures, social relationships, conceptions of identity, ritual practices, and gender roles. Also covers the theoretical and methodological approaches archaeologists use to study food in the past.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ANT 560: Ancient Mesopotamia
An examination of the cultural history of Mesopotamia based on the archaeological, textual and art historical record. Focusing on the fourth through second millennia, this course investigates both the long term developmental process of this civilization, and ways to understand its settlement systems, urban structure, social and political organization, economic structure and the role played by religion.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 561: Peasant Societies and Cultures
The concept of peasantry is examined from political, religious, and social class viewpoints as well as from the more traditional economic view. These agricultural peoples, who are essentially preliterate and preindustrial, are described and analyzed especially in relation to the national societies of which they form a part. This course is offered as both ANT 561 and DPA 561.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ANT 562: Long Island Archaeology
Life on Long Island and the surrounding area from its first settlement by Native Americans 12,000 years ago until the end of the nineteenth century. Trends and changes in human behavior are studied in the context of environmental and cultural processes affecting all of northeastern North America.

Spring, 3-4 credits, Letter graded (A, A-, B+, etc.)

ANT 564: Primate Evolution
The taxonomic relationships and evolutionary history of primates as documented by their fossil record and structural and chemical evidence. Emphasis on primates prior to the origin of the human lineage. This course is offered as ANT 564, DPA 564 and HBA 564.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 565: Human Evolution
A survey of the fossil record of hominid evolution through the Pliocene and Pleistocene with emphasis on the morphological structure and function of locomotor, masticatory, and neural systems. Includes utilization of comparative anatomical material and an extensive cast collection. This course is offered as ANT 565, DPA 565 and HBA 565.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 567: Primate Behavior and Ecology
A comparative approach to the behavior and ecology of living lemurs, monkeys, and apes. Emphasis is placed on sociobiological theory; life history strategies; morphological adaptations; comparisons of primate communities in Asia, Africa, Madagascar, and South America; and primate conservation. This course is offered as both ANT 567 and DPA 567.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ANT 568: Hunters and Gatherers
The course focuses on the relationship between ecology and adaptation to explore the cross-cultural diversity of hunter/gatherers. The first part of the course looks at a number of key theoretical issues and debates that surround the study of hunter/gatherers. Once this foundation is laid, students learn about modern and historic hunter-gatherers from all the major geographic regions of the world. This overview draws on studies from behavioral ecology, ethnarchaeology and cultural anthropology. The focus of the course is both to explore hunter/gatherer variation in relationship to their environment, and to give students an appreciation of the ways in which hunter-gatherers have been historically documented. The course is designed to be applicable to archaeologists, anthropologists and to those in other disciplines who make inferences about past ways of life.

Spring, 3-4 credits, Letter graded (A, A-, B+, etc.)

ANT 573: Archaeology of Human Dispersals
A survey of the archaeological evidence for the dispersal of Homo sapiens during the Late Pleistocene epoch (128,000-130,000 years ago). Topics include African origin of Homo sapiens, dispersals into Eurasia, Australia, and the Americas, large mammal extinctions,
origins of art, music, and symbolic behavior, emergence of hunter-gatherers.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ANT 583: Human Demography
The study of human demography has had a long standing focus in anthropology, archaeology, economics and sociology for the simple reason that the distribution and density of people fundamentally shapes many other aspects of the human condition. Human Demography gives students an overview of population dynamics both as they change through time and differ across cultures. The course starts with outlining the history of population studies. Following this introduction, the three major components of population change - fertility, mortality and migration - are explored in depth. We then survey the seminal transitions in human demographic history from hunting and gathering to domestication and through modern postindustrial times. Drawing from the ethnographic, human ecology, demographic and archaeological literature, students read and discuss human demography from a variety of perspectives. The course includes some simple computations and a lab.

Spring, 3-4 credits, Letter graded (A, A-, B+, etc.)

ANT 585: Prehistoric Peoples of the Americas
ANT 585 Prehistoric Peoples of the Americas
Life in the Americas from the first settlement at the end of the Ice Age until the arrival of the Europeans in the 15th and 16th centuries. The culture, history, and evolution of prehistoric peoples of North, Central, and South America are treated. Specific topics covered include settlement by North Americans, hunting-gathering lifeways, plant and animal domestication, the origins of village life, and state-level societies.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ANT 599: M.A. Thesis Research
Fall, 0-6 credits, S/U grading
May be repeated for credit.

ANT 602: Research Seminar in Anthropological Theory
This course is offered as both ANT 602 and DPA 602.

Fall and Spring, 0-12 credits, S/U grading
May be repeated for credit.

ANT 610: Individual Research
Research supervised by faculty. Students must have permission of instructor and enroll in appropriate section. This course is offered as both ANT 610 and DPA 610.

Fall and Spring, 1-12 credits, S/U grading
May be repeated for credit.

ANT 620: Research Seminar in Topical Problems
This course is offered as both ANT 620 and DPA 620.

Fall and Spring, 3 credits, S/U grading
May be repeated for credit.

ANT 630: Research Seminar in Physical Anthropology
This course is offered as both ANT 630 and DPA 630.

Fall and Spring, 3 credits, S/U grading
May be repeated for credit.

ANT 640: Research Seminar in Ethnography and Ethnology
This course is offered as both ANT 640 and DPA 640.

Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

ANT 650: Research Seminar in Archaeology

ANT 660: Special Seminar
Selected topics in cultural and social anthropology. Topics reflect current interests of faculty and graduate students. This course is offered as both ANT 660 and DPA 660.

Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

ARH 502: History of 19th-Century Art Criticism and Theory
Surveys European art criticism and theory from 1750 to 1890, stressing relationships between art and history of ideas. Study of artworks will rely heavily on close readings of primary sources. There are two overlapping goals: to familiarize students with the outstanding writings on art from the period as a foundation for the study of modernism; second, and pertinent to art history in any period, is to acquire analytic strategies for analysis by practicing close reading, by placing texts in context with each other (intertextuality) and the discourses of their times, and by interpreting them in the light of the most recent scholarship and theory. Among major writers and artists studied are Diderot, Winckelmann, Lessing, Goethe, Constable, Delacroix, Baudelaire, Ruskin, Zola, Mallarmé and Gauguin.

3 credits, Letter graded (A, A-, B+, etc.)

ARH 503: History of 20th-Century Art Criticism and Theory
The literature of art has expanded enormously in the 20th century far beyond attempts to organize it developmentally or conceptually. An attempt is made to define types of criticism both in relation to the critics and their relation to the support system for the arts of which they are part.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ARH 540: Methodologies of Art History
This graduate seminar is designed to engage students with the history and methods of the discipline of art history. Through close readings and focused discussions, the course examines issues raised by aesthetics, the problems of biography and periodization, and the role of canon formation. Particular focus is directed towards the interpretive tools that have developed within the discipline of art. In addition, also stressed is the interdisciplinary nature of art history through readings that discuss how lines of thought and critical inquiry emerging
within other disciplines have had enormous influence on art history and criticism in the last two decades: semiotics, feminist theory, psychoanalysis, anthropology and post colonial theory, cultural studies, theories of mass culture and the post-modern, and the current debates about visual culture.

3 credits, Letter graded (A, A-, B+, etc.)

ARH 541: Topics in Ancient Art
This course deals with a variety of topics relating to ancient art and its influence on later European art and artistic theory. Areas explored include ancient art history, aesthetics, and comparative criticism; Roman uses of Greek art; pagan imagery in early Christian and medieval art; antique art and the Renaissance (use of prototypes); collecting antiquities (from the Medici to Getty); archaeological exploration and publication in the 18th and 19th centuries; French neoclassicism; and the calligraphy of Greek vases (Hamilton, Blake, Flaxman, Ingres, Picasso).

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 542: Topics in Medieval Art
A topic in medieval art or architecture, such as early medieval manuscript illumination, ornament and design, or the Gothic cathedral, is selected and explored during the semester in lectures, discussions, and student reports or papers.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 543: Topics in Renaissance Art
This course, usually a seminar, deals with one or several of the following aspects of Renaissance art: iconographic problems, style and connoisseurship (including the study of individual works at the Metropolitan Museum or the Frick), patronage and its effect on the form and content of a work, the exchange of artistic ideas between northern and southern Europe, and Renaissance sources in antiquity and the Middle Ages.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 544: Topics in Early Modern Art
This seminar examines methodological developments and historical issues related to the art and visual culture of the early modern period. Though we are concerned with objects, discourses, and practices emerging in the seventeenth century, we also approach these through the perspective of contemporary critical tools (for example, theories of urban space, spectacle, and representation; psychoanalysis, sexuality and subjectivity; coloniality and the encounter with New world otherness; semiotics and the construction of absolutist power). Students are encouraged to engage with these issues through the study of traditional high art objects as well as through other forms of representation emerging in the early modern period—for example, scientific illustration, more ephemeral forms of print culture, and even urban and courtly spectacle.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 545: Topics in 19th-Century Art
Selected topics in 19th-century art with an emphasis on
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 546: Topics in 20th-Century Art
Twentieth-century art considered as an international movement, European and American, although national groups may be studied. Emphasis varies with topics ranging over stylistic analysis, iconographical interpretations, and theoretical studies. Students are expected to undertake original research and interpretation.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 547: Topics in Global, Colonial, and Diasporic Art
This course examines various issues in the appreciation, interpretation and appropriation of non-Western art. Emphasis is on developing a critical approach to these arts and the manner in which they have been represented and misrepresented in the Western imagination. Topics vary, but may include exploration of themes in the so-called traditional arts of Africa, Oceania, Native and Latin America, the transformations of these arts during the colonial period, issues of identity and the consequences of dislocation versus sense of place in the diaspora, and contemporary expressions of non-Western artists on the global scene.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 548: Museum Studies
Through a combination of field trips, visiting lecturers, group discussion, and student projects, the course surveys the diverse aspects of the museum field, including management, curatorship, exhibitions, public relations, conservation, and other areas of administration and professional practice.

3 credits, Letter graded (A, A-, B+, etc.)

ARH 549: Topics in American Visual Culture
This course examines selected issues in the history of American art and material culture. The course focuses upon, but is not necessarily limited to, the United States. Topics include public art and public culture; approaches to the study of material culture; art and commercial and/or popular culture; art and regional locations; realism; imagining the West; cross-cultural exchanges in art of the United States. (May be used to fulfill 20th-century requirement when material deals with 20th-century art.)

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 550: Inquiries into Art Criticism and Theory
This course deals with the theoretical approaches to the study of art that cross historical boundaries. Topics vary from semester to semester. They may be an expansion of one of the areas generally covered in ARH 540, such as psychology of art or the iconography of architecture. Other investigations may focus on subjects requiring a special methodological approach, such as the theory and history of ornament and design or the role of public art.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 551: Topics in Performance
The histories and theories of performance are explored. Topics may be the performing body, performance and political action, avant-garde performance, performing and artifact, virtual performance, performance and identity. Depending on the topic, there may be a performance and/or computer based projects.

3 credits, Letter graded (A, A-, B+, etc.)

ARH 552: Theories of Performance
This course examines different theories of performance as they relate to theatre and everyday life. Students explore ways of thinking about the performing body and different modes of cultural expression. There is a performing component to the course in addition to a final paper.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.
ARH 552: Topics in Contemporary Art
The course will examine the latest developments in visual art and architecture, beginning with the Neo-Expressionism and Neo-Conceptualism of the 1980s and extending to installation and video art. Postmodernist and activist art will be examined in particular detail, and contextualized in terms of the broader patterns of 20th century art.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 553: Contemporary Art in New York
A systematic survey of contemporary art on view in museums and galleries in New York. The class would alternate between gallery/museum visits and interpretative analyses of the work in the classroom. A variety of theoretical approaches will be used and the full range of contemporary pluralism will be examined. Contemporary art will be understood as both a manifestation of contemporary society and in terms of its larger art historical context and significance. The New York art scene is the richest in the world. The class offers the student the opportunity for direct, informed contact with it.
3 credits, Letter graded (A, A-, B+, etc.)

ARH 554: Topics in Visual Culture
This class examines issues in the interdisciplinary field of visual culture. Visual culture studies look at the dynamic state of visual media in contemporary life and their historical origins, seeking to relate art and film to the mass media and digital culture.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 570: Issues in Architectural History and Criticism
This course examines a series of topics that link architecture with other critical disciplines. Among the topics that may be addressed are architectural theory and the theories of language; the history of proportion and the construction of gender; and Orientalism.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 580: Art Criticism or Gallery Internship
An internship offering practical experience in some aspect of the field of art history and criticism, such as gallery and curatorial work in an on-campus or off-campus gallery or museum, or journalistic experience with an art or criticism publication such as the Art department journal Art Criticism.
Prerequisite: Good standing in the graduate art history and criticism program
Fall and Spring, 1-3 credits, S/U grading
May be repeated 2 times FOR credit.

ARH 591: Practicum in the Writing of Art Criticism
This course is designed as a practicum in the writing of art criticism under the supervision of the faculty.
Fall and Spring, 3 credits, S/U grading
May be repeated 2 times FOR credit.

ARH 592: Practicum in Teaching
Instruction in the department under the supervision of the faculty. (This course may not be included more than once in the courses taken in fulfillment of the 36 credit hour requirement.)
Fall and Spring, 3 credits, S/U grading

ARH 595: Directed Readings in Art History, Criticism, and Theory
An independent reading course to be arranged with a particular faculty member. Normally, this course is reserved for second year Masters Students who have fulfilled most of their course requirements and for whom the proposed program of study cannot be completed within other existing course structures.
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 598: Thesis
Prerequisite: Completion of all degree requirements
Fall, 1-6 credits, S/U grading
May be repeated for credit.

ARH 602: Teaching Practicum, Advanced
Instruction in the department by advanced graduate students under the supervision of faculty.
3 credits, S/U grading
May be repeated 2 times FOR credit.

ARH 690: Directed Readings for Doctoral Candidates
An independent reading course to be arranged with a particular faculty member. Normally, this course is reserved for advanced PhD. students who have fulfilled most of their course requirements and for whom the proposed program of study cannot be completed within other existing course structures.
Fall and Spring, 1-9 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARH 699: Dissertation Research on Campus
Prerequisite: Must be advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ARH 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ARH 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ARH 800: Summer Research

ARS

ARS 520: Special Projects for M.F.A. Candidates
Advanced projects in areas that may not be included in the M.F.A. curriculum, utilizing the unique talents of regular and visiting
ARS 525: Electronic Media
An exploration of the experimental artistic practices utilizing computer and electronic technologies: digital imaging, video and audio, web and CD-Rom production, and interactive installation. It will provide practical instruction in the use of computer media with an orientation towards relating this to the graduate student's own practice. It will also analyze the unique possibilities of this hybrid and developing art form through theoretical readings and examination of recent works, exhibitions, festivals, and the worldwide web. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisite: Accepted candidate for M.F.A. or permission of department
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARS 530: Professional Experience Internship
Internship in the professional art world of New York City and its environs. Depending on the career objectives of the M.F.A. candidate, the student may choose to intern at a foundry, printmaking atelier, art gallery or museum, known artist's studio, or related facility or institution.
Prerequisite: Accepted candidate for M.F.A. or permission of department
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARS 531: Graduate Teaching Practicum
Supervised teaching practicum in undergraduate studio or studio, theory course.
Prerequisite: Accepted candidate for M.F.A.
Fall and Spring, 1-3 credits, S/U grading
May be repeated 2 times FOR credit.

ARS 532: Thesis Project
Preparation of thesis under the program advisor.
Prerequisites: Accepted candidate for M.F.A., review board passed
Fall, 1-6 credits, S/U grading
May be repeated for credit.

ARS 535: Projects in Studio Art
Projects in studio art, field and media to be determined on a per semester basis by the individual instructor.
1-6 credits,
May be repeated 2 times FOR credit.

ARS 540: Graduate Photo Studio
Photographic studio, theory, and laboratory emphasizing individual development as a photographer. Color and black-and-white studies and darkrooms. Fine arts, reportage, illustration, commercial, and industrial. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisites: Demonstration of appropriate level of proficiency, permission of instructor.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARS 550: In Process Critique
Graduate theory and practice of art, investigating historical and contemporary concepts, concentrating on individual development as an artist. Conceptual, environmental and wide ranging solutions are encouraged. Required for first year MFA's; this course culminates in a body of work for the end of the year First Year Exhibition. The course also provides students with vigorous critical feedback throughout this process, augmenting it with readings and discussions of related New York City exhibitions in galleries and museums to inform the development of their work.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARS 551: Graduate Painting Studio
Studio and theory in painting and related visual forms, with instruction and facilities available in all media and techniques; emphasis on individual development as an artist. Models and space for environmental and conceptual works available. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisites: Permission of instructor; accepted candidate for M.F.A. or permission of department
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARS 552: Graduate Ceramics and/or Sculpture Studio
Theory and practice of sculpture for the graduate student, with instruction and facilities available in all media and techniques; emphasis on individual development as an artist. Studio facilities include air, electric, and hydraulic power equipment; TIG, MIG, Arc, and flame welding; forging; woodworking; modeling, molding, and casting facilities for clay, wax, plaster, and plastics; and metal casting capabilities in investment, shell, sand, and centrifugal. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisites: Permission of instructor; accepted candidate for M.F.A. or permission of department
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARS 553: Graduate Printmaking Studio
Graduate studio in the theory and practice of printmaking. Color, black-and-white, and photographic processes in plate and stone lithography, serigraphy, relief, and intaglio, emphasizing the student's individual development as an artist.
Prerequisites: Permission of instructor; accepted candidate for M.F.A. or permission of department
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARS 560: Graduate Sculpture Studio
Theory and practice of sculpture for the graduate student, with instruction and facilities available in all media and techniques; emphasis on individual development as an artist. Studio facilities include air, electric, and hydraulic power equipment; TIG, MIG, Arc, and flame welding; forging; woodworking; modeling, molding, and casting facilities for clay, wax, plaster, and plastics; and metal casting capabilities in investment, shell, sand, and centrifugal. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisites: Permission of instructor; accepted candidate for M.F.A. or permission of department
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.
history/criticism faculty and graduate students, as well as by his or her peers. The visual arts seminar, where applicable, includes field trips and assignments of special lectures, panels, seminars, and other events of the professional art world.

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ARS 800: Summer Research

BCB

Biochemistry and Cell Biology

BCB 551: Introduction to Research in Biochemistry and Cell Biology
A series of talks, discussions, and practical exercises to address topics related to research in biochemistry and cell biology including laboratory etiquette, the laboratory notebook, experimental design, critical evaluation of the literature, analysis and presentation of data, ethical issues, and basic experimental techniques used in biochemistry and cell biology.
Prerequisites: Matriculation in MS program or permission of instructor
Fall, 2 credits, Letter graded (A, A-, B+, etc.)

BCB 552: Advanced Laboratory Methods in Biochemistry and Cell Biology
Introduces the details of theoretical principles and experimental techniques used to investigate the properties and interaction of biological molecules. Students will familiarize themselves with the instrumentation and techniques used to investigate different biochemical and cell biological problems through a combination of lectures, demonstrations, and/or laboratory work. Various topics will be covered such as cell culture and manipulation; protein purification and characterization using electrophoresis, spectroscopy and thermodynamic techniques; the identification of proteins by mass spectrometry; nucleic acid purification and the utilization of PCR and microarray technologies; and modern microscope methods for investigating cellular function. Prerequisite: Matriculation in MS program or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

BCB 559: MS Research Practicum in Biochemistry and Cell Biology
The student will be introduced to modern biochemical and cell biological research techniques through participation in ongoing research in the laboratory of a Biochemistry and Cell Biology or associated faculty member for one semester. Student must obtain permission to register from the sponsoring faculty member.
Prerequisite: Matriculation in MS program or permission of instructor
Fall, 0-4 credits, S/U grading

May be repeated for credit.

BEE

Ecology and Evolution

BEE 500: Directed Readings in Population Biology
Directed readings in topics of current interest, under supervision of a faculty sponsor, culminating in one or more critical review papers.
Prerequisites: Sponsor and approval of master's program executive committee
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

BEE 501: Directed Readings in the Biology of Organisms
Directed readings in topics of current interest, under supervision of a faculty sponsor, culminating in one or more critical review papers.
Prerequisite: Sponsor and approval of master's program executive committee
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

BEE 550: Principles of Ecology
Population dynamics, interactions of organisms, theoretical concepts of community structure and their biological and evolutionary implications.
Prerequisite: Permission of instructor
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

BEE 551: Principles of Evolution
Biological evolution, including the genetics of populations, speciation, evolution of higher taxa, and the fossil record.
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

BEE 552: Biometry
An intensive course in statistical theory and methodology. The analysis of real biological data is emphasized. Topics include analysis of variance, simple multiple and curvilinear regression analysis, correlation analysis, and goodness of fit tests.
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

BEE 553: Multivariate Analysis in Biology
An introduction to multivariate statistical analysis for biologists. Topics include general least squares analysis, MANOVA, cluster analysis, and factor analysis.
Prerequisite: BEE 552 or equivalent
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

BEE 554: Population Genetics and Evolution
A general introduction to mathematical population genetics and evolutionary theory. The effects of mutation, recombination, selection, and migration are studied. Modern concepts in both theoretical and experimental population genetics are covered.
Prerequisite: BEE 552 or equivalent, and a course in evolution
Spring, 0-3 credits, Letter graded (A, A-, B+, etc.)

BEE 555: Mathematical Methods in Population Biology
This course covers a variety of mathematical methods used in modern theoretical biology. Topics include linear algebra and applications, ordinary and partial differential equations, and stochastic processes. Examples from population biology, i.e., mathematical ecology and population genetics, are used throughout.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

BEE 556: Research Areas of Ecology and Evolution
A description of the current research areas of ecology and evolution, broadly conceived. All first-year ecology and evolution students are expected to participate.
Fall and Spring, 1-2 credits, S/U grading
May be repeated for credit.

BEE 558: Tutorial Readings
Individual tutorial study with an instructor in the Graduate Program in Ecology and
Evolution for the purpose of background reading in an area of ecology and evolution.
Fall and Spring, 1-4 credits, S/U grading
May be repeated for credit.

**BEE 559: Individual Studies in Organisms**
A detailed study of the biology of a selected systematic group chosen by the graduate student and a faculty member. This is conducted as a tutorial course.
Fall and Spring, 1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**BEE 562: Concepts and Methods in Evolutionary Biology**
The course aims at achieving two related objectives: first, to provide graduate students in Ecology & Evolution, other biology departments, as well as Philosophy, with a basic understanding of the varied methods (both experimental and statistical) that make up the body of evolutionary quantitative biology. The focus will be in particular on quantitative genetics and its interface with more modern approaches, including QTL mapping, bioinformatics and the various “omics” (genomics, proteomics, etc.).
Second, students will become familiar with the fundamental concepts of philosophy of science, in particular as they relate to the conceptual analysis of the ideas that shape modern evolutionary and ecological theory. In this respect, the focus will be both on philosophical concepts such as falsificationism, induction, deduction, hypothesis testing and the nature of evidence, as well as on the meaning of key ideas in evolutionary ecology, like natural selection, genetic drift, and constraints.
3 credits, Letter graded (A, A-, B+, etc.)

**BEE 564: Geometric Morphometrics**
An introduction to theory and methods used in geometric morphometrics. Image analysis, outline methods, landmark methods, and shape statistics are covered.
Prerequisite: BEE 552 or equivalent; BEE 553 recommended
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BEE 566: Horizons in Ecology and Evolution**
The course is designed to provide beginning graduate students in Ecology and Evolution with an extended perspective on current and developing trends in this field. It will be based on readings (empirical and review papers) and discussion on diverse topics. The hour-long class will meet on a weekly basis. Each class session will be led by the faculty member with expertise in the scheduled topic of study.
Offered:
Spring, 1 credit, S/U grading

**BEE 567: Molecular Diversity Laboratory**
This course will provide hands-on experience in established and recently developed methods of detecting and analyzing molecular variation (DNA, RNA, Proteins) in nature. Natural populations of Drosophila melanogaster will be the model material for this laboratory. The main theme of this course is that molecular variation is abundant in nature and is an important tool for understanding adaptive evolution and species relationships.
Prerequisite: permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BEE 571: Ecology Laboratory**
This course stresses the collection, analysis, and interpretation of ecological data, mostly in terrestrial settings. Laboratory and field exercises demonstrate the operation of general ecological principles in specific populations and communities.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BEE 572: Conservation Biology**
Society and individual lives are increasingly affected by environmental degradation at different scales. From the decline of local fisheries to global climate change, multiple crises threaten the biodiversity and ecosystems that sustain us humans. This course introduces the scientific foundations of conservation biology, along with examples from real-world conservation. The course reviews the biological concepts that underlie conservation including habitat requirements, population dynamics, biogeography, and population genetics. Analysis of case studies on the effects of human activities on biological diversity and ecosystem services will be used to explore the interdisciplinary nature of the practice of conservation. This course will prepare students for careers in environmental sciences and ecology. Offered in Spring.
3 credits, Letter graded (A, A-, B+, etc.)

**BEE 574: Landscape Ecology Laboratory**
A computer lab course focusing on spatial concepts, methods, and tools for addressing environmental problems. The course will be based on fundamental concepts in ecology and environmental science and extend that knowledge, as well as teaching technical skills, including the use of geographic information systems (GIS) software, image processing, spatially explicit modeling, and spatial statistics. The lab exercises will introduce a variety of spatial approaches for addressing problems in environmental protection, ecotoxicology, natural resource management, conservation biology and wildlife management.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BEE 575: Evolutionary Ecology**
The approach is to understand the theoretical basis and review empirical tests of diverse topics. The format includes both lectures and student-led discussions of primary literature.
Prerequisite: BEE 550; BEE 551, or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BEE 576: Principles and Applications of Ecology and Evolution**
An overview of the principles of ecology and evolutionary biology, and the applications of these principles in conservation biology, environmental and health sciences, and resource management. The course will cover fundamental concepts and research questions in population, community, and ecosystem ecology; population genetics; and evolutionary ecology. These principles will be discussed in the context of contemporary issues, such as global climate change, biodiversity loss, environmental contaminants, infectious diseases, invasive species, and management of ecological resources. Offered
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

**BEE 577: Introduction to Ecological Genetics and Genomics**
An introduction to the concepts, research questions, and methods involved in modern ecological genetics and genomics. The course will provide a strong foundation and broad conceptual framework for students planning to engage in empirical work in conservation, management, ecology, and evolutionary biology. The course will cover basic Mendelian genetics, meiosis, and mating systems, standard population genetics methods for describing variation within and between populations, basic quantitative genetics, methods for molecular marker genotyping, bioinformatic and genomic concepts, and organism-specific methods and case studies, including plant and animal ecological genetics. 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

**BEE 585: Research Design and Analysis in Ecology and Evolution**
This course covers topics relevant to statistical aspects of carrying out research in ecology and evolution as well as interpreting the results of one's own and others analyses, particularly in field data and for experimental data in the lab and field. The topics include quantification of spatial pattern and spatial heterogeneity, recognizing and accounting for indirect effects and artifacts, design and analysis of experiments, meta-analysis and quantitative research synthesis. This course will also provide an introduction to ecological niche modeling and bioinformatics (focused on species and traits). We will review a synthetic set of tools useful for a broad range of questions in ecology and evolution. Offered Fall, 3 credits, Letter graded (A, A-, B+, etc.)

BEE 586: Introduction to Ecological Modeling

This course will provide students with a familiarity of the major concepts, approaches, and underlying rationale for modeling in the ecological sciences. Topics will include reviews of theoretical and empirical models, the use of models in adaptive management, and how to confront models with data to evaluate alternative hypotheses. Roughly 1/3 of the course will be devoted to the use of models in management, focusing on the problems of fitting models to data and management pitfalls that follow. Course work will consist of readings, in class exercises, and group assignments that involve the construction, analysis, and interpretation of ecological models.

Prerequisite: BEE 550, BEE 552; MAT 131 or equivalent; any statistics course. Spring, 3 credits, Letter graded (A, A-, B+, etc.)

BEE 587: Applied Ecology and Conservation Biology Laboratory

A computer laboratory course introducing students to ecological risk analysis and conservation biology. Laboratories are based on interactive software. Computer simulation techniques for addressing problems in applied ecology are emphasized. This course is co-scheduled with BEE 353 for Spring 2012. Prerequisites: A year of calculus; one-year undergraduate biology course for majors Spring, 3 credits, Letter graded (A, A-, B+, etc.)

BEE 588: Current Topics in Ecology and Evolution

Subject matter varies from semester to semester, depending upon the interests of students and staff.

Fall and Spring, 2 credits, S/U grading

May be repeated for credit.

BEE 599: Research

Original investigation undertaken with the supervision of a member of the staff. Fall and Spring, 1-12 credits, S/U grading May be repeated for credit.

BEE 670: Informal Seminar

Presentation of preliminary research results and current research problems by students and faculty. Fall and Spring, 0-2 credits, S/U grading May be repeated for credit.

BEE 671: Ecology and Evolution Colloquium

A weekly series of research seminars presented by visiting scientists as well as by the faculty. Required every semester of all ecology and evolution graduate students. Fall, 0-2 credits, S/U grading May be repeated for credit.

BEE 672: Ecology and Evolution Colloquium

A weekly series of research seminars presented by visiting scientists as well as by the faculty. Required every semester of all ecology and evolution graduate students. Spring, 0-2 credits, S/U grading May be repeated for credit.

BEE 679: Seminar on Adaptations of Marine Organisms

Seminars on selected topics concerning ecological, genetical, and evolutionary problems in the marine environment. Fall or Spring, 0-2 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

BEE 689: Seminar on the Environment and Human Affairs

Student seminars on selected topics concerned with the effect of man on the environment. Application of ecological and evolutionary theory to the solution of human problems. Fall or Spring, 0-2 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

BEE 692: Seminar on Population and Community Ecology

Student seminars on selected topics in population and community ecology. Fall or Spring, 0-2 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

BEE 695: Seminar on Ecological Processes

Seminars on selected topics concerning ecological processes at the individual, population, community, ecosystem, and global levels. Offered Fall and Spring, 0-2 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

BEE 699: Dissertation Research on Campus

Prerequisite: Must be advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab. Fall, 1-9 credits, S/U grading May be repeated for credit.

BEE 700: Dissertation Research off Campus - Domestic

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor. Fall, 1-9 credits, S/U grading May be repeated for credit.

BEE 701: Dissertation Research off Campus - International

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by
mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must received clearance from an International Advisor.

Fall, 1-9 credits, S/U grading

May be repeated for credit.

BEE 800: Full-Time Summer Research

May be repeated for credit.

BGE

Genetics

BGE 500: Introduction to News Media Concepts and Institutions

In any age when scientific, medical and environmental issues often make news, this course is designed to familiarize students with how the U.S. news media works. Students will learn how the industry is organized, and why it is undergoing fundamental change; how decisions are made about which stories to cover and how prominently to cover them; how the press weighs such values as freedom, privacy and national security; how the press attempts to deal with issues of scientific uncertainty and conflicting information. In exploring the culture and practices of American journalism, the course will focus on recent coverage of science, health and environmental developments. This course is intended for graduate students in health and science who seek a better understanding of the media context in which they will work, as well as for journalism M.S. students who do not have a background in journalism.

Offered

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

BGE 501: Communicating Science: Distilling Your Message

Current and future scientists and health professionals will learn to communicate clearly and engagingly with different kinds of audiences, at different levels of complexity, using different forms. We’ll examine the basics of clear, two-way communication, including knowing and being responsive to your audience, overcoming "the curse of knowledge", having a point, avoiding jargon, using storytelling techniques, being personal, asking questions, and introducing complexity in stages. Students will start by crafting a short, controversial statement about their work and why it matters. We’ll expand that to a longer statement, convert it into a brief piece of writing, such as a letter to the editor or a blog post, practice answering questions about it from the public and from the media, plan a public presentation, and learn to apply these skills in the classroom. Skills learned in this course can help scientists and health professionals communicate more effectively with students, potential employers or funders, public officials, family and friends, the press, and colleagues in other disciplines.

JRN501, JRN502, and JRN503 are 1-credit modules, each lasting four or five weeks. Students may take all three consecutively in one semester or may take only one or two.

Fall, 1 credit, Letter graded (A, A-, B+, etc.)

BGE 502: Communicating Science: Writing for the Public

Students will practice writing about specific and health material clearly and vividly, in ways not-scientists can understand. They will learn to use analogies, examples and metaphors to illuminate unfamiliar concepts, practice using numbers clearly and translating statistics into conversational English, learn about scientific terms and concepts that are commonly misunderstood by the public. They will learn to introduce complexity gradually, to avoid overwhelming the reader while not "dumbing down" their material. Students will learn to write for different formats, including blogs, letters to the editor or to funders, and op-edits or commentary pieces.

JRN501, JRN502, and JRN503 are 1-credit modules, each lasting four or five weeks. Students may take all three consecutively in one semester or may take only one or two.

Fall, 1 credit, Letter graded (A, A-, B+, etc.)

BGE 503: Communicating Science: Improvisation for Scientists.

This innovative course uses improvisational theater techniques to help students speak more spontaneously and connect more directly and responsively with their audience and with each other. After warm-up exercises, emphasizing physical freedom and verbal spontaneity, students take part in two- and three-person exercises and situational improvisations that focus on paying attention to your listeners, and altering your approach to meet their needs. At the beginning and end of this course, students will deliver a short oral statement about their research or a scientific topic that interests them, so they can measure their progress. This course is not about acting; it’s about helping current and future scientists and health professionals connect with their audiences. Science graduate students who had several sessions of improvisation training in a pilot session reported communicating better as teachers, researchers, students, and family members. A glimpse of the process can be seen in a short video on the web page of Stony Brook’s Center for Communicating Science: www.stonybrook.edu/journalism/science.

JRN501, JRN502, and JRN503 are 1-credit modules, each lasting four or five weeks. Students may take all three consecutively in one semester or may take only one or two.

Fall, 1 credit, S/U grading

BGE 504: Communicating Science: Using Digital Media

Science and health information increasingly travels by digital media, as new ways emerge for scientists to communicate directly with the public, without the intermediaries of press or public relations. Students will learn how to use blogs, podcasts, Twitter and other forms of social media for two-way communication with different segments of the public, including colleagues in other disciplines. The course will include hands-on instruction in working with digital media, tailored to students' interests and levels of experience.

Offered

Fall, 1 credit, S/U grading

May be repeated 2 times FOR credit.

BGE 505: Communicating Science: Connecting with the Community

Students will learn how to use communication techniques, cultural competency, and health literacy concepts to reach and mobilize the community and key stakeholders on health- and science-related issues related to their research, outreach or community education objectives. The course will incorporate role-playing and community networking skills to help students make connections with key people and groups relevant to their current interests and work. This will require contact with the instructor before the start of the course to discuss students' projects, plans or interests.

Offered

Fall, 1 credit, Letter graded (A, A-, B+, etc.)

BGE 506: Communicating Science: Advanced Writing for the Public

This course is for graduate students in the sciences who have taken JRN 502, Communicating Science: Writing To Be Understood, and want to continue developing and practicing their ability to write about science clearly and vividly for non-expert readers.

Offered
**BGE 510: Graduate Genetics**

This course investigates fundamental aspects of the transmission and expression of genetic information in prokaryotic and eukaryotic systems. The course is organized in a way that allows the students to appreciate the breadth of genetics research, while also gaining an in-depth understanding of selected important topics. Students explore the use of both classical and molecular genetic approaches to understand biological processes in genetics model systems including yeast, flies, worms, mouse, and man.

*Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

**BGE 530: Laboratory Rotation**

The student rotates through laboratories of four different genetics program faculty members during the first year. The selection of the laboratories is made by the student, in conjunction with individual faculty, and with the approval of the program director. By taking part in ongoing projects, the student will learn experimental procedures and techniques and become acquainted with research opportunities in the participating programs. Prerequisite: Permission of instructor

*Fall and Spring, 1-8 credits, S/U grading May be repeated 2 times FOR credit.*

**BGE 531: Graduate Student Seminar in Genetics**

Students have the opportunity to present their research to other students and faculty on an annual basis. Students in the first or second year will present brief seminars as part of a one-day symposium with all of their classmates. Advanced students present research seminars as part of a weekly research seminar series that is attended by faculty and students. Although the first and second year students do not present in the weekly seminar series, they should attend these seminars as it provides an excellent mechanism for learning about current areas of research interest.

*Fall and Spring, 0-1 credits, S/U grading May be repeated for credit.*

**BGE 534: Introduction to Systems Biology**

This course is geared towards teaching essential concepts and computational skills in Systems Biology. The course is centered upon two key programming languages: Matlab for modeling applications and the R language for statistical analysis and sequence manipulation.

*Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

**BGE 550: Genetics Outside Seminar**

Outside seminars and special topics courses in areas relating to genetic studies.

*I-4 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.*

**BGE 599: Graduate Research**

Original investigation undertaken with the supervision of a member of the program.

*Fall and Spring, 1-9 credits, S/U grading May be repeated for credit.*

**BGE 657: Principles of Development**

This course deals with developing systems at all levels from the morphological to the molecular. Illustrative material from both animal and plant kingdoms is used. Special attention is given to gametogenesis, genetic control of early development, transcriptional and translational control of protein synthesis, the role of cell division and cell movements, and cell-to-cell interactions in defining developing systems.

*Prerequisite: MCB 656, matriculation in graduate program or permission of instructor. Fall, 3 credits, Letter graded (A, A-, B+, etc.)*

**BGE 691: Readings in Genetics**

Journal Club on thematic topics in different areas of current genetics research

*Prerequisite: Permission of instructor Fall and Spring, 1 credit, Letter graded (A, A-, B+, etc.) May be repeated for credit.*

**BGE 699: Dissertation Research on Campus**

Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.

*Fall, 1-9 credits, S/U grading May be repeated for credit.*

**BGE 700: Dissertation Research off Campus - Domestic**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.

*Fall, 1-9 credits, S/U grading May be repeated for credit.*

**BGE 701: Dissertation Research off Campus - International**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by second week of classes. The charge will only be removed if other plan is deemed comparable.

*All international students must received clearance from an International Advisor. Fall, 1-9 credits, S/U grading May be repeated for credit.*

**BGE 800: Summer Research**

*May be repeated for credit.*

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**BIO 511: Topics in Biotechnology**

An introduction to the field of biotechnology. The course will survey the history of the development of genetic engineering, methodologies used in biotechnology, applications of biotechnology in medicine, agriculture and manufacturing, and the implications of these technologies for society. Intended for the students in the MAT Science and MALS programs.

*Offered Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

**BIO 515: Current Topics in Microbiology**

A survey of microbiology with an emphasis on microbial ecology, the role of microbes in the biosphere and the methodology used to explore these areas. The course is organized around two resources available online: Unseen Life on Earth: An Introduction to Microbiology, which was produced by The American Society for Microbiology (http://www.learner.org/resources/series121.html) and the New York State core curriculum for The Living Environment (http://www.p12.nysed.gov/ciai/mst/sci/ls.html). Intended for the students in the MAT Science and MALS programs.

*Offered*
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BIO 520: Topics in Genetics**
A survey of genetics organized around a particular topic, including gene regulation, developmental genetics, cancer genetics, epigenetics with emphasis on areas with emerging new insight. The methodology used to study these areas will also be explored. Intended for students in the MAT Biology and PhD Science Education programs.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**BIO 521: Laboratory Science Curriculum Development**
Development of curriculum materials appropriate for a secondary school biology classroom. Students may take this course in their second semester of the Master of Arts in Teaching Science program.
Offered
Fall and Spring, 1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**BIO 542: Model Systems for the Living Environment**
Introduction to microbial model systems used in biological research such as yeast, nematodes and slime molds. Particular attention will be given to using these systems in introductory biology. Students will read and discuss research papers selected from the current scientific literature. Topics to be covered include: life cycle, laboratory techniques and design of inquiry-based investigations.
Offered
Summer, 3 credits, Letter graded (A, A-, B+, etc.)

**BIO 558: Biological Basis of Human Evolution and Behavior**
A exploration of biological theories of human evolution, properties, and behavior. We build an understanding of evolution of complex organisms by natural selection, followed by the emergence of humans as a uniquely complex species. Scientific hypothesis formation and testing using the extensive multidisciplinary empirical record of the 1.8 million years of human history is developed throughout. Implications of human evolutionary biology for contemporary social and sexual behavior are also investigated.
This course is co-scheduled with BIO 558.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**BIO 600: Practicum in Teaching**
Fall and Spring, S/U grading
*May be repeated for credit.*

**BIO 601: Practicum in Teaching**
Fall and Spring, 1-3 credits, S/U grading
*May be repeated for credit.*

**BME**

**Biomedical Engineering**

**BME 501: Engineering Principles in Cell Biology**
Course content is directed toward describing the physico-chemical and biological interactions within cells, and between cells and their environment. The course has two main objectives: 1) to equip students with essential knowledge and stimulate intuitive understanding of molecular and cell biology; 2) to introduce and develop common engineering concepts and approaches for quantitative analysis of physical-chemical systems in context of cell biology. The long-term goal is to help apply their knowledge of long-term and cellular phenomena and the analytical techniques learned in this course to design and development of products and processed for improving help and/or medical care. Therefore, a major component of this course will be an individual project requiring the development of a patent for a biomedical device or process, which relies on one or more of the biological (cell and molecular level) and engineering principles covered in class.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 502: Advanced Numerical & Computation Analysis Applied to Biological Systems**
Numerical analyses of Biological Data. A unified mathematical/time series framework for modeling and mining biological data. Applications range from cardio-respiratory, renal blood pressure/flow and sequence (DNA,RNA, proteins) to gene expression data. Tools of data analysis include linear algebra, interpolation and extrapolation, parametric and nonparametric spectral estimation with the FFT and singular value decomposition, statistical description of data and integration of ordinary differential equations. Special focus will be placed on the use of linear and nonlinear numerical methods for the identification of physiological system dynamics and the development of computer simulation techniques to study dynamic response of physiological systems. Cannot be repeated for credit.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 503: Cell and Molecular Imaging**
This course will cover basics of optics, microscopy, spectroscopy and fluorescence in the context of imaging at the cellular and molecular level. Recently developed advanced imaging techniques for probing protein interactions and live cell functions are also discussed. The course is organized in 3 modules:
3 credits, Letter graded (A, A-, B+, etc.)
*May be repeated 2 times FOR credit.*

**BME 504: Biomaterials Science and Analysis**
Course content is directed toward providing an introductory treatment of the engineering issues implicit in understanding living tissue interactions with processed materials. Emphasis on identifying and eliminating surface contamination, corrosion, and optimizing material surface properties and compatibility.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 505: Principles and Practice of Biomedical Engineering**
Introduces first year students to the basic and clinical research at the cutting edge of biomedical engineering. The course has two key components: the first is a seminar series presented by internationally renowned bioengineers. An interactive discussion of topic-specific scientific literature precedes the formal presentation. The second component of the course is teaming up with a physician, in rounds, the operating theater, clinics, etc., to get exposure to the real-life problems which face the medical community. It is hoped that the mix of science and clinic will move students towards determining how they can make contributions to health and society.
2 credits, Letter graded (A, A-, B+, etc.)

**BME 508: Molecular and Cellular Biomechanics**
Course content revolves around the effects and interactions of mechanical forces at the cellular and molecular level. The topics will range from describing the molecular and cellular basis of the adaptation of tissues to physical signals, to prescribing specific mechanical environments for improved tissue engineering, to delineating relevant molecular, cellular, and biomechanical techniques, all the way to issues involved in the development and approval of diagnostics, and therapeutics in molecular engineering. For a deeper understanding of the course material as well as to allow students to apply their newly gained knowledge, this course will contain a module...
on the design and analysis of experiments (i.e., applied biostatistics) and incorporate practical exercises in both laboratory (e.g., a real time PCR experiment) or simulated computer settings (e.g., modeling of cell behavior). Prerequisite: BME 501 or permission of instructor.

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 509: Fundamentals of the Bioscience Industry**

A 4-module course set up to provide students with a comprehensive introduction to the complexities of the bioscience business environment.

Prerequisite: Must be either a BME or MBA graduate student (West Campus). All other students must obtain permission from the instructor.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 510: Biomechanics**

This course emphasizes the application of continuum mechanics to living tissues and organs in order to describe the material properties and their behavior under loading and stress. The interrelationship between biomechanics and physiology is examined in normal function and in disease processes. This course focuses on the physiology of tissue and organ systems in the context of mechanics, stress, strain, viscoelasticity and material behavior, and the constitutive equations and the field equations governing fluids and fluid flow, with an emphasis on the cardiovascular and musculoskeletal systems. Emphasis is placed on the utilization of engineering principles to analyze processes at the tissue and organ levels, covering soft and hard tissues and organs (blood, cardiovascular system, bone, cartilage, etc.) and to understand how these principles could be applied towards the design and development of prosthetic devices.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 517: Radiation Physics**

This graduate offering provides an initial physical background required for the study of the Medical Physics. Sources of ionizing radiation including radioactivity (natural and manmade) and x-ray producing devices are studied as well as sources of nonionizing radiation such as radiofrequency and ultrasound. The physical aspects of these radiations are characterized by their interaction with matter and methods for their detection. Each student will select and present a proposal for solving a clinical medical physics problem.

Prerequisites: Modern Physics or equivalent
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 518: Radiobiology**

The biological consequences of irradiation (ionizing, ultrasound, laser, RF, etc.) will be examined. Interaction mechanisms will first be examined followed by examination of the radiation impact at the molecular and cellular level. The use of radiation for therapeutic gain will be considered. As well, models will be developed for risk estimates. Topics to be covered will include: target theory, biological response, NSD and risk estimates.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 519: Medical Health Physics**

This course discusses the health physics and safety issues associated with radiological devices, facilities and procedures.

Prerequisite: BME 517.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 520: Lab Rotation I**

**BME 521: Lab Rotation II**

**BME 525: Tissue Engineering**

Course deals with basics of biomaterial formulation that are relevant to tissue engineering, leading to the principles and practice of designing an engineered tissue, which will be facilitated by a design project.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 526: Biological Systems Engineering**

This course is a hands-on study of systems engineering in biology, using computer modeling to conceptualize and simulate a wide variety of applications. All skills taught in class. Appropriate and applicable to all BME tracks. May not be repeated for credit.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 530: Medical Image Formation**

This course covers the physical aspects of medical image formation. Image receptor design/optimization, reconstruction techniques, device hardware and performance characteristics are considered.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 531: Biosensing and Bioimaging**

Basic concepts of biosensing and bioimaging, which include the elements of biological systems and bioimmobilizers, traditional electrode and novel optical transducers, and advanced biomedical optical imaging systems.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 532: Time Series Modeling of Biological Systems**

A unified mathematical/time series framework for modeling and mining biological data. Applications range from cardio-respiratory, renal blood pressure/flow and sequence (DNA, RNA, proteins) to gene expression data. Tools of analysis include neural networks, time-invariant and time-varying spectral methods, fractal and nonlinear dynamics techniques, hidden Markov Model, clustering analysis, and various system identification techniques.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 534: Functional Genomics**

Course provides foundation in concepts of functional genomics and proteomics. Topics include organization and complexity of the mammalian genome and mechanisms of expression of genes, gene expression analysis technologies with a strong focus on construction and utilization of DNA microarrays, and tools for determining gene function by perturbation of gene expression.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 540: Radiation Oncology Physics**

This course provides a background in therapeutic instrumentation, dosimetry and treatment planning.

Prerequisite: BME 517
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 546: Statistical Analysis of Physiological Data**
Statistical methods useful in analyzing common types of physiological data. Topics include probability, data distributions, hypothesis testing, with parametric and non-parametric methods, ANOVA, regression and correlation and power analysis. Emphasis is on experimental design and appropriate, efficient use of statistical software.
1 credit, Letter graded (A, A-, B+, etc.)

**BME 547: Model-Based Analysis of Physiological Data**
The analysis of common biochemical and physiological data by non-linear regression of data models and biophysical models of physiological and biochemical processes. Examples include binding kinetics, compartmental mass transfer and spectral analysis.
1 credit, Letter graded (A, A-, B+, etc.)

**BME 548: Measurement and Analysis in Physiological Research**
The acquisition and analysis of data arising from common biochemical and physiological measurements. Topics include computer-based data acquisition and processing, densitometry, microscopy, and image analysis and processing. Emphasis is on experimental design and strategies for optimizing signal to noise ratio of measurements.
1 credit, Letter graded (A, A-, B+, etc.)

**BME 549: Experimental Techniques in Systems Physiology**
A series of lectures and laboratory exercises designed to introduce students to in vitro experimental techniques used in systems physiology. Emphasis will be placed on the ethical use of rodents in biomedical research and the measurement of physiological variables. Data acquisition and analysis procedures used in cardio-vascular, respiratory, neural and renal physiology will also be covered.
1 credit, Letter graded (A, A-, B+, etc.)

**BME 550: Mathematical Models of Physiological & Biophysical Systems**
An introduction to mathematical modeling of cell and tissue function. Topics include the derivation and numerical solution of models of cell homeostasis, membrane transport and excitability, and cell signaling and metabolism. Grading is based on problems, student presentation, and completion of a modeling project.
3 credits, Letter graded (A, A-, B+, etc.)

**BME 571: Microfluids in Biological Systems**
This course will outline theory and applications of special fluid handling conditions associated with living systems.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 572: Biomolecular Analysis**
This interdisciplinary course is intended for graduate students and advanced undergraduates in departments such as Biomedical Engineering, Chemistry, Physics, Biology and Chemical Engineering. This course will give an introduction to single molecule experiments using fluorescence, optical traps, AFM cantilevers, microneedles, magnetic microbeads as well as micro and nanofluidic devices.
Prerequisites: BME 501 and 502, or instructor approval.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**BME 599: Biomedical Engineering Research**
Research to be supported by a faculty member of the Department of Biomedical Engineering. Students must have permission of instructor to enroll in appropriate section. Faculty to be identified by the student.
Fall and Spring, 1-9 credits, S/U grading
May be repeated for credit.

**BME 601: Cardiovascular Fluid Mechanics**
The course will cover the application of fluid mechanics principles to the analysis of blood flow in the cardiovascular system under normal and pathological conditions. It will follow an historical time line by beginning with the most basic models of arterial blood flow, and proceed to the most advanced theories related to physiology and pathology of blood flow phenomena, including an examination of the most up-to-date research in the area and the development of devices and implants.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 602: Topics in Biomedical Applications of Neural Networks**
This is a project based course which includes weekly seminars discussing advanced topics in fuzzy logic and neural networks and their applications, in biomedical devices. Applications include drug delivery, diagnostics, management information handling. Students utilize simulation software to develop algorithms to deal successfully with training data sets of their own choosing.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 604: Finite Element Modeling in Biology and Medicine**
Both finite difference and FEM are applied to solve the equations of incompressible and compressible fluid flow in porous media with emphasis on flows in skeletal tissues, i.e., bone and cartilage. Steady-state, transient flow, permeability and surface boundary conditions are discussed. Practical and recent studies in the field are also discussed. Programming using FORTRAN or C languages will be required. The student is also introduced to commercially available software packages.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 605: Biomechanics of Tactile Sensory Systems**
Detailed study of the biomechanics of tactile neurophysiology for engineers entering the field of haptics and robotics manipulations. Anatomy and electrophysiology of transducer cells and neurons starting at the fingertips and extending to the somatosensory cortex. Characteristics of the external stimulus and its peripheral transformation. Relations of these topics to perceptual and/or behavioral responses.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 606: Drug Gene Delivery**
Applications of biodegradable and biocompatible polymers in the design of drug and gene delivery systems for site-specific applications. A broad overview on the origin and development of controlled release therapeutic devices will be provided. Existing and proven commercial products will be examined. The second half of the course will be devoted to the use of DNA as a therapeutic entity and issues relevant to DNA delivery will be explored. An assessment of the most up-to-date DNA delivery technologies will be presented. Students are required to write a term paper on a drug or gene delivery topics of their choice. Students are also expected to give presentations on drug delivery and gene therapy related topics during the course.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 608: Contemporary Biotechnology**
General discussion on the nature of biotechnology and its historical development, applications, impact, consequences, and some of the social and ethical considerations.
Co-scheduled with BME 402
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 610: Magnetic Resonance**
This course provides a comprehensive study of magnetic resonance and its applications in medical imaging. An introduction of NMR is followed with development of the hardware and processing aspects required for MR image formation. An overview of basic and advanced MR imaging techniques is provided. Each student will select a topic in MR imaging for presentation at the conclusion of the course.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 611: Positron Emission Tomography**

Positron emission tomography (PET) is a unique and powerful functional imaging method used in the clinic and in medical research. It is a multidisciplinary endeavor involving the fields of chemistry, physics, mathematics and medicine. This course addresses the disparate areas of science underlying PET imaging, including radioisotope production, radiotracer synthesis, the physics of the imaging process, quantitative data processing, image reconstruction approaches, data analysis, and tracer kinetic modeling to extract quantitative physiological parameters. Radioactive validation and applications of PET will also be covered including the area of drug addiction. There is a hands-on component in which students will visit an active PET research center and acquire and manipulate PET data.

3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 1 times FOR credit.

**BME 612: Biomedical Engineering Aspects for the Use of Radiation in Medicine**

This course provides a comprehensive study of the use of radiation in medicine. Physical aspects of the interaction of radiation with matter and for the radiation production are initially considered. The underlying principles of current radiation based medical imaging is considered next. Topics include radiography, fluoroscopy, radionuclide imaging and computed tomography. The use of radiation for the treatment of malignancy is considered with the focus on required technology. Finally advanced applications of radiation are considered with focus on imaging and treatment. Each student will select a topic examining the engineering or technical application of radiation in medicine for presentation at the conclusion of the course.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**BME 615: Clinical Nuclear Imaging**

This course is designed to prepare the Medical Physics graduate student in the area of clinical Medical Imaging. In this clinical rotation, medical physics methods for: planar film, DR, CR, mammography, fluoroscopy, CT, ultrasound and MRI performance evaluations will be introduced. In addition, basic medical ethics, radiographic anatomy and radiation safety will be covered. A total of 200 clinical hours will be completed in this program.

Prerequisites: BME 517; BME 518; BME 519; BME 530 or BME 540.

Fall, 4 credits, SU grading

May be repeated 2 times FOR credit.

**BME 616: Clinical Nuclear Medicine Imaging**

This course is designed to prepare the Medical Physics graduate student in the area of clinical Nuclear Medicine Imaging. In this clinical rotation, the students will be exposed to radionuclide processes, radiopharmaceuticals, radioactive gases and aerosols, characteristics and radiation dosimetry, in vitro and in vivo radiation detection systems, imaging systems and their performance evaluations. In addition, basic medical ethics, clinical interpretations and radiation safety will be covered. A total of 150 clinical hours will be completed in this program.

Fall, 4 credits, SU grading

May be repeated 2 times FOR credit.

**BME 617: Clinical Radiation Oncology Physics**

This course is designed to prepare the Medical Physics graduate student in the area of clinical radiation oncology physics. In this clinical rotation, the student will learn by observation and participation some of a selection of the following medical physics procedures: LINAC Beam Dosimetry (ion chamber measurement techniques, film dosimetry (radiographic and radiochromic), diode dosimetry, TLD dosimetry, water phantom scanning), implementation of photon and electron beam calibration protocols (AAPM TG51), LINAC beam data measurement and tabulation, commissioning a TPS system, LINAC, acceptance testing, LINAC monthly QA, HDR QA and planning, and IMRT inverse planning and IMRT clinical QA. A total of 120 clinical hours will be completed in this program. Prerequisite: BME 517 and BME 540 with a B+ or better.

Spring, 4 credits, S/U grading

**BME 620: Space Radiation Biology**

An extensive series of lectures, training sessions and laboratory activities sponsored by NASA’s Radiation Health Program in collaboration with BNL. The material is oriented to cover basic and state of the art concepts in space radiation environment, physics and radiobiology. Content includes basic concepts in physics, dosimetry, radiobiology, space radiation problems and accelerator operations. Concurrent sessions are provided to complete specific BNL training and plan and prepare experiments for low- and high-LET radiation exposures. Students are trained in NSRL operations and are able to run control experiments using gamma rays in preparation for NSRL runs, and subsequently experiments at the NSRL using heavy ions. Data are obtained from different endpoints are discussed and analyzed with the instructors. Homework are used to test the student’s level of comprehension of the lectures and laboratory activities. The write up of a full BNL beam time request proposal is required of each student.

4 credits, Letter graded (A, A-, B+, etc.)

**BME 690: Biomedical Engineering Research**

Biomedical Engineering research for doctoral students who have already received their M.S. degree, but have not yet advanced to candidacy.

Fall and Spring, 1-9 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

**BME 698: Practicum in Teaching**

Undergraduate teaching to be supervised by a faculty member of the Program in Biomedical Engineering. Course to be identified by the student and graduate studies director.

Fall and Spring, 1 credit, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

**BME 699: Dissertation Research on Campus**

Prerequisite: Students must be advanced to candidacy (G5); permission of instructor and enroll in appropriate section. Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.

Fall, 1-9 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

**BME 700: Dissertation Research off Campus - Domestic**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate programs.
BNB 551: Writing Neuroscience
Seminar course for doctoral students in Neuroscience providing practical instruction in written communication in Neuroscience. Topics include writing effective abstracts, cover letters, figure captions, and grant specific aims, among others.
2 credits, Letter graded (A, A-, B+, etc.)

BNB 552: Neurobiological Techniques
A series of laboratory exercises designed to give students hands-on experience in the basic laboratory techniques of contemporary neuroscience. Includes intracellular and extracellular recording, neuronal tissue culture, neuroanatomical techniques, and integrative physiology.
Fall, 2 credits, Letter graded (A, A-, B+, etc.)

BNB 555: Laboratory Rotations in Neuroscience
Course for doctoral students in Neuroscience in which students participate in three formal laboratory rotations in program faculty laboratories during the first year. Student make oral presentations for each rotation. Instruction is provided in how to organize and present material in a seminar format, including the proper use of visual aids. Enrollment restricted to students in the Graduate Program in Neuroscience.
May be repeated 2 times FOR credit.

BNB 560: Introduction to Mammalian Neuroanatomy
This course consists of visual presentations and supplemental lectures providing an overview of the structural organization of the nervous system. The mammalian nervous system and its sensory, motor and cognitive components are emphasized. Opportunities for examination of whole brains and historical sections, and some hands-on experience with basic neuroanatomical techniques may also be available.
1 credit, Letter graded (A, A-, B+, etc.)

BNB 561: Introduction to Neuroscience I
First of a two semester core course introducing students to basic principles of neuroscience. The major focus is cellular and molecular neuroscience. Topics covered include the ionic basis of resting potentials and electrical excitability, the structure, function and molecular biology of voltage- and ligand-gated ion channels, exocytosis, cellular networks, and gene regulation.
4 credits, Letter graded (A, A-, B+, etc.)

BNB 562: Introduction to Neuroscience II
Second of two-semester core course introducing students to basic principles of neuroscience. The major focus is systems neuroscience. Topics covered include analyses of all major sensory systems, motor systems, and systems mediating higher order, cognitive functions in the nervous system.
4 credits, Letter graded (A, A-, B+, etc.)

BNB 563: Advanced Topics in Neuroscience, I
This course includes one to three separate modules taught by different faculty on focused topics in neuroscience.
1 credit, Letter graded (A, A-, B+, etc.)

BNB 564: Advanced Topics in Neuroscience II

BNB 565: Neuropharmacology
An advanced course for graduate students interested in developing an understanding of neuropharmacology and research on this topic. Following a general introduction to the nerve cell structure, synaptic and chemical transmission, three themes receptors, receptors as channels, and G-protein-coupled receptors are developed. Recent advances in cell and molecular biology provide the framework for instruction and discussion. This course is offered as both HBH 655 and BNB 655.

BNB 566: Neurobiology of Disease
This advanced seminar course is coordinated with the Neurobiology of Disease lecture series hosted by the Program in Neuroscience each Spring semester. The Program invites 5-6 distinguished scientists to present research seminars organized around the broad topic of neurobiological and neurological diseases. Students read and discuss papers recommended by the guest speakers. This course also provides students the opportunity to meet with the guest seminar speakers.
Offered Spring, 1 credit, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

BNB 597: Seminar Themes
This course focuses on current research topics in neuroscience and is integrated with the Neuroscience Seminar Series. It is centered on a common research theme. Students discuss manuscripts, attend seminars and meet with outside speakers.
Offered Fall/Spring, 1 credit, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

BNB 599: Research
Original investigation undertaken with supervision of a member of the staff.
Fall and Spring, 1-12 credits, S/U grading
May be repeated for credit.

BME 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

BME 800: BME RESEARCH
Full-time summer research.
S/U grading
May be repeated for credit.

GRADUATE COURSE DESCRIPTIONS Fall 2013

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BNB 800: SUMMER RESEARCH
May be repeated for credit.

BSB

Biochemistry and Structural Biology

BSB 509: Experimental Biochemistry and Structural Biology
An introduction to modern biochemical research techniques. The student spends a half-semester in the laboratory of each of four different members of the faculty. In each laboratory, the student participates in some aspect of the research being pursued by the faculty member.
Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Fall and Spring, 1-6 credits, Letter graded (A, A-, B+, etc.)

BSB 510: Experimental Biochemistry and Structural Biology
An introduction to modern biochemical research techniques. The student spends a half-semester in the laboratory of each of four different members of the faculty. In each laboratory, the student participates in some aspect of the research being pursued by the faculty member.
Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Fall and Spring, 1-6 credits, Letter graded (A, A-, B+, etc.)

BSB 512: Structural Biology and Spectroscopy
Theoretical principles and experimental methods used in the study of proteins and nucleic acids, e.g., spectroscopy, magnetic resonance and diffraction.
Prerequisites: MCB 520, or undergraduate physical chemistry course, plus matriculation in graduate program or permission of instructor.
Fall, 2 credits, Letter graded (A, A-, B+, etc.)

BSB 515: Computational Methods in Biochemistry and Structural Biology
Computational methods used in sequence searching and analysis, bioinformatics, graphical analysis of proteins, and nucleic acids. Prerequisite: This class is restricted to first year BSB, HBM, MCB PHD, & HBH PhD students. Exception requires approval from the course instructor.
Fall, 1 credit, S/U grading

BSB 532: Journal Club in Biochemistry and Structural Biology
Provides students with a forum for acquiring skills involved in the critical analysis and presentation of scientific data by active participation in seminars of major topics in structural biology and biochemistry, and critical discussion of selected topics with presentation of papers from the literature.
Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Spring, 1 credit, Letter graded (A, A-, B+, etc.)

BSB 580: Advanced Structural Biology/Structural Methods in Drug Discovery
This course is designed for students that want to gain theoretical and practical experience in macromolecular structure determination through NMR spectroscopy and/or X-ray crystallography. The course is organized into two modules: NMR spectroscopy and X-ray crystallography. Students may elect to take one or both modules. Emphasis will be placed on practical aspects of structural determination, including sample preparation, data collection and processing. In each of the modules, students will be guided through a complete structural determination project. A final project report per module will be required. Familiarity with Linux is desirable. Students are encouraged to contact instructors prior to enrolling. Crosslisted as BSB580 and HHB585.
Spring, 0-4 credits, S/U grading

BSB 581: Teaching Honors
Selected students whose performance in the basic required courses for the graduate program is in the top 10 percent conduct tutorials for first-year graduate students in the program and other students taking graduate courses for credit. The tutors are supervised and graded by faculty of the graduate program. Successful completion of this course makes students eligible to receive “Honors in Teaching” on their transcripts.
Fall and Spring, 1 credit, S/U grading

BSB 599: Research
Original investigation undertaken with the supervision of a faculty member.
Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Fall and Spring, 1-12 credits, S/U grading. May be repeated for credit.

BSB 601: Colloquium in Biochemistry and Structural Biology
A weekly series of talks and discussions by visiting scientists covering current research
and thinking in various aspects of structural biology and biochemistry.

Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Fall, 0-1 credits, S/U grading
May be repeated for credit.

BSB 602: Colloquium in Biochemistry and Structural Biology

A weekly series of talks and discussions by visiting scientists covering current research and thinking in various aspects of structural biology and biochemistry.

Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Spring, 0-1 credits, S/U grading
May be repeated for credit.

BSB 603: Student Seminars in Biochemistry and Structural Biology

Seminars given by graduate students on the progress of their own thesis research. Required of all students every semester in which they are registered in the Graduate Program in Biochemistry and Structural Biology. Attendance is mandatory. Visitors are welcome.

Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Fall and Spring, 1 credit, S/U grading
May be repeated for credit.

BSB 604: Student Seminars in Biochemistry and Structural Biology

Seminars given by graduate students on the progress of their own thesis research. Required of all students every semester in which they are registered in the Graduate Program in Biochemistry and Structural Biology. Attendance is mandatory. Visitors are welcome.

Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Fall and Spring, 1 credit, S/U grading
May be repeated for credit.

BSB 699: Dissertation Research on Campus

Original investigations undertaken as part of the Ph.D. program under supervision of a research committee.

Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, or at the Brookhaven National Laboratory. Fall, 1-9 credits, S/U grading
May be repeated for credit.

BSB 700: Dissertation Research off Campus - Domestic

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.

Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Fall, 1-9 credits, S/U grading
May be repeated for credit.

BSB 701: Dissertation Research off Campus - International

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.

Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. Fall, 1-9 credits, S/U grading
May be repeated for credit.

BSB 800: SUMMER RESEARCH

Prerequisite: Must be matriculated in BSB Graduate Program or permission of instructor. S/U grading
May be repeated for credit.

CHE 501: Instrumental Methods in Chemistry

Practical and theoretical aspects of instrumentation in chemistry. The primary emphasis is on contemporary methods of molecular structure determination such as X-ray crystallography, NMR, IR, and MS. Other topics may also be presented.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 502: Mechanisms and Strategies in Organic Synthesis

This course will focus on (1) the meaning and practice of writing organic reaction mechanisms and (2) standard synthetic reactions, their mechanisms, and modern refinements. Examples and applications will be presented. The course will also discuss biomimetic syntheses and the use of mechanism in designing total syntheses.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 503: Synthetic Organic Chemistry

A survey of the most important organic reactions from the viewpoint of synthetic utility, including many recent innovations in this field. Throughout the discussion of these methods, emphasis is placed upon their use in the synthesis of complex organic structures.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 504: Structure and Reactivity in Organic Chemistry

Electronic and stereochemical theories relating to organic structure and reactions. Topics such as bonding, strain, aromaticity, MO theory, molecular rearrangements, pericyclic reactions, and photochemistry are covered. This course is intended to provide a foundation of knowledge at the beginning graduate level as preparation for advanced subjects in CHE 502 and CHE 503, and is complementary to CHE 501.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 511: Structural Inorganic Chemistry

Properties and reactions of inorganic compounds are considered from the viewpoint of molecular and electronic structure. The modern bonding theories used in inorganic chemistry including molecular orbital, valence bond, and ligand field theories are developed using symmetry and group theory. Selected main group, transition metal, and organometallic compounds are discussed. An introduction to crystallography and solid-state structure is included.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 514: Transition Metal Chemistry

A survey course with an emphasis on the transition metals. Reaction mechanisms, synthesis, and structure are covered. Specific areas of concern include coordination chemistry, organometallic chemistry, bioinorganic chemistry, and selected topics from solid-state and non-transition metal chemistry.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
CHE 515: Advanced Inorganic Chemistry
A topical course with an emphasis on the current literature. Subject matter varies and is announced in advance. Possible subjects include reaction mechanisms, organometallic chemistry, bioinorganic chemistry, and physical inorganic chemistry. May be repeated as the subject matter varies.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CHE 516: Solid-State Chemistry
This course will provide an introduction to structure and bonding in solid materials. This class will survey the important structural classes of periodic solids and will discuss space groups and the crystallographic symmetry elements important to these materials. Topics that will be covered may include, but are not limited to: (i) The mechanisms by which crystals grow and common types of defects. (ii) An introduction to the basics of band theory. (iii) An overview of the important synthetic methods for preparing solid state materials in nanocrystalline, powder, thin film, and single crystal form. (iv) A survey of the important techniques for assessing the composition, homogeneity, and crystallinity of materials (such as SEM, TEM, AFM, STM), with an emphasis on powder x-ray diffraction.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 517: Structural Chemistry
Much of chemistry is concerned with the properties of atoms and molecules that are too small to see directly. This course will cover a variety of advanced techniques for elucidating the atomic-scale structure of molecules and periodic solids. A central technique is diffraction, which probes periodic arrays. The mathematical basis for diffraction will be presented, followed by practical examples of obtaining atomic coordinates from diffraction data (powder and/or single crystal). Other techniques that may be covered include the analysis of local structure in partially ordered or disordered solids (via techniques such as PDF, EXAFS, small angle scattering, or solid state NMR), and the basis of more complex diffraction experiments (neutron/ electron diffraction, energy-dispersive/Laue diffraction, and diffraction under extreme pressure/temperature conditions).
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 518: Materials Chemistry
Our high technology world is driven forward by advances in materials chemistry. This class will discuss the origin of this technology, covering the synthesis, structures, and properties of advanced materials. These materials will be studied from a multidisciplinary perspective, since the knowledge required for their development spans more than one traditional academic discipline. This class will focus on broad topics with great current societal importance (energy, computing, nanoscience, etc.), and will discuss the materials at the heart of our present technology as well as novel classes of materials being developed for future technology applications. Specific topics may include batteries, fuel cells, catalysts, metallic conductors, semiconductors, superconductors, permanent magnets, magnetic films.
Co-listed with CHE 378
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 521: Quantum Chemistry I
Quantum theoretical concepts are discussed. Schrödinger wave mechanics and related mathematical techniques are illustrated by treatment of systems of chemical interest. Designed to form the theoretical basis for the study of chemical bonding, molecular structure, spectroscopy, and molecular collision phenomena.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 522: Molecular Spectroscopy
A detailed description of the theory and practice of molecular spectroscopy. Topics include the interaction of molecules with electromagnetic radiation and the time evolution of molecular energy states.
Prerequisite: CHE 521
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 523: Chemical Thermodynamics
A rigorous development of the fundamentals of thermodynamics and its application to a number of systems of interest to chemists, such as electrochemical cells, gases, and homogeneous and heterogeneous equilibrium. An introduction to statistical mechanics will also be included.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)

CHE 524: Magnetic Resonance
This course provides an introduction to the fundamental quantum mechanics of the magnetism of spin-1/2 (and higher) particles. It includes a study of the Bloch equations (the responses of the magnetism to continuous-wave and pulsed irradiation) and a discussion of the experimental hardware and techniques commonly employed. Topics covered include the basics of the spin Hamiltonian (chemical shifts, J, dipolar, and quadrupolar couplings), dynamics and relaxation 1-D spectroscopy (spin and chemical exchange, lineshapes, spin echoes, etc.), 2-D spectroscopy (homonuclear and heteronuclear correlation), techniques for studies of solids and liquid crystals (magic angle spinning, cross polarization, quadrupolar echo), and the principles of magnetic resonance imaging. Applications to the biological and material sciences, as well as chemical problems, will be discussed.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 525: Theoretical Chemistry
This course stresses the physical theory underlying chemical phenomena. Special emphasis is given to advanced topics in electronic structure theory, molecular dynamics, condensed matter and surfaces, many-body and quantum ensemble theory, and the interaction of light and molecules.
3 credits, Letter graded (A, A-, B+, etc.)

CHE 528: Statistical Mechanics
Statistical theory of equilibrium systems and rate processes. Ensemble theory, spatial and time correlation functions. Model systems and methods of estimating their properties. Designed to enable the student to use the current literature dealing with application of statistical mechanics to problems in chemistry.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 530: Physical Chemistry of Macromolecules
An investigation of the gross and fine structures of macromolecules and molecular aggregates in solution as revealed by hydrodynamic behavior (e.g., ultracentrifugation, viscosity), light scattering, spectroscopic properties (e.g., ultraviolet hypochromism, circular dichromism, Raman, fluorescence, magnetic resonance spectra), and the thermodynamics and kinetics of interaction with small molecules and ions. Theory of conformation changes and phase transitions.
3 credits, Letter graded (A, A-, B+, etc.)

CHE 535: Introduction to Computational Structural Biology and Drug Design
This course will provide an introduction to Computational Structural Biology with application to Drug Design. Methods and applications that use computation to model
The use of molecular concepts and methodology to solve problems in biology and medicine. The course covers methods to elucidate and control biological systems. Possible topics include chemical genomics, metabolomics, and chemotherapeutics.

Prerequisite: CHE 542
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 558: Physical Biology
This is a course on the principles of physical chemistry. We describe the nature of the forces and energies and entropies that drive molecular systems toward their states of equilibrium. We consider a broad range of applications throughout chemistry, biology, materials engineering and nanoscience. This course aims to give students an understanding of how the actions and behaviors of materials arise from their atomic and molecular structures. Co-listed with PHY 558
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 559: Biological Dynamics and Networks
This course gives the foundations for systems biology. First, we discuss dynamical properties of chemical and biochemical networks, particularly in cells. Second, we give a broad introduction to the emerging science of networks # including the internet, transportation systems, social nets such as Facebook, networks of disease propagation and others. We apply the principles learned on those systems to the networks of biochemical reactions in cells. Our aim is to prepare students to better understand the properties of cells and the principles for drug discovery of the future.
Co-listed with PHY 559
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CHE 580: Chemical Demonstrations
The design and implementation of demonstrations to illustrate modern concepts of chemistry.
3 credits, Letter graded (A, A-, B+, etc.)

CHE 595: Scientific Computing
The basic methods of numerical analysis as well as the design of computer programs that use them are discussed within the framework of solving a variety of exciting problems chosen from all areas of science. The presentation makes extensive use of powerful scientific computational environments, such as Mathematica and Matlab, but guidance to other scientific high-level computer languages is also provided. No previous knowledge of computer programming is assumed.
2 credits, Letter graded (A, A-, B+, etc.)

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin
CHE 598: Professional Masters Internship
Participation in private corporations, public agencies, or non-profit institutions for research and other experiential training activities related to the completion of a Master term paper. Students will be required to have a faculty coordinator as well as a contact in the outside organization, to participate with them in regular consultations on the project, and to successfully complete CHE 590. Prerequisites: Permission of Master's Program Director. 0-12 credits, S/U grading May be repeated for credit.
Offered
Fall, 0-12 credits, S/U grading
May be repeated for credit.

CHE 599: Research
Fall, 1-12 credits, S/U grading
May be repeated for credit.

CHE 602: Special Topics in Physical Organic Chemistry
The subject matter varies depending on interests of students and staff. It may cover such areas as photochemistry, theoretical organic chemistry, and the chemistry of unstable intermediates; the emphasis is on fundamental considerations and recent developments.
1-12 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CHE 603: Special Topics in Bioorganic Chemistry
The subject matter varies depending on interests of students and faculty. Possible topics include asymmetric synthesis and natural product synthesis.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CHE 606: Special Topics in Synthetic Chemistry
May be repeated for credit.

CHE 607: Modern Drug Design & Delivery
A seminar course covering modern aspects and approaches to drug design. This course combines presentations by faculty and by industry representatives to provide a cross-disciplinary view of the development of pharmaceuticals.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)

CHE 610: Practicum in Teaching
Practice instruction in chemistry at the undergraduate level, carried out under faculty orientation and supervision. A minimum of two semesters of CHE 610 or 611 is required of all candidates for graduate research degrees in chemistry, unless explicitly waived by the chairperson.
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CHE 611: Practicum in Teaching
Practice instruction in chemistry at the undergraduate level, carried out under faculty orientation and supervision. A minimum of two semesters of CHE 610 or 611 is required of all candidates for graduate research degrees in chemistry, unless explicitly waived by the chairperson.
Fall and Spring, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CHE 619: Critical Readings of Current Topics in Chemistry
Recent research papers from the literature will be analyzed in depth. These papers may originate from the inorganic, organic, physical, and/or biochemical literature. The exact topic of the course is announced in advance. Fall and Spring
0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CHE 625: Molecular Structure and Crystallography
Experimental methods in the determination of molecular structure. The emphasis is on the determination of structure in the solid state, particularly by X-ray crystallography. Students complete a single-crystal molecular structure determination using modern diffractometer techniques.
3 credits, Letter graded (A, A-, B+, etc.)

CHE 641: Organometallic Chemistry
A systematic presentation of the chemistry of organometallic compounds, particularly those of the transition metals. Topics include structure, bonding, reaction mechanisms, synthesis, and applications in catalysis and organic synthesis.
3 credits, Letter graded (A, A-, B+, etc.)

CHE 682: Special Topics in Inorganic Chemistry
Subject matter varies, depending on interests of students and staff, but covers recent developments in inorganic chemistry.
0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CHE 683: Special Topics in Physical Chemistry
Subject matter varies, depending on interests of students and staff, but covers recent developments and advanced topics in physical chemistry.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CHE 690: Internship in Dissertation-Related Research
Supervised curricular training in dissertation-related research. Prerequisite: For full-time: Summer session or advancement to candidacy; Permission of Graduate Program Director.
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

CHE 693: Physical Chemistry Seminar
Fall and Spring, 0-12 credits, S/U grading
May be repeated for credit.

CHE 694: Biological Chemistry Seminar
Fall and Spring, 0-12 credits, S/U grading
May be repeated for credit.

CHE 695: Inorganic Chemistry Seminar
Fall and Spring, 0-12 credits, S/U grading
May be repeated for credit.

CHE 696: Organic Chemistry Seminar
Fall and Spring, 0-12 credits, S/U grading
May be repeated for credit.

CHE 697: Seminar in Physical and Quantitative Biology
Fall and Spring, 0-1 credits, S/U grading.
0-1 credits, S/U grading
May be repeated 1 times FOR credit.

CHE 698: Colloquium
Fall and Spring, 0-12 credits, S/U grading
May be repeated for credit.

CHE 699: Dissertation Research on Campus
Fall and Spring, 0-12 credits, S/U grading
May be repeated for credit.

CHE 699: Dissertation Research off Campus
Prerequisite: Must be advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

CHE 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven
National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

CHE 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver before second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must receive clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

CHE 800: SUMMER RESEARCH
May be repeated for credit.

CLT

Comparative Literature

CLT 501: Theories of Comparative Literature
This course provides a survey of literary theory and its role in the formation of comparative literature as a discipline.
3 credits, Letter graded (A, A-, B+, etc.)

CLT 509: History of Literary Criticism
A history of literary theory from classical Greece to Freud. Offered Fall/Spring.
3 credits, Letter graded (A, A-, B+, etc.)

CLT 597: Directed Readings for M.A. Students
A student and faculty member agree on a corpus of texts to read and discuss at weekly or biweekly meetings. The reading list must be filed with the program's form before the add/drop period ends. May be repeated for credit.
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

CLT 599: Independent Study
A student and faculty member agree on a topic not offered in any seminars and a reading list to study at weekly or biweekly meetings.
A final research paper or major annotated bibliography will be required. The syllabus must be filed with the program's form before the add/drop period ends. May be repeated for credit.

Only three credits of Independent Study can be counted toward the M.A. requirements, and a maximum of six toward the Ph.D
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CLT 600: Seminar in Stylistics
Changing topics in the study of stylistic and structural elements of the literary text.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CLT 601: Seminar in Literary and Cultural Theory
Changing topics in the specialized examinations of recent or historical trends such as semiotics, Marxism, reader-response, psychoanalysis, hermeneutics, deconstruction.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CLT 602: Interdisciplinary Seminar
Specific problems in the relations between literature and other disciplines.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CLT 603: Comparative Studies in Literary History
Changing topics in the study of literary periods and styles.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CLT 604: Comparative Studies in Genre
Changing topics in the study of the history and theory of literary genres.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CLT 605: The Experience of Speech in Literature and Psychoanalysis: Marcel Proust
By reading In Search of Lost Time (Remembrance of Things Past) in light of the Proustian experience of France's literary but also political history, and with regard to Freud's work on sublimation, this seminar proposes to raise the question: Is literature still possible as an experience today?

Co-requisite: Students must co-enroll in 1.5 credits of CLT directed readings (or other) Spring, 1.5 credits, Letter graded (A, A-, B+, etc.)

CLT 607: Major Authors in Comparative Context
Critical and comparative examination of two or more major figures from different literary or other aesthetic traditions. Recent topics have included "Kristeleva", Dostoevsky and the West", and "European Realisms" Offered Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CLT 608: Cross-Cultural Perspectives
Key topics in genre, literary criticism, and methodology from a cross-cultural perspective. Emphasis will be placed on an examination of differences as well as similarities. Presuppositions of specific literary traditions will be questioned within the broader perspectives of philosophical and religious valences.
3 credits, Letter graded (A, A-, B+, etc.)

CLT 609: Topics in Cultural Theory
Emphasis on diverse specialist areas in cultural and critical theory. Course content will vary depending upon instruction.
Offered Fall/Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CLT 608: Cultural Studies Research Seminar
In addition to readings on issues, debates, and problems within the profession and field of Cultural Studies students will develop research for publication while engaging with practices of professionalization.
Offered Fall/Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

CLT 690: Directed Readings for Doctoral Candidates
A student and faculty member agree on a corpus of texts to read and discuss at weekly or biweekly meetings. The reading list must be filed with the program's form before the add/drop period ends. May be repeated for credit.
Fall and Spring, 1-12 credits, S/U grading
May be repeated for credit.

CLT 696: Self-Directed Readings
For doctoral students who have completed all course requirements and wish to dedicate themselves to full or part-time preparation for the Comprehensive Examination.

**Fall and Spring, 3-9 credits, S/U grading**

May be repeated 6 times FOR credit.

**CLT 698: Practicum in Teaching**

The course is divided into two parts: one half is normally given in the fall, one in the spring. The first part deals primarily with matters of pedagogy. The second part is designed to help students plan their own undergraduate courses. The practicum is required of all students during their first year.

3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 2 times FOR credit.

**CLT 699: Dissertation Research on Campus**

Prerequisite: Advancement to candidacy (G5).

A portion of dissertation research must take place on SBU campus.

Fall, 1-9 credits, S/U grading

May be repeated for credit.

**CLT 700: Dissertation Research off Campus - Domestic**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.

Fall, 1-9 credits, S/U grading

May be repeated for credit.

**CLT 701: Dissertation Research off Campus - International**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must received clearance from an International Advisor.

Fall, 1-9 credits, S/U grading

May be repeated for credit.

**CLT 800: SUMMER RESEARCH**

May be repeated for credit.

**CLT 850: SUMMER TEACHING**

May be repeated for credit.

**CSE**

**Computer Science**

**CSE 500: Patterns in Programing**

This course provides an introduction to programming patterns often encountered in software systems. It presents the role of patterns and introduces patterns used by computer scientists and software engineers. The course covers a wide breadth of program types including user interfaces, numerical computing, event handling, and use of varied data structures. Patterns developed during the course are predominantly object-oriented patterns, including factory, facade, and many others. Not accepted for credit toward M.S. degree

Prerequisite: permission of instructor

3 credits, Letter graded (A, A-, B+, etc.)

**CSE 502: Computer Architecture**

Topics covered include instruction pipelines and memory caches to improve computer performance; instruction-level parallelism; machines: superscalar versus VLIW; cache and main memory hierarchy design tradeoffs; compiler optimizations to speed pipelines; low-power computer system design; processor, OS, and compiler support; graphics, DSP, and media processor design; disk I/O system design; interconnections and networking; and introduction to parallel architecture. Advanced topics include asynchronous microprocessors; FPGA-based reconfigurable computing; system on a chip; embedded processors; intelligent RAM and superconducting computers.

Prerequisite: CSE 345

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**CSE 504: Compiler Design**

This course covers advanced topics in compilation, including memory management, dataflow analysis, code optimization, just-in-time compilation, and selected topics from compilation of object-oriented and declarative languages.

Prerequisites: CSE 304 and CSE 307

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**CSE 505: Computing with Logic**

The course explores logic-based computing and logic programming. It includes an introduction to programming in logic, covering basic techniques for solving problems in a logic programming system. Particular attention will be paid to user interface issues and how a logic system can provide a useful computing environment. The course covers implementation issues, emphasizing how a logic programming system generalizes both traditional programming language systems and traditional database systems.

3 credits, Letter graded (A, A-, B+, etc.)

**CSE 506: Operating Systems**

This course is an in-depth study of important concepts and techniques found in modern computer operating systems. An undergraduate course in operating systems is a prerequisite. The course focuses on in-depth study of such important issues as virtual memory, file systems, networking, and multiprocessor support, with an eye to recent directions in these areas. Textbook readings are supplemented where appropriate by papers from the research literature. An important part of the course is the case study of an actual operating system. Students study the source code for this operating system and do programming exercises and projects that involve modifying the operating system and measuring its performance.

Prerequisite: CSE 306

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**CSE 507: Introduction to Computational Linguistics**

Overview of computational approaches to language use. Core topics include mathematical and logical foundations, syntax, semantics and pragmatics. Special topics may include speech processing, dialog system machine translation information extraction and information retrieval. Statistical and traditional approaches are included. Students will develop familiarity with the literature and tools of the field.

Prerequisites: CSE 537; CSE 541 recommended

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**CSE 508: Network Security**


Prerequisite: CSE/ISE 310, or CSE 346 or equivalent.
CSE 509: Computer System Security
3 credits, Letter graded (A, A-, B+, etc.)

CSE 510: Hybrid Systems
Hybrid systems combine discrete state-machines and continuous differential equations and have been used as models of a large number of applications in areas such as real-time software, embedded systems, robotics, mechatronics, aeronautics, process control and biological systems. The course will cover the state-of-the-art modeling, design and analysis of hybrid systems.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 511: Brain and Memory Modeling
An introduction to brain modeling. Neuroscience topics include major brain structures, constituent glia and neurons, and synapses connecting neurons; how excited neurons send ionic firing spikes to other neurons; synapse changes during learning and forgetting; connection structures for stable ionic activity in neural networks; and distributed firing patterns underlying memory, perception, and thought. Computing topics include efficient methods for modeling electrical activity in single neurons using NEURON and in networks of millions of neurons using discrete event simulation.
Participants will code simulations or use neuroscience experience to refine brain models.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 512: Machine Learning
A course on the fundamentals of machine learning, including basic models, formulations and modern methods. Topics include validation, classification, regression, clustering, component analysis and graphic models.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 515: Introduction to Transaction Processing Systems
Discusses transaction processing systems. Topics covered include models of transactions, including nested transactions and workflow; architectures of transaction processing systems, including client-server, two-tiered and three-tiered architectures; concurrency controls for conventional and relational databases including two-phase locking and the SQL isolation levels; logging and recovery; distributed transactions including the two-phase commit protocol; replication; Internet commerce, including encryption, the SSL and SET protocols, goods atomicity, and electronic cash.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 522: Special Project in Computer Science
Project in a sub-discipline of Computer Science, including but not limited to, computer architecture, operating systems, programming languages, compilers, artificial intelligence, networking, computer graphics, data mining, databases, computer vision, visualization, computer security, mobile computing, parallel processing, logic programming, hybrid systems, simulation and modeling, computational biology, and multimedia.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 523: Advanced Project in Computer Science I
First part of an advanced project in computer science that will extend over two semesters. The student starts the project in one semester by registering for CSE523 and completes the project in a following semester by registering for CSE524. CSE523/524 sequence must be on the same project under the direction of the same advisor. The student must identify a faculty advisor before registering.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 524: Advanced Project in Computer Science II
Second part of the advanced project undertaken in CSE523. Must be on the same project and under the same faculty advisor as CSE524.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 525: Introduction to Robotics
This course introduces fundamental concepts in Robotics. In the first half of the course, basic concepts will be discussed, including coordinate transformation, kinematics, dynamics. Laplace transforms, equations of motion, feedback and feedforward control, and trajectory planning. These topics will be exemplified with Matlab/Simulink simulation studies. The second half of the course will focus on applying the knowledge from the initial lectures to various motor systems, including manipulators, artificial eye systems, locomotory systems, and mobile robotics. There will be homeworks for Matlab/Simulink and a final project, a midterm and a final.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 526: Principles of Programming Languages
Discusses programming language concepts and design, with emphasis on abstraction mechanisms. Topics include language paradigms (procedural, object-oriented, functional, and logic), language concepts (values, bindings, types, modules), and foundations (lambda calculus, denotational semantics). Examples will be drawn from several representative languages, such as C, Java, Standard ML, and Prolog.
Prerequisite: CSE 307
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 527: Introduction to Computer Vision
Introduction to basic concepts in computer vision. Low level image analysis, image formation, edge detection, segmentation. Image transformations for image synthesis methods for 3D scene reconstruction, motion analysis, object recognition.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 528: Computer Graphics
This course emphasizes a hands-on approach to the use of computer graphics. The topics covered include models, picture description, and interaction; windowing, clipping, panning, and zooming; geometrical transformations in 2D and 3D; algorithms for raster displays (scan-line conversion, polygon fill, polygon clipping, etc.); hidden line and hidden surface removal, shading models; user interaction. The students will implement a substantial graphics application program.
Prerequisite: CSE 328
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 529: Simulation and Modeling
A comprehensive course in formulation, implementation, and application of simulation models. Topics include data structures, simulation languages, statistical analysis, pseudo-random number generation, and design of simulation experiments. Students apply simulation modeling methods to problems of their own design. This course is offered as CSE 529, AMS 553 and MBA 553.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 530: GEOMETRIC FOUNDATNS
This course will focus on mathematical tools, geometric modeling techniques, and fundamental algorithms that are relevant to graphics, visualization, and other visual computing areas. The goal is to provide...
graduate students with a comprehensive knowledge on geometric concepts and demonstrate the significance of these mathematical tools and geometric algorithms in graphics and relevant areas. Course topics include geometric algorithms for both polygonal and curved objects, theory of parametric and implicit representations, modeling methods of curves, surfaces, and solids, in-depth spline theory, rudiments of wavelet theory and multi-resolution shape representations, differential geometry fundamentals, and other sophisticated topics and latest advances in the field.

Prerequisites: CSE 328 and CSE 332
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 532: Theory of Database Systems
The course will cover advanced topics in modern database systems, including object-oriented databases, rule-based databases, temporal and active databases, parallel and distributed databases, distributed object model, data mining, online analytical processing, data warehousing, multimedia databases.

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 533: Network Programming
Topics include Unix and Linux socket API programming at the TCP, UDP, IP (raw sockets) and datalink access (Linux PF_PACKET sockets, libcap & libnet libraries) levels, in the context of developing and implementing client-server applications, reliable data transfer using TCP-like rdt and flow control mechanisms, routing protocols, address resolution protocols, multicasting, DNS protocols.

3 credits, Letter graded (A, A-, B+, etc.)

CSE 534: Fundamentals of Computer Networks

3 credits, Letter graded (A, A-, B+, etc.)

CSE 535: Asynchronous Systems
Discuss asynchronous systems, their description using concurrent and distributed programming languages, and their verification. Topics include concurrent programming using shared memory and message passing, formal semantics of communication, reliability, and concurrent algorithms.

3 credits, Letter graded (A, A-, B+, etc.)

CSE 536: Introduction to User-Interface Development
Survey of user-interface systems, includes command language, windowing, multiple input/output devices, architecture of user interface management systems, toolkits for designing user-interface, human factors, standards, visual languages. The course also includes discussion of emerging technologies, such as systems for cooperative work, physically distributed user-interfaces, parallelism and user-interfaces, virtual reality. A substantial project requiring the design, implementation, and evaluation of a user-interface will be required

3 credits, Letter graded (A, A-, B+, etc.)

CSE 537: Artificial Intelligence
A comprehensive introduction to the problems of artificial intelligence and techniques for attacking them. Topics include problem representation, problem-solving methods, search, pattern recognition, natural language processing, learning, expert systems, AI programming languages and techniques. Covers both theoretical methods and practical implementations.

Prerequisites: MAT 371 or CSE 541
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 540: Theory of Computation
Topics include models of computation: finite-state machines, stack machines, Turing machines, Church's thesis; computability theory: halting problem and unsolvability, introductory recursion theory; complexity theory: complexity measures, time and space hierarchy, NP-complete problems.

Prerequisite: CSE 303
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 541: Logic in Computer Science
A survey of the logical foundations of mathematics and the relationships to computer science; development of propositional calculus and quantification theory; the notions of a proof and of a model; the completeness theorem.

Pre- or co-requisite: MAT 313 and CSE 213
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 542: Speech Processing
Introductory speech processing course, surveying speech analysis, speech recognition and speech synthesis. Students will develop familiarity with speech processing tools (PRAAT, HTK, Festival.)

Prerequisite: CSE 526 or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 547: Discrete Mathematics
This course introduces such mathematical tools as summations, number theory, binomial coefficients, generating functions, recurrence relations, discrete probability, asymptotics, combinatorics, and graph theory for use in algorithmic and combinatorial analysis. This course is offered as both CSE 547 and AMS 547.

Prerequisite for CSE 547: AMS 301
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 548: Analysis of Algorithms
Techniques for designing efficient algorithms, including choice of data structures, recursion, branch and bound, divide and conquer, and dynamic programming. Complexity analysis of searching, sorting, matrix multiplication, and graph algorithms. Standard NP-complete problems and polynomial transformation techniques. This course is offered as both AMS 542 and CSE 548.

Prerequisite for CSE 548: CSE 373 recommended
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 549: Computational Biology
This course focuses on current problems in computational biology and bioinformatics. Our emphasis will be algorithmic, on discovering appropriate combinatorial algorithm problems and the techniques to solve them. Primary topics will include DNA sequence assembly, DNA/protein sequence comparison, hybridization array analysis, RNA and protein folding, and phylogenetic trees.

3 credits, Letter graded (A, A-, B+, etc.)

CSE 555: Computational Geometry
Study of the fundamental algorithmic problems associated with geometric computations, including convex hulls, Voronoi diagrams, triangulation, intersection, range queries, visibility, arrangements, and motion planning for robotics. Algorithmic methods include plane sweep, incremental insertion, randomization, divide-and-conquer, etc. This course is offered as both AMS 545 and CSE 555.

Prerequisite for CSE 555: CSE 373 or CSE 548
CSE 564: Visualization
The course emphasizes a hands-on approach to scientific, medical, and information visualization and visual analytics. Topics include: traditional visualization techniques, the visualization process, visual perception and cognition, basic graphics and imaging concepts, visualization of sampled, observed, and computed data, volume and flow visualization, information visualization, human-computer interaction, and the coupling of intelligent computing with visualization.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 570: Wireless and Mobile Networks
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 577: Medical Imaging
This course presents an introduction to the mathematical, physical, and computational principles underlying modern medical imaging systems. It covers fundamentals of X-ray radiography, X-ray computed tomography (CT), ultrasonic imaging, nuclear imaging, magnetic resonance imaging (MRI), and functional MRI (fMRI), as well as more general concepts required for these, such as linear systems theory, the Fourier Transform, and numerical optimization. Popular techniques for the visualization, segmentation, and analysis of medical image data will also be discussed, as well as applications of medical imaging, such as image-guided intervention.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 580: Topics in Computer Science
An advanced lecture course on a new topic in computer science. The course is primarily designed for M.S. students, but can be taken by Ph.D. students as well.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 581: Topics in Computer Science
An advanced lecture course on a new topic in computer science. The course is primarily designed for M.S. students, but can be taken by Ph.D. students as well.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 582: Topics in Computer Science
An advanced lecture course on a new topic in computer science. The course is primarily designed for M.S. students, but can be taken by Ph.D. students as well.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 587: Proficiency Requirement in Computer Science
Students can get credit for a 300-level undergraduate course by registering for CSE 587. The syllabus of the undergraduate course must specify additional work that graduate students must do in order to pass the course. Graduate students taking an undergraduate course under CSE 587 number must be graded separately from the undergraduate students. See Graduate Student Handbook for restrictions on the use of this course.
Fall and Spring, 2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 590: Topics in Computer Science
An advanced lecture course on a new topic in computer science. The course is primarily designed for M.S. students, but can be taken by Ph.D. students as well. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated for credit as the topic changes, but cannot be used more than twice to satisfy CSE major requirements for M.S. Limited to CSE graduate students; others, permission of instructor.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 592: Advanced Topics in Computer Science
An advanced lecture course on a new topic in computer science. The course is primarily designed for M.S. students, but can be taken by Ph.D. students as well. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated for credit as the topic changes, but cannot be used more than twice to satisfy CSE major requirements for M.S. Limited to CSE graduate students; others, permission of instructor.

CSE 593: Independent Study in Computer Science
Students can register for this course in order to conduct or participate in a project under the supervision of a Computer Science faculty member. The student must prepare a description of the project or the course to be taken and submit it before the add/drop deadline to the project sponsor. The description will reside in the student's file. Both M.S. and Ph.D. students can take this course. This course cannot be taken as part of M.S. Thesis research --- use CSE 599 in this case. Ph.D. students take CSE 593 for any kind of research or project work prior to advancement to candidacy (G5 status). After the advancement, CSE 699 should be used to conduct Dissertation Research. Prerequisite: Limited to CSE Graduate Students; others, permission of instructor.
Spring, 1-9 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 594: Advanced Topics in Computer Science
An advanced lecture course on a new topic in computer science. This course is primarily designed for M.S. students, but can be taken by Ph.D. students as well. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated as the topic changes, but cannot be used more than twice to satisfy CSE major requirements for the M.S.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 595: Topics in Computer Science
An advanced lecture course on a new topic in computer science. This course is primarily designed for M.S. students, but can be taken by Ph.D. students as well. Semester supplements
to this Bulletin contain specific description when course is offered. May be repeated for credit as the topic changes, but cannot be used more than twice to satisfy the SCE major requirements for the M.S.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 596: M.S. Internship in Research
Participation in private corporations, public agencies, or non-profit institutions. Students will be required to have a faculty coordinator as well as a contact in the outside organization to participate with them in regular consultations on the project, and to submit a final report to both. At most 1 credit can be accepted towards the M.S. degree.

Prerequisite: Permission of graduate program director.
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

CSE 599: M.S. Thesis Research
This course can be used only for M.S. Thesis research; non-thesis research should be done under the designation of CSE 593: Independent Study. M.S. students who wish to enroll in CSE 599 for any number of credits must prepare a 1-2 page description of the work to be completed. The description must be approved by the research advisor, signed by both student and advisor, and will reside in the student's file. Amendments to the proposal must be approved by the advisor. Up to 9 credits of CSE 599 can be counted towards the 31 credits that are required for graduation.

Prerequisite: Limited to CSE graduate students; others permission of instructor.
Fall, 1-12 credits, S/U grading
May be repeated for credit.

CSE 600: Topics in Modern Computer Science
A survey of current computer science research areas and issues. This course comprises lectures by faculty members and visitors, selected readings, and introductory-level research problems.

1 credit, S/U grading
May be repeated for credit.

CSE 601: Advanced Image Processing
Modern approaches to Image Processing, Statistical Image Formation and Image Models, Image Restoration, Reconstruction and Segmentation, Applications to Medical Imaging. Crosslisted with ESE 559

3 credits, Letter graded (A, A-, B+, etc.)

CSE 602: Advanced Computer Architecture

The focus will be on the architectural rather than micro-architectural issues, and a systems approach to computer architecture taking into account the interaction between the architecture and the compiler, operating system, database, and networking. The course starts with superscalar/VLIW processor architecture and proceeds to memory hierarchy, storage systems, network hardware, graphics processor, and database machines. The emphasis will be on hands-on evaluation of architectural ideas, the exploration of software/hardware design trade-offs, and the articulation of experimental procedures and performance analysis. A publication-quality class project will be required.

3 credits, Letter graded (A, A-, B+, etc.)

CSE 605: Performance Evaluation of Computer Systems
The purpose of this course is to provide background and training in understanding and evaluating performance of computer systems, including centralized, distributed, parallel, client/server based systems, and computer communication networks. The goal is to develop a perspective on how the performance of computer systems or networks should be evaluated in order to decide on various design alternatives. The course will include various analytical techniques, mainly based on Markov models and queuing theory, and simulation modeling.

Prerequisites: Limited to CSE graduate students; others permission of instructor.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 608: Advanced Computer Security
Advanced course on principles and practice of engineering secure information systems. Topics covered include threats and vulnerabilities, counter measures, legal policy issues, risk management and assurance. In-depth coverage of various research problems, which will vary from one offering of the course to another.

Prerequisite: CSE 508 or CSE 509 or permission of instructor.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 610: Parallel Computer Architectures
Topics include parallel computer systems; important parallel applications; parallel computation models; interconnection networks; SIMD and MIMD architectures; hybrid architectures; memory management; cache coherence; distributed shared memory; synchronization methods; operating systems; compilers; and programming tools.

3 credits, Letter graded (A, A-, B+, etc.)

CSE 611: Transaction Processing
An advanced course in transaction processing systems covering the latest developments in the area. Topics include stable storage, distributed database systems, commitment protocols, failures, replication and advanced models of transactions.

3 credits, Letter graded (A, A-, B+, etc.)

CSE 612: Advanced Visualization and Volume Graphics

This course discusses advanced concepts in the area of volumetric data modeling and visualization. Topics include multi-variate and multi-dimensional large datasets on regular and irregular grids, modeling of natural phenomena and simulation of realistic illumination, volumes as magic clay for sculpting and deformation effects, non-photorealistic rendering for illustration and artistic works, information-centric exploration of large datasets and exploitation of hardware for acceleration. The course strives to provide a snapshot on the current state of the art and will be supported mostly by recent research papers. Students will expand on a topic of their choice by completing an individual project.

Limited to CSE graduate students, others permission of instructor. Prerequisites: CSE 564.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 613: Parallel Programming
Algorithms and techniques for programming highly parallel computers. Trends in parallel and distributed computing; shared address space and message passing architectures; design issues for parallel algorithms; converting sequential algorithms into equivalent parallel algorithms; synchronization and data sharing; improving performance of parallel algorithms; interconnection network topologies, routing, and flow control; latency limits on speedup of algorithms by parallel implementations.

3 credits, Letter graded (A, A-, B+, etc.)

CSE 614: Advanced Programming Languages
Selected topics on advanced programming language technology. Program analysis and transformation, program optimization and program manipulation systems. Very high-level and declarative languages such as sets and relations based languages and deductive and object-oriented languages.

Prerequisite: CSE 526 or CSE 504
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
CSE 615: Advanced Computer Vision
Survey of methods used for the analysis of images by computer, including computer vision and pattern recognition. Topics to be covered are image formation, image segmentation and edge detection, binary images and shape analysis, shape from shading, motion field and optical flow, surface inference, classification techniques.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 616: Digital Multimedia Systems
In-depth survey of multimedia computing, including multimedia conversion, data compression, multimedia data representation and modeling, authoring techniques, audio and video editing, 2D and 3D animation, media synchronization, distributed multimedia, and advanced application development.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 617: Advanced Topics in Wireless Networks
Advance topics taken from ad hoc wireless networks and sensor networks. Will comprise of lectures, presentations and/or a project.
Prerequisite: Limited to CSE graduate students; others, permission of instruction.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

CSE 618: Advanced Computer Graphics
Advanced topics in rendering and modeling realistic 3D imagery including texture mapping and synthesis, radiosity, amorphous phenomena, artificial life, and animation. Further contents include introductions to freeform curves and surfaces, volume rendering, and image-based rendering. Limited to CSE graduate students; others, permission of instructor.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSE 620: Virtual Reality
Practical issues in the design and implementation of virtual environments. Topics include system requirements, transformations, user-interaction models, human vision models, input/output devices, tracking systems, augmented reality, and virtual-reality applications. The course will involve a substantial programming project to implement an immersive virtual reality system.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 621: Physics-based Modeling for Visual Computing
A unified approach to various fields such as graphics, visualization, computer-aided geometric design, biomedical imaging, vision, and virtual environment. The course will explore select research topics centered on physics-based modeling methodology and associated computational methods for theoretical and practical problems in widespread areas of visual computing. The emphasis will be on geometric and solid modeling, geometric design techniques, wavelets and multi-resolution analysis, deformable models based on mathematical physics, variational analysis, optimization methods, numerical simulation with finite-difference and finite-element algorithms, differential equations for initial-value and boundary-value problems, force-driven interaction with constraints, dynamic sculpting system, and a large variety of applications for visual computing.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 622: Advanced Database Systems
The course covers selected topics on the cutting edge of database technology, such as deductive database query languages and systems, object-oriented data models, persistent programming languages, heterogeneous databases, and advanced transaction models.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 624: Advanced Operating Systems
Students will study advanced operating system topics and be exposed to recent developments in operating systems research. In addition to being conversant in classic and recent research papers, this course aims to teach students to read research papers critically, formulate new research questions, and evaluate these questions experimentally. Topics to be covered typically include: distributed systems, cloud computing and data centers, operating system design, virtual machines, OS interaction with the hardware architecture, synchronization and communication, file systems, and security.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 625: Advanced Asynchronous Systems
Formal specification and verification of asynchronous systems. Topics include concurrent programming, process algebras, logics for describing the properties of concurrent systems, and formal semantics of communication.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 626: Switching and Routing in Parallel and Distributed Systems
This course covers various switching and routing issues in parallel and distributed systems. Topics include message switching techniques, design of interconnection networks, permutation, multicast and all-to-all routing in various networking nonblocking, and rearrange capability analysis and performance modeling.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 628: Natural Language Processing
The course offers computationally-oriented introduction to natural language processing (NLP). The focus is on modern quantitative techniques in NLP: algorithms and statistical approaches to word-level, syntactic, and semantic processing of natural language. The choice of topics includes practically motivated questions in NLP such as (1) can we teach computers to automatically authorship of a document? (2) can computers automatically suggest paraphrases (phrases with similar meaning) to help with writing?
Prerequisite: Familiarity with either Artificial Intelligence or Machine Learning is strongly recommended, but not absolutely required. Limited to CSE Graduate Students
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSE 630: Theory of Computational Complexity
Machine-based polynomial-time complexity theory, including nondeterministic computation, probabilistic computation, time and space trade-off, and complexity hierarchy; applications to related areas such as combinatorial algorithms and cryptography.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 631: Advanced Logic in Computer Science
The course may include the following: deductive theorem proving (resolution, sequent-style calculi, natural deduction), inductive theorem proving, equational reasoning (rewrite systems), non-classical logics (modal logics, intuitionistic logic).
3 credits, S/U grading

CSE 633: Computability and Undecidability
Computability theory based on Turing machines and recursive functions; proof by diagonalization and reducibility; unsolvable problems in set, group, number and language theory; reducibility orderings and degrees of unsolvability; priority methods and Post's problem. Prerequisite: CSE 540 or consent of instructor.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 634: Data Mining Concepts and Techniques

Data Mining is a new, promising and flourishing interdisciplinary field drawing work from areas including database technology, artificial intelligence, machine learning, pattern recognition, high-performance computing, and data visualization. It focuses on issues relating to the feasibility, usefulness, efficiency and scalability of techniques for automated extraction of patterns representing knowledge implicitly stored in large databases, warehouses, and other massive information repositories. The course gives a broad, yet in-depth overview of the field of data mining and presents one or two techniques in rigorous detail. Prerequisite: Database course
3 credits, Letter graded (A, A-, B+, etc.)

CSE 636: Analysis and Synthesis of Computer Communication Networks

Topics include analysis of message queuing and buffering in computer networks; survey of OSI layered architecture; network topology; local, metropolitan, and wide area networks; circuit and packet switching techniques; high-speed and lightwave network concepts: Synchronous Optical Network (SONET), Fiber Distributed Data Interface (FDDI), Distributed Queue Dual Bus (DQDB-QPSX), Integrated Services Digital Networks (ISDN), Broadband-ISDN, and Asynchronous Transfer Mode (ATM).
3 credits, Letter graded (A, A-, B+, etc.)

CSE 637: Program Semantics and Verification

Topics include formal approaches to defining semantics of programming languages: denotational, operational, axiomatic, and transformational semantics; formal systems for program verification; logics of program, type theory, lambda calculus; further topics selected from term rewriting approach to proving properties of data types, and semantics and verification of languages with concurrent and parallel constructs.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 638: Advanced Algorithms

This is an advanced course in the design and analysis of combinatorial algorithms, focusing on recent material and special topics, including randomized algorithms, approximation algorithms for NP-complete problems, string algorithms, amortized analysis of data structures, and heuristic methods such as simulated annealing. Material will be selected to have little or no overlap with traditional introductory algorithms courses.
3 credits, Letter graded (A, A-, B+, etc.)

CSE 640: Seminar in Theory of Computing

CSE 641: Seminar in Logic in Computer Science

CSE 642: Seminar in Algorithms

CSE 643: Seminar in Concurrency

CSE 644: Seminar in Databases

CSE 645: Seminar in Languages

CSE 646: Seminar in Artificial Intelligence

CSE 647: Seminar in Image Processing

CSE 648: Seminar in Graphics

CSE 649: Seminar in Operating Systems

CSE 650: Seminar in Architecture

CSE 651: Seminar in Applications

CSE 652: Seminar in User Interfaces

CSE 653: Seminar in Virtual Reality

CSE 654: Seminar in Visualization

CSE 655: Seminar in Modeling and Simulation

CSE 656: Seminar in Computer Vision

Current readings in computer vision and image understanding.
Prerequisite: Limited to CSE graduate students; others need instructor consent
Fall, 1 credit, S/U grading
May be repeated for credit.

CSE 657: Seminar in Design Analysis

Methods for constructing reliable and efficient computer systems. Topics include: modeling and specification, analysis and verification, design and optimization, code generation, simulation and testing. Tool support. Applications and case studies.

CSE 658: Seminar on Mobile and Wireless Networking

This seminar course will draw topics from mobile and wireless networks of current interest. The main focus will be multi-hop wireless networks. It will cover topics on mobile routing, multiple access and transport protocols for such networks. It will also cover topics from micromobility architectures and pervasive computing.
Prerequisites: Limited to CSE graduate students; others permission of instructor.
Fall, 1 credit, S/U grading
May be repeated 2 times FOR credit.

CSE 659: Seminar in Computer Security

Seminar course, covering various research problems in computer security.
Spring, 1 credit, S/U grading
May be repeated for credit.

CSE 660: Seminar in Media Networks

Graduate seminar that covers recent work on multimedia and networks.
Fall, 1 credit, S/U grading
May be repeated for credit.

CSE 661: Seminar in Data Privacy

Current research in Data Privacy.
Limited to CSE graduate students; others, permission of instructor.
Spring, 1 credit, S/U grading
May be repeated for credit.

CSE 662: Seminar in Applied Cryptography

May be repeated for credit.

CSE 665: Special Topics in Theory of Computing

CSE 666: Special Topics in Logic in Computer Science

CSE 667: Special Topics in Algorithms

CSE 668: Special Topics in Concurrency

CSE 669: Special Topics in Databases

CSE 670: Special Topics in Languages
CSE 671: Special Topics in Artificial Intelligence

CSE 672: Special Topics in Image Processing

CSE 673: Special Topics in Graphics

CSE 674: Special Topics in Operating Systems

CSE 675: Special Topics in Architecture

CSE 676: Special Topics in Applications

CSE 677: Special Topics in User Interfaces

CSE 678: Special Topics in Virtual Reality

CSE 679: Special Topics in Visualization

CSE 680: Special Topics on Modeling and Simulation

This is an advanced modeling and simulation course on selected research topics. This application-oriented course tries to address issues of modeling and simulation from graphics, animation, CAD/CAM, medicine, artificial life, and virtual environments. Primary areas covered by this course include visual modeling, mathematical methods for geometry, shape design technology, computational physics for simulation, and scientific computing techniques. New topics will be added each year to reflect the latest state-of-the-art. Prerequisite: graphics/visualization background or permission of the instructor.

Fall, 2 credits, Letter graded (A, A-, B+, etc.)

CSE 681: Special Topics in Computer Vision

Advanced research topics course.

Prerequisite: Limited to CSE graduate students; others need instructor consent

Fall, 2 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

CSE 682: Special Topics in Design Analysis

Methods for constructing reliable and efficient computer systems. Topics include: modeling and specification, analysis and verification, design and optimization, code generation, simulation and testing. Tool support. Applications and case studies.

Prerequisite: Limited to CSE graduate students; others, instructor consent

Fall, 2 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

CSE 683: Special Topics on Mobile and Wireless Networking

This course will draw topics from mobile and wireless networks of current interest. The main focus will be multi-hop wireless networks. It will cover topics on mobile routing, multiple access and transport protocols for such networks. It will also cover topics from micromobility architectures and pervasive computing.

Prerequisites: Limited to CSE graduate students; others permission of instructor.

Fall and Spring, 2 credits, Letter graded (A, A-, B+, etc.)

May be repeated 2 times FOR credit.

CSE 684: Special Topics in Computer Security

Special topics course, covering selected research areas in computer security.

Spring, 2 credits, Letter graded (A, A-, B+, etc.)

May be repeated 2 times FOR credit.

CSE 686: Special Topics in Data Protection

Advanced research topics course.

Limited to CSE graduate students; others, permission of instructor.

Spring, 2 credits, S/U grading

May be repeated for credit.

CSE 687: Special Topics in Applied Cryptography

May be repeated for credit.

CSE 690: Advanced Topics in Computer Science

An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

CSE 692: Advanced Topics in Computer Science

An advanced lecture course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well. Semester supplements to this Bulletin contain specific description when course is offered. An advanced course on a new topic in computer science. This course is primarily designed for Ph.D. students, but can be taken by M.S. students as well.
CSE 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

CSE 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are not in their home country are not covered by mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

CSE 800: FT SUMMER RESEARCH
May be repeated for credit.

CSM

Center for Science and Mathematics Education

CSM 599: Graduate Research in Science Education
Research to be supported by a faculty member in the Program in Science Education.
Prerequisite: Permission required.
Fall, 1-9 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

CSM 600: History and Philosophy of Science Education
An introduction to the history of the field of science education and the related philosophical underpinnings. The course will survey the major events, ideas and philosophies and how these have changed over time. Particular focus will be on the time period from 1890 to the present day.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

CSM 610: The Nature and Practice of Science
An overview of the nature and practice of science through the analysis of current issues in science. Through the extensive use of case studies, students will address questions such as: What is science? What distinguishes science from other ways of knowing? What standards of evidence and scientific explanations, processes, and conventions are used in science? What philosophical, social, ethical, and historical perspectives are important in understanding science?
Offered
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSM 620: Science Teacher Education
Introduction to the historical, philosophical and pedagogical issues surrounding science teacher education. Introduction to the nature of the research that has been conducted on teacher education in the past and current trends.
Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSM 630: Science Education Research Seminar
Introduction to the major theoretical frameworks and paradigms in societal issues (gender, culture, and diversity). Students will be required to critique research papers in the field and will conduct a literature review in their general thesis area.
Offered
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

CSM 640: Directed Study in Science Education
In their fifth semester students will individually complete a directed study with a faculty advisor. The intent of this course is to prepare the students for the doctoral qualifying examination and assist them in refining their research topics.
Offered
Fall and Spring, 3-9 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CSM 699: Dissertation Research on Campus
Prerequisite: Must be advanced to candidacy (G5); major portion of the research will take place on SB campus, at Cold Spring Harbor; or at Brookhaven National Lab.
Semesters offered:
Fall, 1-9 credits, S/U grading
May be repeated 1 times FOR credit.

CSM 700: Dissertation Research Off Campus-Domestic
Prerequisite: Must be advanced to candidacy (G5); major portion of the research will take place off Campus, but in U.S. and/or U.S. provinces. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated 1 times FOR credit.

CSM 701: Dissertation Research Off Campus-International
Prerequisite: Must be advanced to candidacy (G5); major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are not in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are in their home country are charged for the mandatory health insurance (if they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable).
May be repeated 1 times FOR credit.

CST

Cultural Studies

CST 502: Theories in Cultural Studies
This course examines the role of theory in the practice of cultural studies. 3 credits.
3 credits, Letter graded (A, A-, B+, etc.)

CST 510: History of Cultural Studies
This course will examine the intellectual and disciplinary stakes of raising the question, "what is Cultural Studies?" The intention is not so much to define Cultural Studies as to
study the polemics and histories that sparked its delineations.

Offered Fall/Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

CST 597: Directed Readings for M.A. Students
A student and faculty member agree on a corpus of texts to read and discuss at weekly or biweekly meetings. The reading list must be filed with the program’s form before the add/drop period ends. May be repeated for credit.
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

CST 599: Independent Study
A student and faculty member agree on a topic not offered in any seminars and a reading list to study at weekly or biweekly meetings. A final research paper or major annotated bibliography will be required. The syllabus must be filed with the program’s form before the add/drop period ends. May be repeated for credit. Only three credits of Independent Study can be counted toward the M.A. requirements, and a maximum of six toward the Ph.D.
Offered
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CST 609: Topics in Cultural Theory
Emphasis on diverse specialist areas in cultural theory. Course content will vary depending upon instruction.
Offered Fall/Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CST 680: Cultural Studies Research Seminar
In addition to group readings in cultural studies theory and practice (continuing from CLT 609), students will develop individual or collaborative research projects.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

CST 690: Directed Readings for Doctoral Candidates
A student and faculty member agree on a corpus of texts to read and discuss at weekly or biweekly meetings. The reading list must be filed with the program’s form before the add/drop period ends. May be repeated for credit.
Fall and Spring, 1-12 credits, S/U grading
May be repeated for credit.

CST 696: Self-Directed Readings
For doctoral students who have completed all course requirements and wish to dedicate themselves to full or part-time preparation for the Comprehensive Examination.
Fall and Spring, 3-9 credits, S/U grading
May be repeated 6 times FOR credit.

CST 698: Practicum in Teaching
The course is divided into two parts: one half is normally given in the fall, one in the spring. The first part deals primarily with matters of pedagogy. The second part is designed to help students plan their own undergraduate courses. The practicum is required of all students during their first year.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

CST 699: Dissertation Research on Campus
Prerequisite: Advancement to candidacy (G5).
A portion of dissertation research must take place on SBU campus.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

CST 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5).
Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

CST 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5).
Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

CST 800: Summer Research
May be repeated for credit.

CST 850: Summer Teaching
May be repeated for credit.

CWL

Creative Writing and Literature

CWL 500: Introduction to Graduate Writing
A seminar that introduces students to one another, the faculty, the program in Writing and Literature, and to issues in contemporary writing. Offered in conjunction with the Writers Reading Series. Students will attend the regular series of readings sponsored by the Writing program and meet at weekly intervals under the direction of a faculty advisor to discuss and write about topics raised in the lecture series, as well as issues generated from seminar discussions.
Offered
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)

CWL 510: Forms of Fiction
Regular submission, discussion, and analysis of students’ work in one or more of the modes of fiction, including the short story, the novella, and the novel. Writing assignments may include exercises, imitations, responses, and original work. Students will examine relevant works that illustrate point of view, character development, dialogue, plot, setting, theme, motif, and other aspects of fiction. Specific mode or topic to be studied will be announced in the course schedule.
Prerequisite: Permission of instructor and/or departmental consent
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 520: Forms of Poetry
Regular submission, discussion, and analysis of students’ work in one or more of the modes of poetry. Writing assignments may include exercises, imitations, responses, and original work. Students will examine relevant works that illustrate structural principles, metrical and syntactical rhythm, sound and rhyme, formal and stanzaic organization, the use of figurative language, and other aspects of poetry.
Prerequisite: Permission of instructor and/or Program Director
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 530: Forms of Scriptwriting
Regular submission, discussion, and analysis of students' work in one or more of the contemporary modes of scriptwriting, including writing for film, theater, radio, and television. Writing assignments may include exercises, imitations, responses, and original work. Students will examine relevant works that illustrate point of view, character development, dialogue, plot, setting, and other techniques vital to scriptwriting. Specific mode or topic to be studied will be announced in the course schedule.
Prerequisite: Permission of instructor and/or departmental consent
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 540: Forms of Creative Nonfiction
Regular submission, discussion, and analysis of students' work in one or more of the contemporary fields of non-fiction writing, including biography, autobiography, memoir, expository writing, and social commentary. Writing assignments may include exercises, imitations, responses, and original work. Students will examine relevant works that illustrate the methods and techniques available to the non-fiction writer. Specific mode or topic to be studied will be announced in the course schedule.
Prerequisite: Permission of instructor and/or departmental consent
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 550: Forms of Professional and Scientific Writing
Regular submission, discussion, and analysis of students' work in one or more of the contemporary modes of professional writing, including technological writing, writing about science, and writing for advertising, business, and public relations, as well as for governmental, educational, and professional organizations. Writing assignments may include exercises, imitations, responses, and original work. Students will examine relevant works that illustrate the strategies available in modern professional communication. Specific mode or topic to be studied will be announced in the course schedule.
Prerequisite: Permission of instructor and/or departmental consent
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 560: Topics in Literature for Writers
A seminar for writers concentrating on the study of one area of literary study, to be announced in the course schedule. The course may examine a contemporary or historical trend in literature, the rise of a specific genre, a social issue expressed in literature, an issue in literary theory, or any other topic of relevance and concern to students of writing. The emphasis will be on scholarly analysis.
Offered
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 565: Special Topics in Writing
A seminar concentrating on a specific topic or concern in writing. The particular theme of the course will be announced in the course schedule. Topics may include, among others, studies of character development, the uses of humor, writing about place, finding one's voice, and narrative style. Written work will be supported by the reading of related texts.
Offered
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 570: Advanced Writing Workshop
The focus is on work in progress and the extension of the manuscript. The workshop is open to students interested in any form of writing. Students are encouraged to pursue their own writing interests while simultaneously being exposed to the work of others in varying genres. Regular writing is required, and vigorous analysis and discussion are encouraged. Strongly recommended for students preparing for the thesis.
Offered
Fall, 3-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 575: Writers Conference
The Southampton Writers Conference is an intensive program of workshops in contemporary writing that includes lectures, readings, workshops, and panels featuring nationally distinguished authors who join the department's summer faculty. Graduate students in the program will assist in planning and running the Conference, and will have the option of taking a Conference workshop for credit. The Writers Conference will also encourage participation by visiting students # new writers, established writers, teachers of writing and editors # who will be admitted by application and may receive academic credit upon request.
1-6 credits. Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 580: Practicum in Arts Administration
Practicum in Arts Administration Under the guidance of a faculty advisor, students will learn the essentials of arts administration. This may include assisting in the coordination of reading and lecture series, conference organization, or other writing and arts administration activities. 1-4 Credits. May be repeated for credit Prerequisites: Permission of instructor and program director SEMESTER: On Demand
1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 581: Practicum in Teaching Writing
Students take the seminar in conjunction with teaching a section of WRT 101. This course provides hands-on experience and instruction in the basics of writing pedagogy, including designing writing assignments, sequencing assignments, motivating writing, writing skill development and evaluating writing. Students will also be given a preliminary overview of the major theories driving composition pedagogy.
3 credits, Letter graded (A, A-, B+, etc.)

CWL 582: Practicum in Publishing and Editing
Under the guidance of the faculty advisor, students will be exposed to the hands-on process of editing and publishing a literary journal.
Offered
Fall, 1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

CWL 588: Independent Study
Independent studies in topics chosen by the student are arranged through an individual instructor.
1-6 credits, S/U grading
May be repeated for credit.

CWL 599: Thesis
Every student in the M.F.A. program in Writing must complete a thesis that is a publishable, book-length work. It may be fiction, non-fiction, poetry, or a script for the visual media. It may be a collection of short pieces. Its subject matter may be scientific or literary. It may be business-oriented or academic. The thesis is judged solely on the
quality of its intelligence and its writing. Every student will, with the assistance of the program director, choose a thesis supervisor to provide guidance and criticism in the completion of the project. At the same time that the thesis supervisor is chosen, the program director will also guide the student in the selection of a thesis committee, which will consist of the thesis supervisor, one other member of the faculty in Writing, and one outside reader knowledgeable in the student’s field of interest. Progress toward the completion of the thesis will be reviewed not only by the thesis supervisor but also by members of the thesis committee, at which point student will submit a bound copy of the thesis to the department. 1-9 credits. 
S/U grading 
May be repeated for credit.

CWL 600: Post MFA Creative Writing Fellow
CWL 600 provides students who have successfully completed the MFA in Creative Writing and Literature degree requirements access to an intellectual community of writers. Participants will be allowed to participate in one workshop or course per semester on a space available basis. The program office will communicate with enrollees prior to the start of the semester the workshops and courses available.
S/U grading 
May be repeated for credit.

CWL 800: Summer Research
Independent reading, writing, research on topics or problems related to work on the MFA Thesis. 
Prerequisite: Permission of instructor and/or program director 
Summer, S/U grading 
May be repeated for credit.

DAN
Dance

DAN 501: Yoga and Somatics
A practicum in the ancient Indian philosophy of yoga approached from the somatic perspective of equally conditioning the physical, psychical, and discriminating mental body. Moments of harmonious action within the human system will be investigated through the physical challenges of Hatha Yoga. Participants will learn dynamic movement sequences, static poses, and breathing techniques, as they relate to the varied historical lineages from India. The student will gain experiential knowledge of yoga as used for healing pain, improving body image through somatic awareness, prevention of mental and physical disease, muscular control, and as training to balance strenth and flexibility. Although the course will focus primarily on the physical experience, related texts will be used to contextualize modern practices and familiarize the student with the extent of varied methodologies available.
Offered Fall and Summer, 3 credits, Letter graded (A, A-, B+, etc.)

DAN 568: Dance Improvisation
The practice and movement investigation through discipline, spontaneity, and awareness. Skills in improvisation will be developed through creative projects and experiments in dance.
Prerequisite: DAN 165, 166, or 167 Summer, 3 credits, Letter graded (A, A-, B+, etc.)

DPA
Doctoral Program in Anthropological Sciences

DPA 501: Development of Anthropological Theory
Survey of the development of anthropological theory from the 19th century to the present. This course is offered as both ANT 501 and DPA 501.
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 502: Social Ecology
This course explores theoretical and methodological issues in the study of human social activity and its relationship to ecological systems and the environment. Readings include both classic studies as well as contemporary research, with particular emphasis placed on the various dimensions and scales of social organization and activity, and on the role of cultural, religious, and political institutions in shaping ecological relationship as well as economic behavior.
3 credits, Letter graded (A, A-, B+, etc.)

DPA 503: Social Organization
This course explores theoretical models and empirical observations of human social organization in a comparative perspective, including such topics as demography and behavioral ecology, kinship and marriage, reciprocal exchange, and political dimensions of resource mobilization in small-scale as well as complex societies. Organized around different layers of human sociality, the course examines social dependence among humans and nonhuman primates, evolutionary explanations for human mating strategies, cooperation in child-rearing, paradigms of descent and affinity, and the dynamics of hierarchy and alliance in egalitarian cultures as well as stratified states.
3 credits, Letter graded (A, A-, B+, etc.)

DPA 509: Seminar in European Ethnography
Investigation and discussion of selected topics and problems concerning European societies and cultures. The perspectives of culture history and current fieldwork are employed. This course is offered as both ANT 509 and DPA 509.
Fall, 3 credits, S/U grading 
May be repeated for credit.

DPA 511: Paleolithic Archaeology
A survey of the archaeological record of foraging peoples in Africa, Europe, and Asia prior to the emergence of agriculture. The course emphasizes particular problems including the relationship between behavioral and biological change, different adaptive strategies in temperate and tropical zones, the origins of modern humans, and the emergence of complex hunter-gatherer societies. This course is offered as both ANT 511 and DPA 511.
Prerequisite: Any other archaeology course.

DPA 512: Comparative Civilizations
A comparative study of the processes of sociocultural evolution from the beginnings of sedentary life to the achievement of early civilization in the Near East, Egypt, the Indus Valley, China, Mesoamerica, and the Andean area. The seminar covers such topics as urbanization, demography, irrigation, craft specialization, militarism, and trade and exchange. This course is offered as both ANT 512 and DPA 512.
Prerequisite: Graduate standing or permission of instructor
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 513: Origins of Agriculture
This course will trace the history of anthropological thought on the origins of agriculture and will assess the evidence from the Old and New worlds for this economic revolution. The course will not only explore areas where early agriculture is evidenced, but will also contrast these areas with those where agriculture was a later development. Emphasis
will be on the environmental, technological, biological, social, and cultural processes associated with the "Neolithic Revolution." This course is offered as both ANT 513 and DPA 513.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 515: Theory and Method in Archaeology
Theoretical and methodological approaches employed in archaeology. The goals of the course are to provide an historical perspective on the growth of theory and method in archaeology and to examine in detail some of the pertinent research topics being studied today. This course is offered as both ANT 515 and DPA 515.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 516: Research Design in Archaeology
An examination of the ways in which archaeologists develop successful research strategies for arriving at answers to the key questions in the field. Students will analyze grant proposals that received funding from the major sources of funding for archaeology before developing research proposals of their own. The aim of the course is to provide the class with the skills needed to plan their future and compete successfully for funding both for their thesis research and in their future careers.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 517: Primitive Technology
An introduction to the technology of hunter-gatherers. The course examines how archaeologists use both ethnographic and experimentation to shed light on prehistoric human technological adaptations. Techniques for making and using primitive tools are practiced in weekly laboratory sessions.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

DPA 518: Lithic Technology
A detailed overview of the methods archaeologists use to extract behavioral information from prehistoric stone tools. The course examines raw material economy, technological strategies, tool use, and discard behavior. Analytical methods are practiced through the computer-assisted analysis of stone tools from simulated archaeological sites.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 519: Archaeozoology
An introduction to the study of animal bones from archaeological sites. Special emphasis is on identification of fragmented bone, identification of bone surface modification, calculation of indexes of abundance, and measurement and metrical analysis of mammal bone. Computer analysis is stressed, and the class seeks to synthesize traditional archaeozoology and actualistic studies. This course is offered as both ANT 519 and DPA 519.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 520: Principles of Social and Cultural Anthropology
Concepts and principles of social and cultural anthropology; historical background, structure and function, social processes, transactions, culture, communication, continuity, and other change; topics and problems of contemporary interest. Some ethnographic monographs are discussed in terms of their relevance to the general concepts and principles treated in the seminar. This course is offered as both ANT 520 and DPA 520.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 526: The Use of Remote Sensing and GIS in Environmental Analysis
An introduction to the use of aerial and satellite imagery in environmental analysis and the manipulation of geographic data sets of all types using Geographic Information Systems. This course is designed to teach students in archaeology, physical anthropology, and related disciplines, how satellite imagery combined with various maps can be manipulated using GIS software to perform powerful geographic analysis. Although students are eventually likely to use these tools in many different parts of the world, this course focuses on Long Island as a research area, and each student designs and completes a research project on a particular section of the area, focusing on the habitats of local wildlife, the locations of archaeological sites, coastal regimes, etc. This course presumes computer literacy and familiarity with database management. Offered as ANT 526 and DPA 526 or HPH 658.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

DPA 527: Field Methods and Techniques in Archaeology
The course will be held during the summer only. It consists of field and laboratory work on an aspect of Long Island's archaeological heritage. Students' time is divided between surveying and excavation in the field and artifact analysis in the laboratory. Such techniques as map and air photo reading, survey, instruments, stratigraphy, conservation, typology construction, etc., are taught. Students are exposed to the full range of excavation, survey, and laboratory methods and techniques. This course is offered as both ANT 527 and DPA 527.

Prerequisite: Graduate standing or permission of instructor
Summer, 3-9 credits, Letter graded (A, A-, B+, etc.)

DPA 541: Evolutionary Anatomy
A lecture and laboratory with emphasis on dissection of the entire human body. Includes functional and comparative anatomy with special emphasis on the musculoskeletal morphology of humans and higher primates. This course is offered as both DPA 541 and HBA 541.

Prerequisite: permission of instructor
Fall, 8 credits, Letter graded (A, A-, B+, etc.)

DPA 550: Theory and Methodology in Primatology
Comprehensive overview of the theory and methodology used in the study of primate behavioral ecology. Includes ecological field methods, behavioral observations, analytical techniques, nonparametric statistics as well as planning, presenting, and reviewing research. Offered as both ANT 550 and DPA 550.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

DPA 559: Archaeology of Food
Explores the archaeological study of food and foodways. The emphasis is on the social aspects of food, particularly its roles in past power structures, social relationships, conceptions of identity, ritual practices, and gender roles. Also covers the theoretical and methodological approaches archaeologists use to study food in the past.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

DPA 560: Ancient Mesopotamia
An examination of the cultural history of Mesopotamia based on the archaeological, textual and art historical record. Focusing on the fourth through second millennia, this course investigates both the long term developmental process of this civilization, and ways to understand its settlement systems, urban structure, social and political organization, economic structure and the role played by religion.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 561: Peasant Societies and Cultures
The concept of peasantry is examined from political, religious, and social class viewpoints as well as from the more traditional economic view. These agricultural peoples, who are essentially preliterate and preindustrial, are described and analyzed especially in relation
to the national societies of which they form a part. This course is offered as both ANT 561 and DPA 561.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

DPA 562: Long Island Archaeology
Life on Long Island and the surrounding area from its first settlement by Native Americans 12,000 years ago until the end of the nineteenth century. Trends and changes in human behavior are studied in the context of environmental and cultural processes affecting all of northeastern North America.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

DPA 563: Aspects of Animal Mechanics
An introduction to biomechanics. Covers freebody mechanics and kinetics as applied to vertebrate locomotion. Considers the structure and physiology of muscle as it relates to adaptations of the musculoskeletal system. This course is offered as both HBA 563 and DPA 563.

Prerequisites: Introductory physics and biology or permission of instructor.

Spring, 2 credits, Letter graded (A, A-, B+, etc.)

DPA 564: Primate Evolution
The taxonomic relationships and evolutionary history of primates as documented by their fossil record and structural and chemical evidence. Emphasis on primates prior to the origin of the human lineage. This course is offered as ANT 564, DPA 564 and HBA 564.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 565: Human Evolution
A survey of the fossil record of hominin evolution through the Pliocene and Pleistocene epoch with emphasis on the morphological structure and function of locomotor, masticatory, and neural systems. Includes utilization of comparative anatomical material and an extensive cast collection. This course is offered as ANT 565, DPA 565 and HBA 565.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 566: Studies in Functional Morphology
Introduction to the theory and methods of functional morphology. Various methods of analysis and the application of experimental techniques such as electromyography or bone strain analysis are discussed as they pertain to the understanding of the interaction between form and function. Special emphasis is placed on the analysis of human and nonhuman primate morphology, and the application of this analysis to interpretation of the fossil evidence for human and nonhuman primate evolution. This course is offered as both HBA 566 and DPA 566.

Prerequisite: Permission of instructor.

Spring, 2 credits, Letter graded (A, A-, B+, etc.)

DPA 567: Primate Behavior and Ecology
A comparative approach to the behavior and ecology of living lemurs, monkeys, and apes. Emphasis is placed on sociobiological theory; life history strategies; morphological adaptations; comparisons of primate communities in Asia, Africa, Madagascar, and South America; and primate conservation. This course is offered as both ANT 567 and DPA 567.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 568: Hunters and Gatherers
The course focuses on the relationship between ecology and adaptation to explore the cross-cultural diversity of hunter/gatherers. The first part of the course looks at a number of key theoretic issues and debates that surround the study of hunter/gatherers. Once this foundation is laid, students learn about modern and historic hunter-gatherers from all the major geographic regions of the world. This overview draws on studies from behavioral ecology, ethnarchaeology and cultural anthropology. The focus of the course is both to explore hunter/gatherer variation in relationship to their environment, and to give students an appreciation of the ways in which hunter-gatherers have been historically documented. The course is designed to be applicable to archaeologists, anthropologists and to those in other disciplines who make inferences about past ways of life.

Spring, 3-4 credits, Letter graded (A, A-, B+, etc.)

DPA 573: Archaeology of Human Dispersals
A survey of the archaeological evidence for the dispersal of Homo sapiens during the Late Pleistocene epoch (128,000-130,000 years ago). Topics include African origin of Homo sapiens, dispersals into Eurasia, Australia, and the Americas, large mammal extinctions, origins of art, music, and symbolic behavior, emergence of hunter-gatherers.

Offered Fall, 3 credits, Letter graded (A, A-, B+, etc.)

DPA 582: Comparative Anatomy of Primates
The comparative anatomy of living primates. Laboratory dissection with emphasis on relating structural diversity to behavior and biomechanics. This course is offered as both HBA 582 and DPA 582.

Prerequisites: HBA 364 and previous course in human or vertebrate anatomy and permission of instructor.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

DPA 583: Human Demography
The study of human demography has had a long standing focus in anthropology, archaeology, economics and sociology for the simple reason that the distribution and density of people fundamentally shapes many other aspects of the human condition. Human Demography gives students an overview of population dynamics both as they change through time and differ across cultures. The course starts with outlining the history of population studies. Following this introduction, the three major components of population change - fertility, mortality and migration - are explored in depth. We then survey the seminal transitions in human demographic history from hunting and gathering to domestication and through modern postindustrial times. Drawing from the ethnographic, human ecology, demographic and archaeological literature, students read and discuss human demography from a variety of perspectives. The course includes some simple computations and a lab.

Spring, 3-4 credits, Letter graded (A, A-, B+, etc.)

DPA 585: Prehistoric Peoples of the Americas
ANT 585 Prehistoric Peoples of the Americas
Life in the Americas from the first settlement at the end of the Ice Age until the arrival of the Europeans in the 15th and 16th centuries. The culture, history, and evolution of prehistoric peoples of North, Central, and South America are treated. Specific topics covered include settlement by North Americans, hunting-gathering lifeways, plant and animal domestication, the origins of village life, and state-level societies.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

DPA 600: Practicum in Teaching
May be repeated for credit.

DPA 602: Research Seminar in Anthropological Theory
This course is offered as both ANT 602 and DPA 602.
DPA 610: Individual Research
Research supervised by faculty. Students must have permission of instructor and enroll in appropriate section. This course is offered as both ANT 610 and DPA 610.
Fall and Spring, 1-12 credits, S/U grading
May be repeated for credit.

DPA 620: Research Seminar in Topical Problems
This course is offered as both ANT 620 and DPA 620.
Fall and Spring, 3 credits, S/U grading
May be repeated for credit.

DPA 630: Research Seminar in Physical Anthropology
This course is offered as both ANT 630 and DPA 630.
Fall and Spring, 3 credits, S/U grading
May be repeated for credit.

DPA 640: Research Seminar in Ethnography and Ethnology
This course is offered as both ANT 640 and DPA 640.
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

DPA 650: Research Seminar in Archaeology

DPA 680: Special Seminar
Selected topics in cultural and social anthropology. Topics reflect current interests of faculty and graduate students. This course is offered as both ANT 680 and DPA 680.
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

DPA 699: Dissertation Research on Campus
Prerequisite: Must be advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

DPA 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

DPA 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable. All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

DPA 800: Summer Research
This course is offered as both ANT 800 and DPA 800.
S/U grading
May be repeated for credit.

ECO 500: Microeconomics I
The first semester of a one-year course in microeconomic theory. Deals with decision-making of economic agents in different choice environments using the analytical approach of duality theory. Topics include theory of the consumer, theory of the firm, decision-making under risk and uncertainty, intertemporal choice, aggregation, and capital theory.
Prerequisite: Graduate standing in the Economics Department or permission of the Graduate Director.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 501: Microeconomics II
A continuation of ECO 500, focusing on theories of equilibrium and market structure. Topics include general competitive equilibrium, imperfect competition and game theory, imperfect information, theory of public goods, and social choice.
Prerequisite: ECO 500, Graduate standing in the Economics Department or permission of the Graduate Director.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 510: Macroeconomics I
The first semester of a one-year course in macroeconomic theory. Deals with theories and determinants of income, employment, and inflation. Topics include static equilibrium models, theories of money demand and monetary phenomena, theories of the labor market and unemployment, rational expectations and stabilization policy, consumption, and investment.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 511: Macroeconomics II
A continuation of ECO 510, focusing on dynamic models. Topics include models of economic growth, optimal growth and efficiency, overlapping-generations models, rational expectations, and optimal policy.
Prerequisite: ECO 510, Graduate standing in the Economics Department or permission of the Graduate Director.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 520: Mathematical Statistics
The first semester of a one-year course in quantitative methods. Statistical methods and their properties of particular usefulness to economists. Topics include probability theory, univariate and multivariate distributions, limiting distributions, point and interval estimation, hypothesis testing.
Prerequisite: Graduate standing in the Economics Department or permission of the Graduate Director.

ECO 521: Econometrics
A continuation of ECO 520. The application of mathematical and statistical methods of economic theory, including the concept of an explanatory economic model, multiple regression, hypothesis testing, simultaneous equations models, and estimating techniques.
Prerequisite: ECO 520, Graduate standing in the Economics Department or permission of the Graduate Director.

ECO 522: Applied Econometrics
A continuation of ECO 521. The application and extension of econometric techniques developed in ECO 521. Emphasis on the relationship among economic theory,

Prerequisite: ECO 521, Graduate standing in the Economics Department or permission of the Graduate Director.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ECO 531: Introduction to Computational Methods in Economics**

A first course in the computational and graphical techniques for finding numerical solutions to a set of economic models (from more elementary models such as Edgeworth Box to a more general competitive equilibrium model to finding the policy function of a dynamic growth model) based on concepts and constructs presented in the 1st year graduate theory courses. Includes the foundations of programming (using a symbolic algebra language), and finding maxima of functions, finding equilibria of markets, and exploring and fitting functions graphically and through finite difference and projection methods. Emphasis is put on understanding the connections between the concepts, the algebra, the algorithm of the computation and the graphical presentation of economic models and on using the numerical models to perform experiments.

Co-Scheduled with ECO 310
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**ECO 590: Mathematical Foundations of Contemporary Economic Theory**

A one-semester course dealing with mathematical concepts and techniques relevant to economic theory. Topics in set theory, topology, linear algebra, and optimization theory. Applications to economic theory developed as time permits.

Prerequisite: Graduate standing in the Economics Department or permission of the Graduate Director.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ECO 597: Masters Project in Economics**

In this required course students will work with an adviser of their choice to write a paper to be submitted by the end of the semester. This research piece will be a well-structured and coherent article on an economic research question in a field of the student’s choice, with some elements of originality. The paper cannot be just an extended example that carries out known techniques on a problem that has known answers even if those techniques are complicated. The approval of the master’s project advisor and the Graduate Program Director are required to register for this class.

Offered fall and spring.

**ECO 599: Research in Special Topics**

Prerequisite: Graduate standing in the Economics Department or permission of the Graduate Director.
Fall and Spring, 1-12 credits, S/U grading
May be repeated for credit.

**ECO 604: Game Theory I**

Elements of cooperative and non-cooperative games. Matrix games, pure and mixed strategies, and equilibria. Solution concepts such as core, stable sets, and bargaining sets. Voting games, and the Shapley and Banzhaff power indices. This course is offered as both ECO 604 and AMS 552. Prerequisite for ECO 604: Graduate standing in the Economics Department or permission of the Graduate Director.

3 credits, Letter graded (A, A-, B+, etc.)

**ECO 605: Game Theory II**

Refinements of strategic equilibrium, games with incomplete information, repeated games with and without complete information, and stochastic games. The Shapley value of games with many players, and NTU-values. This course is offered as both ECO 605 and AMS 555.

Prerequisite for AMS 555: AMS 552/ECO 604.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**ECO 606: Advanced Topics in Strategic Behavior in Economics**

An analysis of varying topics in strategic behavior in economics. One or more of the following topics and others will be dealt with each week: repeated games with incomplete information; stochastic games; bounded rationality complexity and strategic entropy; values of non-atomic games; strategic aspects in the telecommunication industry; general equilibrium and financial markets; auction mechanisms; knowledge, common knowledge, and strategic equilibria.

Prerequisites: ECO 501, ECO 604, ECO 605, or permission of instructor, Graduate standing in the Economics Department or permission of the Graduate Director.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**ECO 610: Advanced Macroeconomics**

Topics in macroeconomic theory, including microfoundations of macroeconomics, temporary general equilibrium and disequilibrium, monetary theory, equilibrium theory of business cycles, implicit contracts, rational expectations, and econometric implications.

3 credits, Letter graded (A, A-, B+, etc.)

**ECO 612: Computational Economics and Dynamic Modeling**

An analysis of the theory and applications of the dynamic modeling literature using computational methods, and on the methods themselves. Dynamic Modeling and Computational Economics are possibly the fastest growing areas of interest in the profession due to its suitability to model, solve and also estimate realistic decision making problems in most areas of economics.

Prerequisite: Graduate standing in the Economics Department or permission of the Graduate Director.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ECO 613: Computational Macroeconomics**

A concentration on numerical methods commonly used to solve dynamic macroeconomic models. These include methods relying on dynamic programming techniques, linear approximation methods, and non-linear methods that can be applied to models with distortions and heterogeneous agents. The different methods will be explained and their application to macroeconomics will be illustrated with examples from various areas such as Real Business Cycles, Asset Pricing with Complete and Incomplete Markets, and Recursive Contracts.

Prerequisite: ECO 612, Graduate standing in the Economics Department or permission of the Graduate Director.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**ECO 615: Advanced Macroeconomics workshop**

This course is designed for PhD students in their 2nd year and above who are thinking about writing a dissertation in macroeconomics. The course will provide the students with research methods for finding a PhD topic as well as for developing their preliminary ideas for their dissertation topic. The course will involve presentations not only from faculty members but also from students, allowing them to obtain direct feedback and direction for future research from all the faculty members in macroeconomics. The course will also provide students with reviews of the most
important literature through discussions and presentations by the faculty members of seminal papers in the cutting edge research areas in macroeconomics. Some examples of these areas are consumer bankruptcy, Housing Markets, Social Security Reform, Health Care reform and Tax reform. The course will deal with stochastic, dynamic general equilibrium models which do not have a close form solution. Students will have to use these models to study their question of interest and the course will also provide them with direction as to which numerical methods are more appropriate to solve their particular problems.

Fall and Spring, 3 credits, S/U grading. May be repeated for credit.

ECO 623: Data Analysis and Economic Applications
Survey of major sources of data in economics and theoretical hypotheses and statistical methods for organizing and analyzing such data. Statistical models for quantitative data as well as qualitative choices are presented. Computer usage is expected.
Prerequisite: ECO 521; Graduate standing in the Economics department or permission of the Graduate Program Director.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 629: Studies in Quantitative Methods
Prerequisite: ECO 521; Graduate standing in the Economics department or permission of the Graduate Program Director.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 636: Industrial Organization I
Applications of microeconomic theory to the determinants of market structure. Relationships between market structure, firm behavior, and allocational efficiency. Econometric estimation and testing of some hypotheses suggested by the theory.
Prerequisites: ECO 501, ECO 521; Graduate standing in the Economics department or permission of the Graduate Program Director.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 637: Industrial Organization II
This course is a continuation of ECO 636. It deals with the same questions and tools as ECO 636, and provides an introduction to antitrust policy and to public policy toward industry, including regulation and deregulation, the design of optimal regulation, and the effectiveness of current regulation.
Prerequisites: ECO 501, ECO 521; Graduate standing in the Economics department or permission of the Graduate Program Director.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 640: Labor Economics I
This is the first course in the graduate sequence in labor economic theory and empirical applications. Topics include human capital theory, labor supply, life cycle behaviors, and the behavioral effects of social insurance programs. The emphasis is on up to date treatments of these topics in the literature.
Offer
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 641: Labor Economics II
This is an advanced course in labor economics which continues ECO 640. Topics include both theory and estimation of job search, matching, dynamic discrete and continuous choice models of the labor market. Special emphasis will be given to the role of economic theory in specification and testing econometric models.
Offered in
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 642: Demographic Economics I
This course deals with the economics of the family. It utilizes recently developed techniques in economics and demography to deal with questions concerning marriage, divorce, fertility, contraception, the intrafamily distribution of resources, and the intergenerational distribution of resources. Students will do original theoretical and empirical research under the professor's supervision. Prerequisite: ECO 501; Graduate standing in the Economics department or permission of the Graduate Program Director.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 643: Demographic Economics II
This course is a continuation of ECO 642. It deals with the same questions and tools as ECO 642, but emphasizes developing economies. The connections between population growth and development are stressed.
3 credits, Letter graded (A, A-, B+, etc.)

ECO 645: Health Economics II
Critical reviews of research in health economics topics of current interest, such as empirical and conceptual models of physician behavior, competition in the pharmaceutical industry, the economic impacts of managed care, and the causes and consequences of unhealthy behaviors. Students will present and critique original research and produce a research paper on a topic of their interest.
3 credits, Letter graded (A, A-, B+, etc.)

ECO 646: Health Economics II
Theoretical and econometric analysis of selected aspects of the health care delivery system, such as the demand for medical services, the supply and distribution of physician services, the utilization of non-physician medical personnel, alternative models of hospital behavior, third-party insurance reimbursement, national health insurance and cost, and price inflation in the hospital and long-term care sectors. Offered as ECO 646 or HPH 664.
3 credits, Letter graded (A, A-, B+, etc.)

ECO 647: Research Methods in Applied Microeconomics
Presentation, discussion and analysis of student and faculty research in the areas of applied microeconomics, labor economics, health economics and industrial organization, as well as applied econometrics. The purpose of the course is to provide skills and feedback to students at various levels in the program that assist them toward the completion of their second year paper, dissertation proposals and thesis. It is a course in research and presentation methods that provides an effective mechanism for learning about current areas of research interest.
Prerequisite: Graduate standing in the Economics Department or permission of the Graduate Director
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ECO 690: Seminar in Applied Economics
Preparation, presentation, and discussion of student and faculty research in applied economics. Topics covered by student papers are usually related to students' long-term research interests.
Fall or Spring, 1-6 credits, S/U grading

ECO 695: Research Workshop
Designed to direct students to the selection of dissertation topics. Oral and written presentation of student papers with active faculty participation. Several sections may be offered each semester in areas of broad research interest.
Prerequisite: Graduate standing in the Economics department or permission of the Graduate Program Director and three semesters of coursework in the Ph.D. program.
Fall, 3 credits, S/U grading
May be repeated for credit.

ECO 698: Practicum in Teaching
Prerequisite: Graduate standing in the Economics department or permission of the Graduate Program Director.
Spring, 3 credits, S/U grading
May be repeated for credit.

ECO 699: Dissertation Research on Campus
Prerequisite: Have declared thesis advisor in Economics Ph.D. program (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ECO 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ECO 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by the mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must receive clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ECO 800: Summer Research
Prerequisite: Pre-approved participation in Economics dept. activity.
S/U grading
May be repeated for credit.
Center or in an English classroom. Included in the course is fieldwork in the campus Writing Center.
3 credits, Letter graded (A, A-, B+, etc.)

**EGL 593: Problems in Teaching Literature**

An examination of literary types and categories.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 594: Contexts of Literary Study**

An examination of the major issues that pertain to particular historical literary periods.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 597: Practicum in Methods of Research**

In depth study of specified writers, from Old English to Contemporary World Literatures in English.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 598: Thesis Research**

Research and writing of M.A. thesis supervised by faculty advisor.
Fall, 1-3 credits, S/U grading
May be repeated for credit.

**EGL 599: Independent Study**

May be repeated for credit.

**EGL 600: Proseminar: The Discipline of Literary Studies**

Pro-seminar: Introduction to critical analysis, including theoretical and methodological approaches, and an orientation to the profession both in the academy and other careers. Faculty members will speak on their own scholarship and professional experiences.
3 credits, Letter graded (A, A-, B+, etc.)

**EGL 601: Problems in History and Structure of the English Language**

A survey of the English language from its historical beginnings through the present.
3 credits, Letter graded (A, A-, B+, etc.)

**EGL 602: Problems in Bibliography, Editing, and Textual Criticism**

An introduction to the study of manuscripts and printed books, with special emphasis on editorial and textual problems and decisions.
3 credits, Letter graded (A, A-, B+, etc.)

**EGL 603: Problems in Literary Theory and Criticism**

A seminar on any of the current theoretical approaches to texts.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 604: Problems in Literary Analysis**

An introduction to the explication of texts.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 605: Problems in Convention and Genre**

An introduction to the explication of rhetoric, the history of rhetoric and pedagogy, and teaching strategies for teachers.

**EGL 606: Period and Tradition**

An examination of the major issues that pertain to particular historical literary periods.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 607: Individual Authors**

In depth study of specified writers, from Old English to Contemporary World Literatures in English.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 608: Problems in the Relationship of Literature to Other Disciplines**

This seminar will encourage the interdisciplinary focus of our program by examining the intersection between textual studies and other forms of inquiry.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 609: Critical Theory**

A seminar on influential theoretical approaches to texts.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 610: Theories in Composition**

This course explores the relationship between speech production and writing production, and the relationship between literacy, culture, and language politics.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**EGL 611: Critical Theory**

A seminar on influential theoretical approaches to texts.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 612: Theories in Composition**

A seminar on influential theoretical approaches to texts.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EGL 613: Research in Composition**

This course provides an introduction to the nature of empirical research in Composition Studies. Students will survey landmark research studies, learn how to read research reports critically, and conduct a mini-research project in their own classrooms or tutoring situations to analyze underlying causes of students' writing problems.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**EGL 614: Topics in Composition and Writing**

This course will consist of directed readings in particular areas of interest in rhetoric, the history of rhetoric and pedagogy, and teaching strategies for teachers.

**EGL 696: Report Writing**

Students take the seminar in conjunction with teaching a section of WRT 101. This course provides hands-on experience and instruction in the basics of writing pedagogy, including designing writing assignments, sequencing assignments, motivating writing, writing skill development and evaluating writing. Students will also be given a preliminary overview of the major theories driving composition pedagogy.
3 credits, Letter graded (A, A-, B+, etc.)

**EGL 699: Dissertation Research on Campus**

Offered
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**EGL 602: Literary Studies Research and Writing Seminar**

This course focuses on the research and writing skills necessary to submit work for publication. In addition to shared readings, students will conduct substantial new research and expand a paper they have previously written for a graduate seminar. Please note that this course cannot be taken until students have completed at least one semester of the doctoral program.
3 credits,

**EGL 609: Directed Readings**

May be repeated for credit.

**EGL 695: Methods of Teaching English Literature**

Teaching workshop for introductory courses in poetry, fiction, and drama.
3 credits, S/U grading

**EGL 696: Practicum in Teaching Writing**

Students take the seminar in conjunction with teaching a section of WRT 101. This course provides hands-on experience and instruction in the basics of writing pedagogy, including designing writing assignments, sequencing assignments, motivating writing, writing skill development and evaluating writing. Students will also be given a preliminary overview of the major theories driving composition pedagogy.
3 credits, Letter graded (A, A-, B+, etc.)

**EGL 697: Practicum in Teaching English Literature**

Teaching workshop for introductory courses in poetry, fiction, and drama.
3 credits, S/U grading

**EGL 698: Practicum in Teaching Writing**

Students take the seminar in conjunction with teaching a section of WRT 101. This course provides hands-on experience and instruction in the basics of writing pedagogy, including designing writing assignments, sequencing assignments, motivating writing, writing skill development and evaluating writing. Students will also be given a preliminary overview of the major theories driving composition pedagogy.
3 credits, Letter graded (A, A-, B+, etc.)

**EGL 699: Dissertation Research on Campus**

Prerequisite: Advancement to candidacy (G5).
Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

**EGL 700: Dissertation Research off Campus - Domestic**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/ or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate
EMP 501: Behavioral and Organizational Aspects of Management
This course provides an understanding of the management process by analyzing organizational behavior. Topics include behavior in two-person situations, factors influencing attitudes and changes in organizational behavior, group influence on behavior, formal and informal organizational structures, conflict and conflict resolutions, and the dynamics of planned change.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EMP 502: Engineering Economics
This is a course in advanced cost justifications for business and projects. The objective is to give the student a better understanding of what is required to justify, budget, plan and carry out technological projects in industry today. The student will also understand how management decisions are influenced by financial analysis when making budgetary project plans.
3 credits, Letter graded (A, A-, B+, etc.)

EMP 503: Legal and Regulatory Aspects of Management
A survey of business and regulatory law. Topics include contracts, sales, warranties, and business partnerships and corporations. An overview is provided of high technology topics such as computer law, product liability, patent, trademark, copyright, and environmental law and their impact on business.
Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EMP 504: Quantitative Methods in Management
This course is a rapid introduction to the application of modern mathematical concepts and techniques in management science. Algebraic operations, mathematical functions and their graphical representation, and model formulation are reviewed. Topics covered include the following: mathematics of interest, annuity, and mortgage; algebraic and graphic methods of linear programming; PERT, CPM, and other network models; and inventory theory. Simple management-oriented examples are used to introduce mathematical formulations and extensions to more general problems. The computer laboratory is used to give students experience with PC software packages that solve problems in all course topics. Interpretation of computer outputs is also stressed.
Prerequisite: MAT 123 or equivalent
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EMP 506: Global Operations
A managerial approach to the concepts, issues, and techniques used to convert an organization's resources into products and services. Topics include strategic decisions for planning products, processes, and technologies, operating decisions for planning production to meet demand, and controlling decisions for planning and controlling operations through teamwork and Total Quality Management (TQM). Operational problems in producing goods and services are reviewed.
Prerequisite: MGT 515
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EMP 507: Research and Special Topics in Global Industrial Management
An individual study course for students investigating special topics relating to global industrial management.
1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

EMP 509: Enterprise Information and Knowledge Systems Management
This course covers the different types of enterprise systems, how they are used to manage an organization's processes, re-engineering the business with enterprise systems, and the relationship among technology, organization, and management. Knowledge-based and web-based features in modern enterprise systems will be emphasized. Database Management, Security, Control, Ethical, and Social issues of enterprise systems will be discussed.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EMP 511: Starting a Business Venture
This course covers the necessities of beginning a business from turning a concept into a new venture and developing a business plan for a venture. Topics include how to identify and evaluate the product and its market potential; management and organization issues; production and channels of distribution; and how to present a plan to the financial community. Specific case studies and guest speakers are utilized.
Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EMP 517: Quality and Value Management
Modern management's approach to quality has changed radically in the last 20 years; this course explains why and how. It covers methods used by both manufacturing and service organizations to achieve high quality: how each organizational function is involved in quality; how improving quality can reduce costs; importance of communication; importance of involving all employees; need to measure quality; and introduction to statistical quality control and how it is used.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EMP 518: Program / Project Management
We will examine how teams can be organized, directed, and monitored so that relatively complex projects can be carried out efficiently. Topics include: planning, organizing, and controlling resources; monitoring progress toward objectives; identifying and managing risks; resolving conflicts; communicating effectively; setting priorities; and writing proposals. The systems approach will be emphasized.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
EMP 521: New Product Development and Design
This course covers how to manage enterprise innovation, corporate innovation cultures, ideation and creative thinking, product design and development processes and phases, issues in product design, collaboration between R&D and operations/marketing. Also, this class will focus on how to use forecasting to ensure the successful launch of a product. Case studies will be discussed.
3 credits, Letter graded (A, A-, B+, etc.)

EMP 522: Strategic Marketing: Planning and Process
This course will examine the vital role that strategic marketing and planning plays in all businesses, as well as non-profit and government organizations. Marketing's role in our economy, society and the appropriate marketing target and mix of media will also be presented. The various careers which exist in marketing and the structure of marketing plans and departments are studied. The class will create a marketing plan based on real products and present it.
3 credits, Letter graded (A, A-, B+, etc.)

EMP 523: International Business and Management
This course covers the world's marketplace, international environment, managing international business, and managing international business operations. Additional topics include cultural issues in a global marketplace, the impact of law and legal differences in the world marketplace compared to the U.S., and addressing competitive issues related to items such as a need for local contact.
3 credits, Letter graded (A, A-, B+, etc.)

EMP 524: Supply Chain Management
The integration of the activities that procure materials and services, transform them into intermediate goods and final products, and deliver them to the customers in a global environment. This course covers all the logistical, ethics, and outsourcing issues in strategic and global ways.
Offered Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EMP 525: Technology Assessment for Emerging Technologies
This course will address the technology assessment for emerging technology through four basic components of technology assessment: scope, technology, impact, and policy. Emerging technology will cover information technology, energy, and medical technology.
Offered Summer, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESE 501: System Specification and Modeling
A comprehensive introduction to the field of System-on-Chip design. Introduces basic concepts of digital system modeling and simulation methodologies. Various types of hardware description language (HDL) will be studied, including Verilog, VHDL, and SystemC. Topics include top-down and bottom-up design methodology, specification language syntax and semantics, RTL, behavioral and system-level modeling, and IP core development. Included are three projects on hardware modeling and simulation.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 502: Linear Systems
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 503: Stochastic Systems
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 504: Performance Evaluation of Communications and Computer Systems
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 505: Wireless Communications
This course covers first year graduate level material in the area of wireless communications: Wireless channels, overview of digital communications and signal processing for wireless comm., voice and data applications, design basics for wireless modems, analysis of system issues like resource management and handoff, cellular and wireless LAN systems.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 506: Wireless Network
This course will examine the area of wireless networking and mobile computing, looking at the unique network protocol challenges and opportunities presented by wireless communications and host or router mobility. The course will give a brief overview of fundamental concepts in mobile wireless systems and mobile computing, it will then cover system and standards issues including second generation circuit switched and third generation packet switched networks, wireless LANs, mobile IP, ad-hoc networks, sensor networks, as well as issues associated with small handheld portable devices and new applications that can exploit mobility and location information. This is followed by several topical studies around recent research publications in mobile computing and wireless networking field. This course will make the system architecture and applications accessible to the electrical engineer.
3 credits, Letter graded (A, A-, B+, etc.)

ESE 508: Analytical Foundations of Systems Theory
An exposition of the basic analytical tools for graduate study in systems, circuits, control, and signal processing. Sets and mappings, finite-dimensional linear spaces, metric spaces, Banach spaces, Hilbert spaces. The theory will be developed and exemplified in the context of systems applications such as nonlinear circuits, infinite networks, feedback control, signal restoration via projections, and optimal signal modeling.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 510: Electronic Circuits
This is a course in the design and analysis of analog circuits, both discrete and integrated. The first part of the course presents basic topics related to circuit analysis: laws, theorems, circuit elements and transforms. Fundamental semiconductor devices are introduced next. A number of aspects of circuit design beginning with basic device operation through the design of large analog functional blocks including amplifiers, oscillators and filters are discussed.

Cannot be used to fulfill any ESE degree requirements.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 511: Solid-State Electronics**

A study of the electron and hole processes in solids leading to the analysis and design of solid-state electronic devices. Solutions to the Schrödinger equation of quantum effects, perturbation techniques. Simple band structure, effective mass theorem. Derivation and application of the Boltzmann transport theory. Electrical and thermal conductivities of metals and of semiconductors, Hall effect, thermal effects, and their application to electronic devices. Properties of semiconductors and the theories underlying the characteristics of semiconductor devices.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 512: Bipolar Junction and Heterojunction Electronic Devices**

A study of fundamental properties of homojunction and heterojunction semiconductor devices. Derivation of the characteristic equation for p-n junction diodes, for the bipolar junction transistor (BJT) and for the heterojunction bipolar transistor (HBT); the device parameters for low- and high-frequency operation, the effects on the device characteristics of fabrication methods and of structural arrangements. The development of the large-signal and small-signal equivalent circuits for the p-n diode and the BJT and HPT devices, with emphasis on models used in prevalent computer-aided analysis (e.g., SPICE). Consideration of the devices in integrated-circuit applications.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 514: MOS Transistor Modeling**

An overview of the metal-oxide semiconductor (MOS) transistor and its models for circuit analysis. The course is modular in structure. In a common first part, CMOS fabrication, device structure and operation are introduced. Starting from basic concepts of electrostatics, MOS field-effect transistor operation is presented in an intuitive fashion, and no advanced background in solid-state theory is required. Analytical models of increasing complexity and their SPICE Implementations are discussed. The second part of the course allows students to focus on their field of preference: Device physics; digital circuits; Analog circuits. The course includes a project in one of these subtopics.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 515: Quantum Electronics I**

Physics of microwave and optical lasers. Topics include introduction to laser concepts; quantum theory; classical radiation theory; resonance phenomena in two-level systems; Block equations-Kramers-Kronig relation, density matrix; rate equation and amplification; CO2 lasers; discharge lasers; semiconductor lasers.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 516: Integrated Electronic Devices and Circuits I**

Theory and applications: elements of semiconductor electronics, methods of fabrication, bipolar junction transistors, FET, MOS transistors, diodes, capacitors, and resistors. Design techniques for linear digital integrated electronic components and circuits. Discussion of computer-aided design, MSI, and LSI.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 517: Integrated Electronic Devices and Circuits II**

Theory and applications: elements of semiconductor electronics, methods of fabrication, bipolar junction transistors, FET, MOS transistors, diodes, capacitors, and resistors. Design techniques for linear digital integrated electronic components and circuits. Discussion of computer-aided design, MSI, and LSI.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 518: Advanced Design of low noise and low power analog circuits**

Students will learn state-of-the-art circuit techniques for low-noise and low-power amplification and processing of signals from sensors. Examples of circuits are low-noise amplifiers, filters, peak detectors and discriminators. Applications range from medical, to security, safety, industrial measurements and physics research. As a course project, students will develop part of a front-end circuit from transistor level to physical layout using industry-standard CAD tools, and will participate in the experimental characterization of those similar circuits. At the end of the course the student will own a solid background and the basic instruments to design low-noise and low-power amplifiers and processing circuits.

Offered in Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 519: Semiconductor Lasers and Photodetectors**

The course provides an introduction to performance, testing and fabrication techniques for semiconductor lasers and photodetectors. The topics include fundamentals of laser and detector operation, devices band diagram, device characteristics, and testing techniques for analog and digital edge emitting and surface emitting lasers, avalanche and PIN photodetectors. Special attention is given to the design and working characteristics of transmitters and pumping lasers for telecommunication networks.

3 credits, Letter graded (A, A-, B+, etc.)

**ESE 520: Applied Electromagnetics**


3 credits, Letter graded (A, A-, B+, etc.)

**ESE 521: Applied Optics**

This course teaches students the fundamental techniques necessary for analyzing and designing optical systems. Topics include matrix methods for ray optics, fundamentals of wave optics, beam optics, Fourier optics and electromagnetic optics. The latter part of the course will deal with optical activity in anisotropic media and include polarization and crystal optics, electro-optics and acousto-optics.

3 credits, Letter graded (A, A-, B+, etc.)

**ESE 522: Fiber Optic Systems**

This course covers the essential components of a modern optical fiber communication system: (I) wave propagation in optical fiber waveguides, (II) transmitter design, (III) receiver design, (IV) single wavelength fiber-optic networks, and (V) wavelength division multiplexing networks.

Prerequisite: ESE 319
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 524: Microwave Acoustics**
Continuum acoustic field equations. Wave equation, boundary conditions, and Pointing vector. Waves in isotropic elastic media: plane-wave modes, reflection and refraction phenomena, bulk-acoustic-wave (BAW), waveguides, surface acoustic waves (SAW). Plane and guided waves in piezoelectric media. BAW transduction and applications: delay-line and resonator structures, the Mason equivalent circuit, monolithic crystal filters, IM CON dispersive delay lines, acoustic microscopes, SAW transduction and applications: the interdigital transducer, band-pass filters, dispersive filters, convolvers, tapped delay lines, resonators.

**Prerequisite:** ESE 319

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 525: Modern Sensors**

Sensors are devices that convert physical values into electrical signals. This course will provide practical information on diversified subjects related to the operation principles, design and use of various sensors. Established and novel sensor technologies as well as problems of interfacing various sensors with electronics are discussed.

**Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 526: Silicon Technology for VLSI**

This course introduces the basic technologies employed to fabricate advanced integrated circuits. These include epitaxy, diffusion, oxidation, chemical vapor deposition, ion implantation lithography and etching. The significance of the variation of these steps is discussed with respect to its effect on device performance. The electrical and geometric design rules are examined together with the integration of these fabrication techniques to reveal the relationship between circuit design and the fabrication process.

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 527: Circuit Theory and Applications**

Foundation of design procedures for electric circuits. Fundamental concepts, graph theory, network equations, network functions, state equations, network synthesis, scattering parameters, nonlinear circuits.

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 528: Communication Systems**

This course provides a general overview of communication theory and addresses fundamental concepts in this field. After a review of signals and systems representations, various continuous and digital modulation schemes are analyzed. Spread spectrum systems and their application to multiuser communications are also addressed. Advanced communication systems are described and general concepts of wide and local area networks are introduced.

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 529: Electrical Network Theory**

Linear and nonlinear electrical networks; graph theory; determination of operating points; transient estimation; interconnection networks; numerical methods; parameter extraction; infinite and transfinite networks; discrete potential theory; random walks on networks.

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 530: Computer-Aided Design**

The course presents techniques for analyzing linear and nonlinear dynamic electronic circuits using the computer. Some of the topics covered include network graph theory, generalized nodal and hybrid analysis, companion modeling, Newton's method in n-dimensions and numerical integration.

**Prerequisite: B.S. in Electrical Engineering**

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 531: Detection and Estimation Theory**


**Prerequisite: ESE 503 or permission of instructor**

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 532: Theory of Digital Communication**

Optimum receivers, efficient signaling, comparison classes of signaling schemes. Channel capacity theorem, bounds on optimum system performance, encoding for error reduction, and the fading channel. Source coding and some coding algorithms.

**Prerequisite: ESE 503**

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 535: Information Theory and Reliable Communications**


**Prerequisite: ESE 503 or equivalent or permission of instructor**

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 536: Switching and Routing in Parallel and Distributed Systems**

This course covers various switching and routing issues in parallel and distributed systems. Topics include message switching techniques, design of interconnection networks, permutation, multicast and all-to-all routing in various networking nonblocking, and rearrange capability analysis and performance modeling.

**3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 540: Reliability Theory**


**3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 541: Digital System Design**

The course provides an introduction to digital and computer systems. The course follows a top-down approach to presenting design of computer systems, from the architectural-level to the gate-level. VHDL language is used to illustrate the discussed issues. Topics include design hierarchy and top-down design, introduction to hardware description languages, computer-aided design and digital synthesis, basic building blocks like adders, comparators, multipliers, latches, flip-flops, registers etc, static and dynamic random access memory, data and control buses, fundamental techniques for combinational circuit analysis and design, sequential circuit design procedures, and programmable logic devices. Testing of digital designs is addressed throughout the course. A mini project will complement the course.

**Cannot be used to fulfill any ESE degree requirements.**

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 542: Product Design Concept Development and Optimization**

This graduate course will concentrate on the design concept development of the product development cycle, from the creative phase of solution development to preliminary concept...

**Prerequisite:** Senior level course in signals and systems

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 548: Computer Networks**

To present basic network principles and methods in a top-down approach. The course will introduce the material of high-level network applications, and motivate Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 549: Advanced VLSI System Testing**

This course is designed to acquaint students with fault diagnosis of logic circuits. Both combinatorial and sequential circuits are considered. Concepts of faults and fault models are presented. Emphasis is given to test generation, test selection, fault detection, fault location, fault location within a module and fault correction.

**Prerequisite:** BS in Electrical Engineering

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 550: Network Management and Planning**

This course provides an introduction to telecommunications and computer network management and planning. Network management is concerned with the operation of networks while network planning is concerned with the proper evolution of network installations over time. Network management topics include meeting service requirements, management operations, management interoperability, and specific architectures such as Telecommunications Management Network (TMN), and Simple Network Management Protocol (SNMP). Network planning topics include planning problem modeling, topological planning design, heuristic and formal solution techniques.

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 551: Switching Theory and Sequential Machines**

Survey of classical analysis and synthesis of combination and sequential switching circuits, followed by related topics of current interest such as error diagnosis and fail soft circuits, use of large-scale integration, logic arrays, automated local design.

**Prerequisite:** ESE 218 or equivalent Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 552: Interconnection Networks**

Formation and analysis of interconnection processing elements in parallel computing organization. Topics include: SIMD/MIMD computers, multiprocessors, multicomputers, density, symmetry, representations, and routing algorithms. Topologies being discussed include: Benes, Omega, Banyan, mesh, hypercube, cube-connected cycles, generalized chordal rings, chordal rings, DeBruijn, Moebius graphs, Cayley graphs, and Borel Cayley graphs.

**Prerequisite:** ESE 545 or equivalent Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**ESE 553: A/D and D/A Integrated Data Converters**

This is an advanced course on analog integrated circuit design aspects for data converters. Topics include: continuous and discrete-time signals and systems; sampling theorem; ideal ND and D/A converters; specifications and testing of data converters; basic building blocks in data converters: current sources and mirrors, differential gain stages, voltage references, S/H circuits, comparators: Nyquist D/A and ND converters: principles of data conversion and circuit design techniques; oversampling data converters: low-pass and band-pass delta-sigma modulators, decimation and interpolation for delta-sigma data converters. The attending students must be acquainted with principles of transistor operation, function of simple analysis. Familiarity with SPICE is required.

**3 credits, Letter graded (A, A-, B+, etc.)**

**ESE 554: Computational Models for Computer Engineers**

This course covers mathematical techniques and models used in the solution of computer engineering problems. The course heavily emphasizes computer engineering application. Topics covered include set theory, relations, functions, graph theory and graph algorithms, and algebraic structures.

**Fall, 3 credits, Letter graded (A, A-, B+ etc.)**

**ESE 555: Advanced VLSI Systems Design**

Techniques of VLSI circuit design in the MOS technology are presented. Topics include MOS transistor theory, CMOS processing technology, MOS digital circuit analysis and design, and various CMOS circuit design techniques. Digital systems are designed and
simulated throughout the course using an assortment of VLSI design tools.  
Prerequisite: B.S. in Electrical Engineering or Computer Science  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 556: VLSI Physical and Logic Design Automation  
Areas to be covered are Physical Design Automation and Logic Design Automation. Upon completion of this course, students will be able to develop state-of-the-art CAD tools and algorithms for VLSI logic and physical design. Tools will address design tasks such as floor planning, module placement and signal routing. Also, automated optimization of combinational and sequential circuits will be contemplated.  
Prerequisite: B.S. in Computer Engineering/Science or Electrical Engineering  
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 557: Digital Signal Processing II: Advanced Topics  
A number of different topics in digital signal processing will be covered, depending on class and current research interest. Areas to be covered include the following: parametric signal modeling, spectral estimation, multirate processing, advanced FFT and convolution algorithms, adaptive signal processing, multidimensional signal processing, advanced filter design, dedicated signal processing chips, and signal processing for inverse problems. Students will be expected to read and present current research literature.  
Prerequisite: ESE 547 or permission of instructor  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 558: Digital Image Processing I  
Covers digital image fundamentals, mathematical preliminaries of two-dimensional systems, image transforms, human perception, color basics, sampling and quantization, compression techniques, image enhancement, image restoration, image reconstruction from projections, and binary image processing.  
Prerequisite: B.S. in Engineering or Physical or Mathematical Sciences  
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 559: Digital Image Processing II  
The course material will proceed directly from DIP-I, starting with image reconstruction from projections. After the basic projection, theorems are developed and computerized axial tomography techniques will be examined in detail including forward and inverse random transformations, convolution, back projection, and Fourier reconstruction; nuclear magnetic resonance imaging and positron emission tomography will be similarly covered.  
Prerequisite: ESE 545 or equivalent  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 560: Optical Information Processing  
The course is designed to give the student a firm background in the fundamentals of optical information processing techniques. It is assumed that the student is familiar with Fourier transforms and complex algebra, and is conversant with the principles of linear system theory. The course begins with a mathematical introduction to linear system theory and Fourier transformation. The body of the course is concerned with the scalar treatment of diffraction and its application to the study of optical imaging techniques and coherent and incoherent optical processors.  
Prerequisite: B.S. in Physical Sciences  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 563: Fundamentals of Robotics I  
This course covers homogenous transformations of coordinates; kinematic and dynamic equations of robots with their associated solutions; control and programming of robots.  
Prerequisite: Permission of instructor  
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 565: Parallel Processing Architectures  
This course provides a comprehensive introduction to parallel processing. Topics include types of parallelism, classification of parallel computers, functional organizations, interconnection networks, memory organizations, control methods, parallel programming, parallel algorithms, performance enhancement techniques and design examples for SIMD array processors, loosely coupled multiprocessors, and tightly coupled multiprocessors. A brief overview of dataflow and reduction machines will also be given.  
Prerequisite: ESE 545 or equivalent  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 566: Hardware-Software Co-Design of Embedded Systems  
This course will present state-of-the-art concepts and techniques for design of embedded systems consisting of hardware and software components. Discussed topics include system specification, architectures for embedded systems, performance modeling and evaluation, system synthesis and validation. The course is complemented by three mini-projects focused on designing and implementing various co-design methods.  
3 credits, Letter graded (A, A-, B+, etc.)

ESE 568: Computer and Robot Vision  
Principles and applications of computer and robot vision are covered. Primary emphasis is on techniques and algorithms for 3D machine vision. The topics include image sensing of 3D scenes, a review of 2D techniques, image segmentation, stereo vision, optical flow, time-varying image analysis, shape from shading, texture, depth from defocus, matching, object recognition, shape representation, interpretation of line drawings, and representation and analysis of 3D range data. The course includes programming projects on industrial applications of robot vision.  
3 credits, Letter graded (A, A-, B+, etc.)

ESE 570: Bioelectronics  
Origin of bioelectric events; ion transport in cells; membrane potentials; neural action potentials and muscular activity; cortical and cardiac potentials. Detection and measurement of bioelectric signals; impedance measurements used to detect endocrine activity, perspiration, and blood flow; impedance cardiography; vector cardiography; characteristics of transducers and tissue interface; special requirements for the amplification of transducer signals.  
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 571: Introduction to Auto ID Technologies  
Introductory course is a series of Auto ID systems, technologies and applications. The course covers theory and applications of important data-capture technologies, namely, barcodes, biometrics and RFID. Topics to be covered include: architecture of data-capture/ Auto ID system, barcodes: overview of 1-D and 2-D barcodes and other LOS technologies; biometrics: fingerprints, iris-scan, voice recognition and smart-cards; radio frequency identification (RFID): fundamentals, near-field vs. far-field, UHF read range estimation, reader sensitivity limits, tag singulation and multiple access protocols, standards, privacy and security issues in RFID, real time location systems (RTLS), and wireless sensor networks.
Prerequisites: ESE 372, ESE 218, ESE 305 (ESE 319)
3 credits, Letter graded (A, A-, B+, etc.)

ESE 575: Advanced VLSI Signal Processing Architecture
This course is concerned with advanced aspects of VLSI architecture in digital signal processing and wireless communications. The first phase of the course covers the derivation of both data transformation and control sequencing from a behavioral description of an algorithm. The next phase reviews the general purpose and dedicated processor for signal processing algorithms. This course focuses on low-complexity high-performance architecture development and evaluation, system architecture modeling, power-performance tradeoff analysis. The emphasis is on the development of application-specific VLSI architectures for current and future generation of wireless digital communication systems. An experimental/research project is required.
3 credits, Letter graded (A, A-, B+, etc.)

ESE 580: Microprocessor-Based Systems Engineering I
This course is a study of methodologies and techniques for the engineering design of microprocessor-based systems. Emphasis is placed on the design of reliable industrial quality systems. Diagnostic features are included in these designs. Steps in the design cycle are considered. Specifically, requirement definitions, systematic design implementation, testing, debugging, documentation, and maintenance are covered. Laboratory demonstrations of design techniques are included in this course. The students also obtain laboratory experience in the use of microprocessors, the development of systems, circuit emulation, and the use of signature and logic analyzers.
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ESE 581: Microprocessor-Based Systems Engineering II
This course is a study of methodologies and techniques for the engineering design of microprocessor-based systems. Emphasis is placed on the design of reliable industrial quality systems. Diagnostic features are included in these designs. Steps in the design cycle are considered. Specifically, requirement definitions, systematic design implementation, testing, debugging, documentation, and maintenance are covered. Laboratory demonstrations of design techniques are included in this course. The students also obtain laboratory experience in the use of microprocessors, the development of systems, circuit emulation, and the use of signature and logic analyzers.
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

ESE 585: Nanoscale Integrated Circuit Design
This course describes high performance and low power integrated circuit (IC) design issues for advanced nanoscale technologies. After a brief review of VLSI design methodologies and current IC trends, fundamental challenges related to the conventional CMOS technologies are described. The shift from logic-centric to interconnect-centric design is emphasized. Primary aspects of an interconnect-centric design flow are described in four phases: (1) general characteristics of on-chip interconnects, (2) on-chip interconnects for data signals, (3) on-chip power generation and distribution, and (4) on-chip clock generation and distribution. Existing design challenges faced by IC industry are investigated for each phase. Tradeoffs among various design criteria such as speed-power-noise-area are highlighted. In the last phase of the course, several post-CMOS devices, emerging circuit styles, and architectures are briefly discussed. At the end of the course, the students will have a thorough understanding of the primary circuit and physical level design challenges with application to industrial IC design.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 588: Pattern Recognition
Basic concepts of pattern recognition techniques are introduced, including statistical pattern recognition, syntactic pattern recognition, and graph matching. Topics on Bayes decision theory, parametric and nonparametric techniques, clustering techniques, formal languages, parsing algorithms, and graph-matching algorithms are covered.
Prerequisite: Stochastic processes and data structures
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 591: Industrial Project in OEMS Engineering
A student carries out a detailed design of an industrial project in OEMS engineering. A comprehensive technical report of the project and an oral presentation are required.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 597: Practicum in Engineering - Internship
This course is for part-time and full-time graduate students, relating to their current professional activity. Participation is in private corporations, public agencies or non-profit institutions. Students will be required to have a faculty advisor as well as a contact in the outside organization to participate with them in regular consultations on their project. Students are required to submit a final written final report to both.
The maximum credits which can be accepted towards the M.S. degree is 3 credits.
Fall, 1-3 credits, S/U grading
May be repeated for credit.

ESE 599: Research Master's students
Fall and Spring, 1-12 credits, S/U grading
May be repeated for credit.

ESE 610: Seminar in Solid-State Electronics
Current research in solid-state devices and circuits and computer-aided network design.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 670: Topics in Electrical Sciences
Varying topics selected from current research topics. This course is designed to give the necessary flexibility to students and faculty to introduce new material into the curriculum before it has attracted sufficient interest to be made part of the regular course material. Topics include biomedical engineering, circuit theory, controls, electronics circuits, digital systems and electronics, switching theory and sequential machines, digital signal processing, digital communications, computer architecture, networks, systems theory, solid-state electronics, integrated electronics, quantum electronics and lasers, communication theory, wave propagation, integrated optics, optical communications and information processing, instrumentation, and VLSI computer design and processing.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESE 691: Seminar in Electrical Engineering
This course is designed to expose students to the broadest possible range of the current activities in electrical engineering. Speakers from both on and off campus discuss topics of current interest in electrical engineering.
Fall and Spring, 1 credit, S/U grading
May be repeated for credit.

ESE 697: Ph.D. Practicum in Teaching
The course provides hands-on experience in classroom teaching. Other activities may include preparation and supervision of laboratory experiments, exams, homework assignments and projects. Final report that summarizes the activities and provides a description of the gained experience and a list of recommendations is required.

Prerequisite: G5 status and Permission of Graduate Program Director.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESE 698: Practicum in Teaching
This course enables graduate students to gain experience in teaching and interacting with students enrolled in an electrical and computer engineering course. Students enrolled in ESE-698 are expected to perform various teaching duties required by the course instructor, such as attending lectures, providing office hours, holding review/recitation sessions, assisting in lab sections and grading, etc.

Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESE 699: Dissertation Research on Campus
Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

ESE 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

ESE 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ESE 800: FULL TIME SUMMER RESEARCH
May be repeated for credit.

ESL

English as Second Language

ESL 591: Intermediate Oral/Aural Skills Class
The purpose of this course is to do intensive work in aural and oral language skills. Emphasis is on the segmental level: vowel/consonant work, syllable work and word stress as well as rhythm on the sentence level. Summarizing and questioning are practiced with work on learning styles. Students’ awareness of American teaching and cultural patterns are stressed. Observing American professors and students in class is encouraged. A student will receive a diagnostic assessment of her/his language segmental and suprasegmental difficulties from the instructor and will be expected to work on improvement in these speech areas both in the classroom and independently in the language laboratories. Successful completion (A- or higher) of the course leads to ESL 598; B+ or below leads to ESL 596. Prerequisite: SPEAK Test score of 40-44 or IELTS score of 5-5.5 or iBT Speak score of 15-18

3 credits, Letter graded (A, A-, B+, etc.)

ESL 593: Advanced Composition
Advanced training in writing for ESL students who need to concentrate on paragraph development. The first half of the semester deals with paragraph construction, stressing concepts of the main thesis and supporting arguments. Some advanced grammar is reviewed, but the assumption is that basic structures and mechanics of writing have already been mastered. The second half of the semester stresses combining paragraphs into short compositions. Both descriptive and argumentative writing are practiced. Diagnostic test during first week of classes determines placement in the course. A through C/Unsatisfactory grading only.

3 credits, Letter graded (A, A-, B+, etc.)

ESL 596: High Intermediate Oral/Aural Skills Class
The emphasis of this course is threefold: developing language skills, teaching skills and cultural awareness. Language skills will focus on sentence stress, phrasing, linking and pausing with field specific language practice. Teaching skills stress include questioning techniques for discussion and assessment, leading effective discussions and assessing student learning. The cultural awareness focuses on idioms, American cultural values and norms as well as non-verbal communication. Successful completion of this course (B or higher) leads to ESL 598.

3 credits, Letter graded (A, A-, B+, etc.)

ESL 598: Advanced Oral/Aural Skills Class
This course further develops language skills at the supra segmental level, teaching skills, cultural awareness and presentation skills. Intonation is taught with self-monitoring strategies. The teaching skills examine strategies for introducing yourself, your syllabus, explaining a visual, defining terms, giving presentations and giving successful lectures. Analysis of presentations is given to each student throughout the semester. Cultural awareness is centered on some assumptions affecting teaching in the American classroom. Successful completion of this course (a B or better) clears the student from the oral/aural ESL requirements.

3 credits, Letter graded (A, A-, B+, etc.)

ESM

Materials Science

ESM 501: Teaching and Mentoring Techniques
Discussion of various phases of teaching, including preparation, classroom technique, and student evaluation. Also exploration of skills and understanding necessary for mentoring of undergraduates and others involved in research.

Fall, 1 credit, S/U grading

ESM 502: Scanning Electron Microscopy Skills
Practical introduction to the operation of scanning electron microscopes, including energy-dispersive X-ray spectrometers. Required of all students who use the SEM in their research.
ESM 503: Electron Diffraction
A quantitative discussion of electron diffraction as a means of micro-characterization of materials and as a basis for understanding image contrast in the transmission electron microscope. Topics covered include atomic, kinematical, and dynamical scattering; indexing diffraction patterns; and convergent-beam diffraction.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 508: Impact of Materials on Environment
This course will focus on several concepts underlying the impact of materials on the environment and various methods of minimizing them. More specifically this course will explore the concepts of air and water pollution associated with product manufacturing, various concepts of hazardous materials impact on human health, several topics of sustainable developments and selected methods of contaminated water and air treatment. Additionally this course will be addressing the issues of how to minimize the environmental pollution by product substitution and by decreasing the energy input into materials production. It will also give an overview of the concepts of green chemistry, green engineering and industrial ecology.
Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 513: Strength of Materials
A unified approach for all solid materials will be used with regard to the correlation between microstructure and their macroscopic mechanical properties. The course deals with various testing techniques for delineating mechanical properties of materials, considering elasticity, inelasticity, plasticity, dislocation theory, cohesive strength, fracture, and surface wear. Attention is given to strengthening mechanisms for solids, metals, ceramics, and polymers.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 514: Technical Writing for Materials Scientist
Students will examine writing as it appears in published and draft format, taking into account different audience needs. Processes we will cover include: planning, organizing, writing, review, editing and rewriting. Grammar issues, particularly those that challenge non-native speakers, will also be addressed. We will be working with Professor Gerald Graff's idea of "They Say/I Say," a cornerstone strategy of academic conversation, in which newer colleagues in a field (i.e., undergraduate and graduate students) learn by apprenticeship how to engage their peers in the discussion of ideas through written format. Offered Spring, 0-3 credits, S/U grading

ESM 520: Diffusion in Solids
A study of manufacturing processes used in the semiconductor industries. Topics include single crystal growth, compound formation, zone refining, epitaxial growth, doping techniques, thin film techniques, thick film techniques, passivations, isolations, lead bonding techniques, cleaning and etching, and failure analysis; discrete devices and integrated circuit devices; various modern concepts in IC processing.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 521: Diffusion in Solids
Kinetics and Transformations I changed to Diffusion in Solids. Atomistic rate processes in solids with emphasis on diffusion in crystals. Theory of diffusion and experimental techniques; the role played by a broad class of crystalline imperfections. Topics include annealing of deformed materials, kinetics of defect interactions, thermally controlled deformation, kinetics of nucleation and growth, solidification, and precipitation.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 522: Imperfections in Crystals
The characteristics of point defects in metals, semiconductors, and ionic solids are described, and the thermodynamics of point defects is developed. Dislocation theory is introduced and the structures of internal boundaries are described. Finally, interactions between lattice imperfections are discussed, with emphasis on plasticity and fracture.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 523: Solid-State Electronics
A study of the electronic processes in solids leading to the analysis and design of materials and devices. Crystal structures, binding, electrical and thermal conductivities, diffusion, galvomagnetic, thermomagnetic, and thermoelectric effects. Hall effect and magnetoresistance. Conductivity in thin films.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
ESM 543: Engineering Ceramics

The characterization of ceramics is reviewed with special reference to advanced engineering ceramics, bulk high-temperature superconductors, and ceramic magnets. Typical microstructures and thermal, mechanical, and electrical properties are compared. These properties are related to the various methods of processing.  

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 550: Introduction to Homeland Security

The course is a combination of lectures and laboratory experience to introduce students to critical issues and assess needs for homeland security. The course includes invited lectures by experts on special topics such as fundamentals of nuclear, chemical, and biological weapons and the associated threat to the transportation of goods and the public. The students will learn about cyber security, devices to safeguard materials from terrorist threats, safety of nuclear power plants and water supply, forensics and emergency preparedness. The students will submit a term paper on a selected topic in lieu of the final exam.  

Prerequisite: undergraduate level biology, chemistry and physics.  

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 553: Nuclear Safeguards and Security

The course is intended to familiarize students with the fundamentals of nuclear physics, radiation, mining, weapons and fuel cycle, other than producing electricity, as it pertains to nuclear power plants. Topics include nuclear detection, devices to safeguard nuclear materials from terrorist threats, needed physical protection for safe handling and its relevance to Homeland Security. The course combines lectures with hands-on experience at the newly installed nuclear detection facility located at the nearby United States Department of Energy's Brookhaven National Laboratory.  

Prerequisite: undergraduate equivalent physics and chemistry.  

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ESM 554: Chemical & Biological Weapons: Safeguards and Security

This course deals with the fundamentals of chemistry and biochemistry related to chemical weapons (CW) and biological weapons (BW) that could be used by terrorists. Topics include CW and BW history, production, control, detection, identification, and emergency response measures to deal with intended or unintended release and escape, and security measures to protect and control stockpiles.  

Prerequisite: Undergraduate equivalent chemistry, biochemistry, and microbiology.  

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ESM 555: Synchrotron Techniques in Materials Science

A short course in a selected synchrotron analytical technique as applied to problems in Materials Science. May include demonstration and hands-on experience at the national synchrotron light source at Brookhaven National Laboratory, and synchrotron safety training.  

1 credit, Letter graded (A, A-, B+, etc.)

ESM 556: Fuel Combustion

The course will focus on combustion process for heat and power generation. Describe both fundamentals and actual systems involving fossil fuels and upcoming CO2-neutral biofuels. Emphasis on fuel combustion in stationary equipment, emissions characteristics of burning fuels and challenges in developing the next-generation combustion equipment.  

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 562: Traditional Fossil Fuels

The course will focus on the original and history of traditional fossil fuels, coal, petroleum and natural gas. Discuss mining methods and the role of fossil fuels play in the post-industrial revolution era. A comparison of the three fossil fuels with respect to their energy content, CO2 output and associated environmental impact tied to global warming.  

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 566: Biofuels

The course will focus on biofuels- a promising option to replace fossil fuels. Topics to be covered include crop-growth cycle and its impact on land-use, biomass to various fuel options, their integration into the exiting energy delivery infrastructure and potential benefit in CO2 reduction.  

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 569: Chemical & Biological Weapons: Safeguards and Security

This course deals with the fundamentals of chemistry and biochemistry related to chemical weapons (CW) and biological weapons (BW) that could be used by terrorists. Topics include CW and BW history, production, control, detection, identification, and emergency response measures to deal with intended or unintended release and escape, and security measures to protect and control stockpiles.  

Prerequisite: Undergraduate equivalent chemistry, biochemistry, and microbiology. Fall, 4 credits, Letter graded (A, A-, B+, etc.)

ESM 575: The Material World

The evolution of the Material World starting from the Big Bang, the creation of stars and galaxies, the nucleosynthesis of the elements in supernova explosions, formation of the Earth and Solar System, human adaptation of Earth resources to create the Modern World will be discussed. In this process we will discover the fundamental laws governing material behavior and explore the cosmic significance of our existence.  

3 credits, Letter graded (A, A-, B+, etc.)

ESM 599: Research

Fall and Spring, 1-12 credits, S/U grading  

May be repeated for credit.

ESM 600: Seminar in Surface Science

Discussions and reading on current problems in surface physics, chemistry, and crystallography.  

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
ESM 602: Seminar in Plasticity and Fracture
Intended for advanced students, especially those doing research in the area. Topics: detailed description of defects and their relations to mechanical structure; dislocation theory; plasticity and yield criteria; creep and fatigue; microscopic theory of fracture including ductile and brittle behavior and the relationship of plastic flow to cleavage.
3 credits, Letter graded (A, A-, B+, etc.)

ESM 604: Seminar in Ultrasonic Methods and Internal Friction in Solids
Review of advanced measurement techniques in the field of ultrasonics coupled with quantitative descriptions of experimental variables related to the sample microstructure. Applications to optical, electrical, and mechanical properties are discussed. Use of ultrasonics for nondestructive evaluation is considered.
Prerequisite: ESM 513
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 605: Advanced Diffraction Techniques
Advanced topics in diffraction theory including the dynamical theory in perfect and imperfect crystals and its applications in imaging methods. Other topics from the following list are pursued if time is available: EXAFS/EXELFS/SEXAFS; LEED/RHEED; small-angle scattering; Kossel line and electron channeling patterns; convergent beam diffraction; phonon scattering; glancing incidence X-ray diffraction; diffraction from defect structures; colored symmetry; holography.
Prerequisites: ESM 512 or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 606: Seminar in Optical Properties of Material
A survey of modern optical materials and their characterization. The properties of both glasses and crystalline materials are related to physical origin. Electro-optic, elastooptic, and magneto-optic properties and their interrelations are related to applications in technology including laser systems, displays, and spectroscopy.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 608: Seminar in Catalysis
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 610: Seminar in Reactions in Inorganic Solids
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 612: Seminar in Advanced Thermodynamics of Solids
The fundamentals of the thermodynamics of irreversible processes are presented and the theory applied to thermal diffusion, thermoelectric transport, and other coupled processes in solids. Thermodynamics of multicomponent phase equilibria. Diffusion, oxidation, and other rate processes in ternary and higher-order systems.
Prerequisite: ESM 511
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 613: Seminar in Materials and Environment
Interactions between materials and their environments including corrosion, oxidation, absorption, and adsorption reactions. The influence of these reactions on the properties of materials, the design of materials resistant to these phenomena, alternative methods of protection, and the utilization of these reactions in promoting breakdown and deterioration of materials.
Spring, 3 credits, S/U grading

ESM 614: Seminar in Diffusion in Solids
Diffusion in solids is considered in detail, including solution of the transport equations for volume, grain boundary, and surface diffusion. Kirkendall effect and other diffusion phenomena, atomic mechanisms of diffusion, correlation effects, etc. Next, the theory of processes in which diffusion plays an important role is considered, such as ionic conduction, oxidation of metals, and the sintering of solids.
Spring, 3 credits, S/U grading

ESM 615: Seminar in Phase Transformations
The theory of phase transformations in solids is considered. Kinetics and mechanisms of nucleation and growth and martensitic transformations. Melting and solidification, precipitation from solid solution, polymorphic transformations, eutectic and eutectoid reactions, second-order transitions, recrystallization, and other transformations in solids.
Fall, 3 credits, S/U grading

ESM 694: Tutorials in Special Topics in Materials Science
Supervised reading and discussion of selected publication in particular fields of materials science. This course is designed primarily for advanced graduate students who are, or expect to be involved in research in these areas, although other students may enroll with permission of the instructor.
Fall and Spring, 0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESM 695: Graduate Internship
Participation in private corporations, public agencies, or non-profit institutions for ongoing research activities related to thesis research. Students will be required to have a faculty coordinator as well as a contact in the outside organization, to participate with them in regular consultations on the project, and to submit a final report to both. Not accepted for credit toward the M.S. degree.
1-3 credits, S/U grading
May be repeated for credit.

ESM 696: Special Topics in Materials Science
Supervised reading and discussion of selected publications in particular fields of Materials Science. This course is designed primarily for advanced graduate students who are, or expect to be, involved in research in these areas, although other students may enroll with permission of the instructor.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESM 697: Materials Science Colloquium
A weekly series of lectures and discussions by visitors, local faculty, and students presenting current research results.
Fall and Spring, 0-3 credits, S/U grading
May be repeated for credit.

ESM 698: Practicum in Teaching
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Fall and Spring, 0-3 credits, S/U grading
May be repeated for credit.

ESM 699: Dissertation Research on Campus
Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ESM 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ESM 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces.
Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home countries are not covered by the mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home countries are charged for the mandatory health insurance. If they are to be covered by other insurance plans they must file waivers by the second week of classes. The charge will only be removed if the other plans are deemed comparable. All international students must receive clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

ESM 800: FULL TIME SUMMER RSH
May be repeated for credit.

Earth and Space Sciences

ESM 501: Foundations of Earth Science
Comprehensive analysis of the New York State Earth Science Curriculum taught by an experienced Earth Science teacher. This course is intended for science teachers and science education students.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 511: Pine Barrens Sustainability
The ecologically diverse Long Island Pine Barrens region provides a habitat for a large number of rare and endangered species, but faces challenges associated with protection of a natural ecosystem that lies in close proximity to an economically vibrant urban area that exerts intense development pressure. In this course we will consider the interaction of the ecological, developmental and economic factors that impact the Pine Barrens and the effectiveness of decision support systems in promoting sustainability of the Pine Barrens.
3 credits, Letter graded (A, A-, B+, etc.)

ESM 522: The Planets
A study of present knowledge of planets and their satellites, the interplanetary medium, asteroids, meteorites, comets, and the Sun. Emphasizes the methods of science including the history of astronomical sciences, ongoing deep-space missions, modern astronomical instrumentation, and exoplanet discoveries. Emphasis will be placed on topics contained in the Earth Science curriculum in New York State. A research report is required. This course is intended for science teachers and science education students and requires knowledge of trigonometry, algebra and introductory college level physics.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 523: Collisions in the Solar System
A discussion of the evidence that comet and asteroid impacts have played a significant part in the evolution of the Earth, and other planets of the solar system, as well as an assessment of the actual and perceived hazard posed by terrestrial impacts and discussion of what can be done about it. Research report required. This course is intended for science teachers and science education students and requires knowledge of trigonometry, algebra and introductory college level physics.
Co-scheduled with AST 304 The Universe.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 524: The Universe
The origin, evolution, and ultimate fate of the universe. The course begins with a historical approach with emphasis on the evolution of cosmological ideas from geocentric universes to the Big Bang. Consideration of the evolution of the universe from the earliest moments after the Big Bang to the distant future, including the formation of the galaxies, stars, and planets. Research report required. This course is intended for science teachers and science education students and requires knowledge of trigonometry, algebra and introductory college level physics.
Co-scheduled with AST 301 Collisions in the Solar System.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 532: Atmospheric Fundamentals
This course considers: the principles of atmospheric thermodynamics to assess adiabatic and saturated adiabatic processes; the concepts of radiative transfer such as blackbody radiation, scattering, absorption, and emission by molecules and particles will be discussed; tropospheric and stratospheric chemistry with its subsequent effects on air pollution and chemical cycles; meteorological physical concepts such as geostrophic and gradient winds, and general circulation; and the microphysics of cloud formation and precipitation. Research report required. This course is intended for science teachers and science education students.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 533: Global Climate
This course explores the fundamental physical processes associated with various weather phenomena: tropical cyclones, extratropical cyclones, fronts, convective storms, and local air-sea and mountain flows. The latest analysis techniques, datasets, and tools will be used to understand the climatology and structural evolution of these weather phenomena. Basic forecasting techniques will be applied using observations and numerical model output. Research report required. This course is intended for science teachers and science education students.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESM 534: Air Pollution and Control
This course provides an overall picture of air pollution caused by gas phase species and airborne particulate matter. The sources of air pollution and the transport of air pollutants will be discussed. We will study the underlying chemical processes which can lead to the formation of secondary air pollutants. Their effect on an urban, regional, and global scale and on human health will be assessed. National and international air quality policy regulations will be discussed. The causes and consequences of the stratospheric ozone hole will be outlined. The international efforts in
form of policy protocols to stop stratospheric ozone depletion will be discussed. The natural greenhouse effect will be introduced and our current understanding of global warming will be presented. Research report required. This course is intended for science teachers and science education students.

Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 536: Principles of Weather Analysis and Forecasting
This course explores the fundamental physical processes associated with various weather phenomena: tropical cyclones, extratropical cyclones, fronts, convective storms, and local air-sea and mountain flows. The latest analysis techniques, datasets, and tools will be used to understand the climatological and structural evolution of these weather phenomena. Basic forecasting techniques will be applied using observations and numerical model output. Research report required. This course is intended for science teachers and science education students.

Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 541: Earth's Surficial Environment
This course includes creating and using topographic maps, weathering, soil development, stream systems, groundwater, glacial geology, mass movement, erosion and deposition, instruction will include lectures and laboratory exercises. Research report required. This course is intended for science teachers and science education students.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 542: Tectonic Environment
The use of maps in recognizing, describing and interpreting tectonic features in New York State and around the world; understanding the origin of structural features of the earth's crust and interior; using seismic data to understand the tectonic significance of earthquakes and to describe the earth materials through which seismic waves travel; and understanding the role of plate tectonics in the earth's geologic evolution. Instruction will include lectures and laboratory exercises. Research report required. This course is intended for science teachers and science education students. Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 543: Rocks and Minerals
Identification, properties, formation and occurrence of rock-forming minerals: characterizing igneous, sedimentary and metamorphic rocks including the diverse geologic settings in which they occur with emphasis on their occurrence in the Metropolitan New York area. Instruction will include lectures and laboratory exercises. Research report required. This course is intended for science teachers and science education students.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 544: Geology of New York
The course will explore the geologic development of New York from the Mesoproterozoic to the present and will also explore how the rocks were dated using radiometric methods and fossils. Research report required. This course is intended for science teachers and science education students.

Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 585: Directed Studies
Special studies directed by various faculty members to be taken for variable and repetitive credit.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESS 589: Research for Earth Science Teachers
This course is intended to provide science teachers or graduate students in the Science Education program an opportunity to obtain research experience. A written report is required.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESS 600: Practicum in Teaching
For MAT Earth Science students
Fall, 0-3 credits, S/U grading

ESS 601: Topics in Earth and Space Sciences
This course is intended for science teachers or science education students.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESS 610: Capstone Project in Earth and Space Sciences
This required capstone project considers unifying themes or "big ideas" such as scale and structure, models, stability, and change, systems and interactions, energy and time as they apply to astronomy, atmospheric science and geology. This capstone course integrates "big ideas" across the earth and space sciences. Students should have taken at least two undergraduate or graduate courses in each of astronomy, atmospheric science and geology.
1 credit, Letter graded (A, A-, B+, etc.)

EST

Technology and Society

EST 500: Foundations of Educational Technology for Administrators
This course is designed to teach administrators basic principles surrounding educational technology throughout the school and/or district. Students will explore and discuss critical issues surrounding technology in education. Students will understand administrative technology applications, web 2.0 presentation tools, Internet protocol, cyber safety and cyber bullying, Google Apps, social networking, collaboration tools, portable devices and appitities. The semester project for this course is the development of a needs assessment and research of an educational technology for your school/district.
3 credits, Letter graded (A, A-, B+, etc.)

EST 501: Educational Technology Integration for Administrators
This course is designed to teach administrators how to integrate educational technology within their school/district. Students will understand ISTE Technology Standards for Administrators, the National Technology Plan and the Common Core Standards in relation to educational technology. Students will explore distance education, media streaming and communication tools such as Twitter and Facebook. They will review management systems, data collection/analysis tools and technology funding resources. Students will also learn how to evaluate technology integration throughout their school and/or district. The semester project for this course is the development of an implementation plan and the evaluation of an educational technology that may be used in your school or district.
3 credits, Letter graded (A, A-, B+, etc.)

EST 510: Educational Technology Integration for Administrators

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin
Higher education is impacted by technology on an ever changing scale. Students are bringing in new technology every day. This course will show higher education instructors what technology is available, how higher education students are using technology and offer innovative ways to use that technology to motivate students to learn. Throughout the course students learn about best practices in higher education, a number of web based productivity and course management tools, cyber-ethics and digital footprint, organization of your digital world, collaborating with technology, social media, virtual worlds as well as presentation strategies and tools. The culminating project for this course is the research, assessment, analysis and presentation of a college student profile. Semesters offered

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 511: Infusing Technology into Higher Education Curriculum

The power of technology allows higher education instructors to teach and motivate students to learn in ways never thought possible. This course will show students how to fully integrate technology into the curriculum. For the semester project, students will review and modernize an existing course to make learning more effective and exciting for the higher education student. Students will learn the best way to update courses by understanding different instructional design models, content management systems and the Google Apps for Education suite. Students will enhance his/her web presence and digital profile by harnessing the power of social media and personal learning networks. Students will also explore potential technology grant opportunities for his/her curriculum, department or instructional area. Semesters offered,

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 520: Computer Applications and Problem Solving

A problem-solving course for professionals who use applications software to address administrative and managerial problems. Students develop skills in planning, forecasting, and MIS requirements. The major applications software packages used are Excel and Access. Students learn to create advanced-level spreadsheets and data files, and use them to find optimal solutions to problems in all professions.

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EST 521: The Social and Global Impact of Technology in Education

This course will explore educational systems and practices globally and how the use or lack of use of technology within education impacts society. Inversely students will research how society dictates the use or lack of use of technology in education within the specified educational system. Throughout the course, students will focus on one region of the world and research the current educational system and specifically how they use technology within education. In their research they will find out what technology is available within the educational system, how that technology is used, explore the effectiveness of the technology and research the social impact of that technology use. Students will connect with a global participant via distance communication or video conferencing to gain real world knowledge of the educational system and the use of technology for the specified region. The culminating project is a research based project that assesses the use of technology within the selected global region, offers solutions on how to improve the use of technology and compares that system and the use of technology with our own use of technology locally in our current educational system.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 522: Integrating Educational Technology into Social Studies and Language Arts

Students will learn how to integrate technology into Social Studies and Language Arts curriculum using the ISTE/NETs standards and National Technology Plan to aid in the delivery of instruction. Students will develop a push-in training model focused on the Social Studies and Language Arts Core Curriculum and subject related needs. Students will meet with a Social Studies and Language Arts educator, assess their needs, design an educational technology push-in around those needs and push-in the training with the educator to their class. The culminating activity for this course is to conduct the push-in training with a Social Studies and Language Arts educator and their class. After the push-in training students will work with the instructor to evaluate the delivery and content of the lesson as well as assess the outcome and results of educator learning.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 524: The Role of Educational Technology Specialist

In this course students will learn the role and responsibilities of an Educational Technology Specialist. Students will connect with an administrator and work with the course instructor to develop a year-long technology integration plan. The development of the plan will include: a data driven needs assessment based on current goals and technology available, use of that data to address specific technology/curriculum needs, the integration plan proposal, creation of a professional development plan using workshops, push-ins or one-on-one sessions to deliver instruction and a peer evaluation of the effectiveness of the proposed technology integration plan. In addition, students will learn how to infuse the ISTE Standards and the National Technology Plan into the curriculum, research new technologies and educational resources, and understand the social, political, ethical and legal issues surrounding educational technology.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 525: Google Apps for Education Certified Trainer: Foundations

Google Apps for Education is a powerful suite that now seamlessly integrates into curricula and district technology goals. In this course, students will learn the tools necessary to become a Google Certified Trainer. Students will create and learn how to set up a Google Apps account and domain. They will also develop a comprehensive knowledge of a number of different products within Google Apps including - Drive, Calendar, Gmail, Sites and more. Students will focus on what it takes to become a Google Certified Trainer through hands-on coursework, review and preparation for the six Google Apps for Education Certification exams. The culminating activity for this course is a presentation on how to
integrate one of the Google Apps products into an educational environment.

3 credits, Letter graded (A, A-, B+, etc.)

EST 526: Educational Technology Integration for Administrators
This course is designed to teach administrators how to integrate educational technology within their school/district. Students will understand ISTE Technology Standards for Administrators, the National Technology Plan and the Common Core Standards in relation to educational technology. Students will explore distance education, media streaming and communication tools such as Twitter and Facebook. They will review management systems, data collection/analysis tools and technology funding resources. Students will also learn how to evaluate technology integration throughout their school and/or district. The semester project for this course is the development of an implementation plan and the evaluation of an educational technology that may be used in your school or district. Semesters offered

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 527: The Impact of Mobile Devices and Cloud Based Systems in Education
We are living in a hyperconnected world which allows us instant access to information from anywhere using mobile devices and cloud based technologies. In this course students will learn about what these technologies are, the power they have and what it takes to integrate them into the curriculum. Students will explore a multitude of educational apps, design an app with a corresponding appanity and design a cloud based lesson. Students will also learn how to integrate, sync and deploy a number of mobile technologies within the educational environment including, iPads, Android tablets, Windows Surface tablets, Ultrabooks and Chrome Books. The culminating project for this course is to assess needs, research and develop a plan to integrate one of the mobile technologies within an educational environment.

3 credits, Letter graded (A, A-, B+, etc.)

EST 528: Teaching with Interactive Whiteboards and Immersive Technologies
Interactive whiteboards and other immersive technologies have changed the way educators deliver instruction. They are a technology that has enormous potential to impact student learning in a hands-on, kinesthetic way. Throughout this course students will explore best practices using immersive technologies within education. Students will learn how to effectively integrate interactive whiteboards, interactive projectors and cameras, learner responses systems, document cameras as well as other technologies. The culminating project for this course a comprehensive lesson plan utilizing immersive technology hardware and the associated software within the curriculum.

3 credits, Letter graded (A, A-, B+, etc.)

EST 530: Internet Electronic Commerce
Topics addressed in this course include: technology infrastructure, business models and concepts, technological skills needed to build an E-Commerce web site, marketing, communications, security and encryption, payment systems in E-Commerce/M-commerce. Financial transactions, advertising models, content ownership and the prospects for E-Commerce are also covered.

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EST 531: Virtual Distance Management Course
In today's global corporations, the challenges associated with leadership and management has grown increasingly difficult and complex. More and more, companies are using networked organizational models to deliver work and interact with customers. As globalization and diffused networks of people and companies combine, issues related to virtual/distributed employees, partners and customers have moved front and center. Implications for leadership has grown beyond current skill sets drawn from traditional academic fields and training programs. The Virtual Distance Management course offers business students a powerful model and a set of proven practices to address these challenges in a unique way. Students will learn to: Understand and diagnose barriers to effective communication. Develop ways to work with others using virtual technologies and social media. Contribute to high performance, cross-discipline and cross-cultural teams. Management strategies for the globally distributed workforce. This course, pioneered by Karen Sobel Lojeski, is a conceptual as well as quantitative approach that helps to explain organizational behavior changes when much of our communications are electronically mediated. Understanding these changes and how they impact organizational outcomes is critical to leaders and managers around the world. During this course, students will be exposed to both theoretical models and real-life case studies to more fully develop knowledge and skills for working in the digital age. Students will gain an in-depth understanding of Virtual Distance and how this growing phenomenon impacts critical success factors such as productivity, innovation, and employee engagement and satisfaction. Students will also get hands-on experience with Virtual Distance Index data. Drawing from over 700 project teams from around the world, students will learn how to interpret Virtual Distance data

3 credits, Letter graded (A, A-, B+, etc.)

EST 534: The Lean Launch Pad: Turning a great idea into a great company
This course provides real world, hands-on learning of what it’s like to actually start a high-tech company. This class is not about how to write a business plan, and the end result is not a PowerPoint presentation to venture capitalists. Instead, students will get their hands dirty talking to customers, partners and competitors as they encounter the chaos and uncertainty of how a startup actually works. Students work in teams learning how to turn a great idea into a great company. They will learn how to use a business model to brainstorm each part of a company and customer development to get out of the classroom to see whether anyone other than themselves would want/use their product. Finally, they will see how agile development can help them rapidly iterate their product to build something customers will use and buy. Offered in Fall and Spring.

3 credits, Letter graded (A, A-, B+, etc.)

EST 540: Environmental Management
This is an introduction to environmental management, and will focus on the interplay between science and public policy. Concepts include problem identification and definition, collection and analysis of relevant data to produce information, and the roles of public perception and action in ultimately determining outcomes when consensus is not reached. Specific fields to which these concepts will be applied will be solid waste management and coastal management. Current local problems will be used to illustrate the broader conceptual issues. Offered as MAR 514, EST 540 and CEY 501. Prerequisite: Permission of instructor

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 541: Long Island’s Groundwater
This course will cover basic groundwater concepts in unconsolidated sediments, and examine contamination issues in light of Long Island’s particular hydrogeology, land use, and waste management history. Mathematical principles will be discussed but not stressed.
scientific and technical papers discussing particular concepts or problems, including important local examples, will be closely read. Prerequisite: Permission of instructor. Offered as MAR 521 or HPH 673.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 542: Water and Wastewater Engineering Practices**

This course will provide basic engineering concepts and practices associated with water supply and wastewater management, with an emphasis on New York metropolitan area technologies. Topics covered will include water supply and distribution, wells, water quality testing and regulation, onsite, package and standard wastewater treatment, and stormwater collection. Policy issues considered will include source water protection and wastewater impact mitigation programs. Offered in

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 546: Financing A Low Carbon Society**

The sums involved in a shift to a low-carbon society are daunting but not impossible to achieve. The world is planning to invest over $15 trillion in fixed-asset investments in the next 10 years. Rather a problem of capital generation, the key challenge of financing the transition towards a low carbon society is to redirect existing and planned capital flows from traditional high-carbon to low-carbon investments. This course is designed to allow students to: (1) Review a number of public policies, public finance mechanisms and market-based instruments designed to shift investments from fossil fuels to more climate friendly alternatives over the past few years; (2) Gain knowledge of the global commercial, political, innovation and technological challenges and opportunities in the transition to a low-carbon society; (3) Develop and practice professional skills in raising and spending public finance to catalyze capital towards low carbon and climate resilient development; and (4) Develop and practice professional skills in accessing carbon finance and designing innovative financing instruments.

This course is aimed at engineering students who are interested in the energy challenges in a carbon-constrained world and their implications to technology innovation; at business- and public-administration students and at mid-career professionals who want to develop innovative financing solutions to real-world energy and environmental problems. Summer, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 547: Advanced Problems in Integrated Planning: Theory, Practice, and Analytical Tools**

This course explores in depth new theories and practical applications of integrated planning through the lens and land use, transportation and urban infrastructure systems. A series of problem sets is undertaken in close coordination with the instructor to produce a portfolio of networked research which, with further research, can be publishable quality. Offered

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 550: Introduction to Homeland Security**

The course is a combination of lectures and laboratory experience to introduce students to critical issues and assess needs for homeland security. The course includes invited lectures by experts on special topics such as fundamentals of nuclear, chemical, and biological weapons and the associated threat to the transportation of goods and the public. The students will learn about cyber security, devices to safeguard materials from terrorist threats, safety of nuclear power plants and water supply, forensics and emergency preparedness. The students will submit a term paper on a selected topic in lieu of the final exam.

Prerequisites: Undergraduate level biology, chemistry and physics. Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 553: Nuclear Security**

The course will familiarize students with the fundamentals of nuclear physics, radiation, mining, weapons and fuel cycle, other than producing electricity, as it pertains to nuclear power plants. Topics include nuclear detection, devices to safeguard nuclear materials from terrorist threats, needed physical protection for safe handling and its relevance to Homeland Security. The course combines lectures with hands-on experience at the newly installed nuclear detection facility located at the nearby United States Department of Energy's Brookhaven National Laboratory. Prerequisite: Undergraduate equivalent physics and chemistry.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

**EST 554: Chemical & Biological Weapons: Safeguards and Security**

This course deals with the fundamentals of chemistry and biochemistry related to chemical weapons (CW) and biological weapons (BW) that could be used by terrorists. Topics include CW and BW history, production, control, detection, identification, and emergency response measures to deal with intended or unintended release and escape, and security measures to protect and control stockpiles. Prerequisite: Undergraduate equivalent chemistry, biochemistry, and microbiology.

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

**EST 560: Risk Assessment, Regulation, and Homeland Security**

The course focuses on risk assessment associated with nuclear, chemical and biological weapons as it relates to Homeland Security. Topics include air dispersion, uncertainty analysis, exposure measurements, epidemiology, toxicology, regulatory issues, risk management, risk communication, risk perception, and risk preparedness. The course will also cover laws and regulation, discouraging terrorism, and disaster preparedness, various acts passed by the U.S. Congress to regulate water, air, and controlled substances. Offered as EST 560 or HPH 656. Prerequisite: Undergraduate or equivalent physics, math and chemistry. Fall and Spring, 4 credits, Letter graded (A, A-, B+, etc.)

**EST 562: Decision Support Systems**

A decision support system (DSS) is a computer system that combines data, analytical tools, and models to support decision making. A DSS may be model-driven or data-driven. A model-driven DSS is a stand-alone system that uses some type of model to perform what-if and other kinds of analysis. A data-driven DSS is a system that supports decision making by allowing users to extract and analyze useful information that was previously buried in large databases. In this course, both model-driven and data-driven decision support services will be considered. Students will identify an appropriate engineering or management application. By collecting relevant data, building suitable mathematical models, designing an accessible user interface, and connecting these components via computer code, students will develop a deliverable DSS. Through a series of presentations, they will demonstrate how their DSS addresses the stated engineering or management problem. In doing so, students will gain insight into the interrelationships among information systems, statistics and management science.

Prerequisite: EMP 504 or permission of instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 563: Computer Literacy for Educators**
This course is an introduction to computer and software basics and was formally listed as EST 583. Students will develop an understanding of the underlying concepts and principles behind computers. Students will gain sufficient knowledge to successfully navigate the digital world. Emphasis will focus on computer literacy areas used in education and other professional environments. Students will leave this course with the ability to grasp the risks and benefits surrounding new and current computer technologies. The following skills will be addressed; electronic communication, application-based projects, information management, assessment, and the societal impacts of computer based technologies. Students having completed EST 565 in a prior semester can not receive credit for EST 563. EST 563 and EST 565 may be taken in the same semester.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 565: Foundations of Technology in Education
Throughout this course students will explore the basic pedagogical issues and social impact of using technology in education. This course examines the basic principles of integrating technology and computer applications into the curriculum. Students will learn how to use and integrate word processing, spreadsheet, and presentation applications for educator planning and student project work. Students will also learn how to use a number of online based Web 2.0 applications within school curriculum. The culminating activity for this course is the design and a presentation of a micro-lesson using one these applications as they would in the classroom.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 567: The Internet, Social Networking and Collaborative Environments
In this course students will learn the basic principles of using the Internet for instruction, the science and engineering concepts behind modern communication systems and their impact on education as well as the evolution of the Internet in education. Students will design and create a website and explore the use and social impact of collaborative learning environments and social networking. Students will learn how to evaluate and effectively integrate a variety of educational resources, such as web 2.0 tools and modern communication devices for active learning. Students will also develop a clear understanding of the issues surrounding cybersafety, cyberbullying, and the ethical issues raised by the use of technology in education. The culminating activity for this course is the development and publishing of a collaborative website that showcases the material and skills mastered throughout this course.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 568: Networked Communication Technologies
EST 568 Network Communication Wired and Wireless
This course examines the range of technologies used in teaching, learning, and communication. Instructional technologies both stand-alone and networked are surveyed with a focus on how they can be used effectively to enhance learning. Students will learn fundamental hardware and software principles underlying the development of the Internet and other networked communications tools. Emphasis will be placed on assessment of these technologies in terms of societal impacts and learning outcomes. This course combines topics from EST 565 and EST 567.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 569: Technology in the City
Will technology transform our cities, making them more livable, efficient, and desirable? Will technology erode our cities, making them more dangerous, chaotic, and insufferable? This course is at the intersection of two trends. First, the world is undergoing a wave of urban growth. Second, the pace of technological change is quickening and, with it, the pace of social change and even social transformation. Course modules will cover technology and society in urban contexts with particular attention to: 1) energy, 2) environments, 3) transportation, and 4) health and human safety (including security). This class will involve trips to sites in New York City, and will involve the use of IT technologies in creative ways to advance our learning.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 573: Interactive Multimedia Curriculum Design and Development
This course allows students to learn how to use a variety of multimedia tools for the classroom. Principles of user interface and interaction design will be covered. Throughout the course students design an interactive unit plan using multimedia authoring software. Students will work with audio/video editing software, collaborative learning software, and learn how to embed online games, activities and video within their unit plan. Development of the interactive multimedia unit requires students to: submit a proposal, use graphic organizers to plan and design, create a draft version, create assessment tools, test market with a specific target audience, then evaluate the unit before the final version is completed. The culminating activity is the presentation and delivery of the finished interactive multimedia unit.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 574: Distance Learning and Virtual Environments
Web-based distance learning applications are quickly growing within higher education institutions, K-12 schools, and corporate environments. The focus of this course is on the underlying theories, design, and implementation of effective modes of e-learning. Students will explore virtual schools, virtual learning, virtual environments and other forms of distance education. The social differences between face-to-face and virtual learning will also be examined and discussed throughout the course. Students will explore virtual learning resources and design their own virtual learning lesson. The
Principles of human-computer interaction applied to the design of educational courseware. Usability engineering, with a focus on the audience and learning objectives. Interface design principles. Human computer dialogs. Multimedia as a communication tool, using images, audio and video. Multimodal input devices and strategies. Students will use a multimedia authoring tool to create a prototype of an educational application or learning tool.

3 credits, Letter graded (A, A-, B+, etc.)

EST 579: Educational Games
Simulations and computer games as a learning tool. Traditional game and simulation genres, and their appropriate uses in education. Gameplay design. Game development process, from storyboarding to delivery. Assessing games as learning tools. Students will use a multimedia tool to prototype an educational game or simulation of their own design.

3 credits, Letter graded (A, A-, B+, etc.)

EST 580: Advanced Technology Assessment: Business, Government and Strategy
This course has a two-fold objective: (1) to help students develop strong conceptual foundations for understanding and addressing issues at the intersection of science, technology, public policy, and business strategy; and (2) to provide students with knowledge of analytical frameworks and tools that are essential to technology assessment in business, government, and government, and other organizations with understanding of their strengths, limitations, and underlying assumptions. Topics covered include utility/profit maximization theory, its limitations and alternative theories, business and government interactions, technology innovation and management, technology forecasting, impact assessment, technology valuation, and basic tools for technology assessment (monitoring, simulation, expert opinion, scenario analysis, cost-benefit analysis, AHP method, etc.).

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

EST 581: Methods of Socio-Technological Decision Making
Focus is on the application of decision-making techniques to analyze problems involving technology, particularly its social impacts. Areas of study include decision making under uncertainty, decision making in a passive vs. active environment, sequential decisions, estimating payoffs, forecasting, and technology assessment. These systems-analysis techniques are used to formulate and solve a variety of socio-technological problems, especially those that arise in educational, industrial, and environmental professions.

Prerequisite: Graduate standing in department or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 582: Systems Approach to Human-Machine Systems
General systems theory concepts such as feedback, stability, tipping point, resilience, recursion, hierarchy, and complexity will be discussed, and used to analyze examples of complex systems drawn from nature, business, technology, and education. The course will address the use of feedback, information and communication, structure, and cybernetics to manage complex systems. Students will prepare a study of a complex system and its management incorporating these general concepts. Offered as EST 582 and HPH 662. Prerequisite: EST 581 or permission of instructor, Graduate standing in the department, Spring

3 credits, Letter graded (A, A-, B+, etc.)

EST 584: Air Pollution and Air Quality Management
The effects of air pollution on the environment and public health are explored. Primary pollutants, such as particulates, oxides of sulfur, nitrogen and carbon, hydrocarbons, lead and CFCs are considered, as are secondary pollutants, such as sulfuric acid, PAN, and surface ozone. The effect of atmospheric conditions on the dilution and dispersion of pollutants and the impact of pollution on the global atmosphere are explained. Air pollution disasters and the impacts and ramifications of the Clean Air Act of 1970, its 1990 amendments, and recent international accords are discussed. Case studies of air pollution reduction, management, and regulation in local industry are included. Other contemporary topics include the loss of stratospheric ozone and global warming due to human activities.

Cross-listed as EST 584 or HPH 683.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 585: Assessment of Technology in Learning Environments
This course is designed to provide educators with an overview of the uses of technology to improve instruction. Students will understand the design and function of learning environments, individual applications related to the student's area of professional practice, and assessment of educational uses of technology today and tomorrow. Students will choose a current technology used in a specific learning environment and analyze and evaluate
its effectiveness within instruction including practical classroom use and staff development for the particular technology. Students will then research and make recommendations on how the particular technology could be integrated most effectively to increase teacher understanding and enhance student learning. Students then present their findings about the current use of the chosen technology, possible improvements on its use as well as future technology recommendations.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 586: Environmental and Waste Management in Business and Industry

Environmental and waste management practices in industrial and other institutional settings. Technologies of hazardous waste prevention, treatment, storage, transportation, and disposal are considered. Topics include information systems and software tools for environmental audits, regulatory monitoring and compliance, cost estimation, recycling programs, air, land and water emissions controls and permits. Employee health, safety, and education and quality management and examined. Field trips to several Long Island institutions.

3 credits, Letter graded (A, A-, B+, etc.)

EST 587: Today's Technology: Impact on Education and Economics

This course involves the student in studies of the science, technology, and economics of four selected areas: electronics, transportation, energy, and health sciences. Classroom time is supplemented by visits to appropriate facilities in each area; individuals and groups also plan for the use of the information in their specific areas of responsibility. For example, teachers are responsible for developing teaching strategies for use of the information in their classes and for student career advice and preparation. Those from commerce and industry learn of the powerful influence of technological development on regional economics. This knowledge is helpful in carrying out strategic planning and forecasting within the student's organization.

3 credits, Letter graded (A, A-, B+, etc.)

EST 588: Technical Communication for Management and Engineering

The ability to communicate technical ideas clearly and effectively is critical to success in management and engineering. Hours and money are wasted when confused, distorted writing and speaking obscure the information they are intended to convey. This course will provide managers, engineers, and other technical professionals with practical methods for making their memos, reports, and correspondence clear, comprehensible, and persuasive. Students learn strategies for communicating with both nonspecialist and technical audiences, stating their purpose clearly, organizing points most effectively, and expressing ideas concisely and precisely. Special attention is given to technical presentations and to communicating in meetings.

3 credits, Letter graded (A, A-, B+, etc.)

EST 589: Technology-Enhanced Decision Making

This course examines the use of technological devices, especially computers, as aids in decision making. A treatment is given of the cognitive science and artificial intelligence methods used in the structure and operation of some systems that support human decision making. Medical diagnosis systems, business and industrial planning systems, and computer-aided dispatch systems are discussed. In addition, the application of high technology in air traffic control systems is examined.

3 credits, Letter graded (A, A-, B+, etc.)

EST 590: Seminar for MS, TSM Students

A forum for the discussion of research methods, project ideas, and proposal preparation. A final product of this seminar is an approved master's project proposal. Each student also leads a discussion of an important technology-society problem, such as censorship of the Internet, scientific decision making, or environmental regulations. Each student works with a faculty advisor on background research and preparation of the master's project proposal.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 591: Independent Study in Technology and Society

The primary objective of independent study is to provide a student with opportunities to interact with faculty members who can be of assistance in his or her master's project. Students should consult individually with faculty members on workload and credit(s).

1-3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.


The ample supply and appropriate use of energy is critical to the well being of human society. Energy plays an enormous role in environmental degradation, national insecurity, international conflict, and in solutions to these problems. This course aims to introduce the major energy issues to students in engineering, business, and public policy areas. It discusses the energy choices to meet regional and global energy needs. Major renewable and conventional energy sources, energy supply technologies, and end-use efficiency options will be assessed in the context of political, social, economic, and environmental goals.

3 credits, Letter graded (A, A-, B+, etc.)

EST 593: Risk Assessment and Hazard Management

A case-study approach to the assessment of risk and the management of natural and technological hazards, with emphasis on those that can harm the environment. The course focuses on technological hazards involving energy, transportation, agriculture, natural resources, chemical technology, nuclear technology, and biotechnology, and on natural hazards such as climatic changes, droughts, floods, and earthquakes. The first part of the course consists of readings on risk assessment and hazard management and discussions of published case studies. During the second part of the course, students conduct Offered as EST 593 or HPH 686.

3 credits, Letter graded (A, A-, B+, etc.)

EST 594: Diagnosis of Environmental Disputes

Diagnosis of disagreements about environmental and waste problems. Tools for evaluating disputes about (a) scientific theories and environmental models, (b) definitions and analytical methodologies for estimating risk, “real” cost, net energy use, and life-cycle environmental impact, (c) regulatory and legal policy, (d) siting of controversial environmental facilities, and (e) fairness and other ethical issues. These diagnostic tools are brought to bear upon case studies of pollution prevention, recycling, nuclear waste disposal, and climate change.

3 credits, Letter graded (A, A-, B+, etc.)

EST 595: Principles of Environmental Systems Analysis

This course is intended for students interested in learning systems engineering principles relevant to solving environmental and waste management problems. Concepts include compartmental models, state variables, optimization, and numerical and analytical solutions to differential equations.

Prerequisites: MAT 132 and one year of quantitative science such as physics, chemistry, or geology; or permission of instructor. Offered as EST 595 or HPH 688.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
EST 596: Simulation Models for Environmental and Waste Management

This course is intended for students interested in developing computer models for technology assessment and for environmental and waste management. Concepts developed in EST 595 Environmental Systems Engineering and Analysis are applied to real-world problems. Techniques in model development are presented in the context of applications in surface and groundwater management, acid rain, and health risks from environmental contamination. Offered as EST 596 or HPH 689.

Prerequisite: EST 595 or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

EST 597: Waste Management: Systems and Principles

Students will learn about the technologies and policy options in waste management, emphasizing recycling, incineration, landfilling, and source reduction options for municipal solid waste on Long Island. Problems concerning paper, glass, plastic, organic materials, and other waste stream components will be explored. Environmental impacts and economics of landfills, materials recovery facilities, and waste-to-energy systems are examined. The institutional and regulatory climate, current and planned practices in the region, and hazardous waste will be discussed. Cross-listed as CEY 597 or HPH 663 or EST 597.

3 credits, Letter graded (A, A-, B+, etc.)

EST 598: Teaching Practicum

Designed to give graduate students teaching experience.
3 credits, S/U grading

EST 599: Special Projects and Topics

A technology assessment laboratory for emerging problems and focused research. May be run as a hands-on, group research study of an important educational, environmental or waste problem (perhaps to provide an assessment to a regulatory agency or administrative system).
1-12 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

EST 600: Technology, Policy, and Innovation: Theory and Practice

This course provides students with frameworks and models for analysis of issues at the intersection of science, technology and public policy, and business strategy; and helps students develop skills to work on policy issues that require deep understanding of the technical details. Topics include utility/profit maximization theory, its limitations and alternative theories, business and government interactions, technology innovation and management, policy process (agenda setting, problem definition, framing the terms of debate, formulation and analysis of options, evaluation of policy outcomes). Cases drawn from energy and environmental policy, educational technology, STEM education will be used to illustrate stakeholders and their value structures, high levels of uncertainty, multiple levels of complexity, and their influence on policy intervention. This course emphasizes quantitative policy analysis methods, and critical thinking.
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

EST 610: Data Analysis for Technology, Policy and Innovation

Common empirical tools used for research in Technology, Policy, and Innovation. Topics include: data collection and sampling techniques, descriptive statistics, probability concepts, estimation, formulating and testing hypotheses, and simple and multiple regression analysis. Discussion of assumptions, strengths and weaknesses of various statistical tools and methodologies. Emphasizes the analysis and presentation of information through visual and numerical means. Use of modern statistical software to analyze real data sets involving socio-technological applications.
Prerequisites: Admission to PhD program or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

EST 620: Decision Making in Socio-Technological and Global Contexts

Methodologies and applications to enhance students' abilities to use qualitative and quantitative approaches to examine decision problems within socio-technological and global contexts. Psychological, social and cultural influences on decision making in organizations. Power and limitations of the theories, models and tools of decision analysis. Applications to decision problems in a variety of areas, including energy and environmental systems, educational technology and education in science and engineering, technology management, and science and technology policy.
3 credits, Letter graded (A, A-, B+, etc.)

EST 650: Directed Study

Individual studies under the guidance of a faculty member. Subject matter varies according to the needs of the student. May be repeated for credit.

1-9 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

EST 680: Teaching, Learning, and Technology

A professional development seminar that is designed to help Ph.D. students develop the competencies needed to become effective teachers in colleges and universities. Students will learn relevant teaching and learning theories and their applications to teaching courses and laboratory sessions. Students will learn methods for the design and assessment of courses, including courses that integrate appropriate technologies to enhance learning and teaching. Students will learn how to create learning environments that build on the strengths and address the varied needs of a diversity of learners.
Restricted to Ph.D. students registered in the Certificate Program on College Teaching.
Fall and Spring, 0-3 credits, Letter graded (A, A-, B+, etc.)

EST 688: Internship in Research

Participation in private corporations, public agencies, or non-profit institutions. Students will be required to have a faculty coordinator as well as a contact in the outside organization to participate with them in regular consultations on the project, and to submit a final report to both. At most one credit can be accepted toward the degree.
1-3 credits, S/U grading
May be repeated for credit.

EST 690: Seminar in Theory Building

Science is about discovering facts as well as explaining what the facts mean. Theories provide explanations and interpretations of empirical phenomena and building and modifying theories are at the heart of core scientific activities. Good theory is essential to many new fields for several reasons. First, good theory provides guidance for practical action and therefore should be at the foundation of curricula. Second, without good theory in any particular field, researchers must borrow theories from other academic disciplines. While this can be useful, sometimes these theories might not fit our subject matter well. For example social theories based on behavioral assumptions stemming from non-digital communications do not fully address substantive features of social behavior in a digital age. Research courses commonly emphasize empirical research methods and formal modeling approaches to theory development. There is much less guidance for those who want to build a theory for managerial and behavioral studies—Yet every researcher must do so to develop a
good research proposal. This seminar aims to fill that gap by focusing on theory types and evaluation criteria, theory development processes, and theoretical writing. Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 691: Seminar on Innovation, Invention, and Diffusion**

Innovation is viewed as central to progress for any individual, organization, nation or global effort. In this seminar we will discuss invention, the two main phases of innovation, exploration and exploitation, the notion of diffusion of innovation and finally innovation policy as well as policy innovation. We will explore a number of types of innovation including radical versus incremental, technological versus administrative, product versus process and more. Using relevant case studies and selected readings from the most influential voices on innovation, including those in academia, corporate America as well as policy-making organizations, we will explore the many different sides of innovation, why it is one of the most critical issues of our time and how seminar participants can contribute to overall innovative efforts. Offered Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**EST 697: Directed Study**

Individual studies under the guidance of a faculty member. Subject matter varies according to the needs of the student. 1-9 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**EST 698: Practicum in Teaching**

This course enables graduate students to gain experience in teaching and interacting with students enrolled in Technology, Policy, and Innovation courses. Students enrolled in EST 698 are expected to perform various teaching duties required by the course instructor, such as attending lectures, providing office hours, holding review/recitation session, proctoring exams, grading, etc...

Fall, 1-3 credits, S/U grading May be repeated for credit.

**EST 699: Dissertation Research on Campus**

Dissertation research under direction of advisor. 1-9 credits, S/U grading May be repeated for credit.

**EST 700: Dissertation Research Off Campus - Domestic**

Prerequisite: Must be advanced to candidacy (G%). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor. 1-9 credits, S/U grading May be repeated 1 times FOR credit.

**EST 701: Dissertation Research Off Campus - International**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are not in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by the second week of classes. The charge will only be removed if other plan is deemed comparable. All international students must receive clearance from an International Advisor. May be repeated for credit. Offered every semester, 1-9 credits, S/U Grading 1-9 credits, S/U grading May be repeated for credit.

**EST 800: Summer Research**

May be repeated for credit.

**FLA**

**Foreign Language Teacher Preparation**

**FLA 505: Methods: Foreign Language**

An in-depth exploration of the methods and materials for teaching of foreign languages, literatures, and cultures. Special attention is given to the theories of first and second language acquisition and to the techniques for teaching listening, speaking and writing. This course gives students the opportunity to conduct observations/field experiences in grade level (7-12) settings. 3 credits, Letter graded (A, A-, B+, etc.)

**FLA 506: Curriculum Development**

Drawing on theories of first and second language acquisition and research into the best practices of language teaching, this course trains future language teachers in the development of well-articulated language programs. Students have the opportunity to enjoy clinical experiences in school settings. Special attention is given to the development of a professional teaching portfolio including lesson plans, assessment instruments, and technology-based activities. 3 credits, Letter graded (A, A-, B+, etc.)

**FLA 507: Critical Pedagogy**

This graduate seminar is intended to introduce the ideas, theories, and practices that together constitute the field known as critical pedagogy. Critical pedagogy assembles numerous forms of academic approaches to teaching and curriculum that are informed by critical social theory. As the educational arm of critical social theory, critical pedagogy engages educators in understanding the relationships among knowledge, ideology, and power. We will read works from several critical pedagogy theorists (Freire, Shor, Giroux, McLaren, Apple, hooks) to explore some of the key themes within critical pedagogy (relations of power: issues of difference and pluralism; transformative education; the social construction of knowledge; dialogic relations in the classroom; teaching for social justice). Learning through collaborative inquiry, we will translate the theories in these readings into practice and will test ideas and concepts unique to teaching and learning "critical (second/foreign) language" in a school setting. 3 credits, Letter graded (A, A-, B+, etc.)

**FLA 540: Foreign Language Acquisition Research**

A study of recent trends in foreign language acquisition research. The focus is on classroom-based research: qualitative and quantitative research methodologies, variables in classroom-based learning research, analysis of research results. Students conduct a classroom research study, present their findings, and address applications to their findings to classroom teachers and learners of foreign languages. Fall or Spring 3 credits, Letter graded (A, A-, B+, etc.)

**FLA 549: Field Experience**

Observation, inquiry, and practice in foreign language education at the secondary level including 50 hours of documented visitations and observations at approved sites. Field experience writing logs are the basis of group discussion. S/U grading. 1 credit, S/U grading

**FLA 550: Field Experience**
Observation, inquiry, and practice in foreign language education at the secondary level including 50 hours of documented visitations and observations at approved sites. Field experience writing logs are the basis of group discussion. S/U grading.

1 credit, S/U grading

FLA 551: Supervised Student Teaching
7-9

FLA 552: Supervised Student Teaching
10-12

FLA 554: Student Teaching Seminar

FLA 571: Foreign Language Technology and Education
Course open to non-D.A. graduate students. Assumes knowledge of material taught in DLL/FLA 570. Addresses more globally and more theoretically the intersection between technology and languages. Issues of cognitive learning theory and educational psychology addressed. Offered as DLL 571 and FLA 571 Prerequisites: DLL 505 and FLA 506

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FLA 581: Foreign Language Teaching Independent Project
Students enrolled in Track B of the MA program in European Languages (French, German, Italian or Russian) or the MA in Hispanic Languages complete an independent project in the area of Foreign Language Teaching. The content and scope of this project must be approved by the Director of Foreign Language Pedagogy. Possible projects include a fully developed professional teaching portfolio (in print and/or electronic version), an action research study or a classroom-based research study culminating in a publishable paper. Fall or spring

3 credits, Letter graded (A, A-, B+, etc.)

FRN 500: Techniques of Reading for Graduate Research
Through intensive study of language structures and idiomatic usage, with extensive practice in written translation of literary and scholarly texts, candidates for advanced degrees are able to attain the proficiency level of the graduate French reading requirement. Several departments grant exemption from further examination for successful completion of this course. (Not for graduate students in French.)

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FRN 501: Contemporary Culture and Civilization
Analysis of contemporary French civilization through the study of the development of its historical, cultural, political, and social characteristics. Designed for potential teachers of French at the college level as well as in secondary schools, this course will emphasize and trace the evolution of the character and institutions of contemporary France and French-speaking countries.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FRN 502: French Civilization in Its Historical Perspective
In this course, students study historical French civilization concentrating on those features which have created France today and its current culture. Political and social developments are considered as well as major trends in the arts.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FRN 507: Stylistics
Stylistic theory and analysis. Contrastive stylistics French/English. Exploration of the connotative level of written message. Designed to develop and refine written expression in French and analysis of literary and non-literary texts.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FRN 510: Phonetics
The pronunciation of French with emphasis on intonation and articulation. Theory and practice of linguistic and phonetic factors of the sound system. Coursework includes phonetic transcriptions, oral and aural transcriptions, as well as pronunciation. The class is entirely conducted in French.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FRN 511: Business French
A course designed to provide efficiency in spoken and written business French with an emphasis on bilingual translation. This course will also familiarize students with French business domestically, in the context of the European Union, and in contrast to America. Issues of current importance as well as institutions will be studied. Students will also carry on individual projects such as comparing marketing strategies of an American company in the US and in France or profiling a major French company.

3 credits, Letter graded (A, A-, B+, etc.)

FRN 513: Romance Linguistics
This course examines the linguistic evolution of the Romance languages from the classical period through modern times. The synchronic grammars of Italian, French, and Spanish are examined.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FRN 531: Studies in 17th-Century French Literature
Analysis of some of the major literary genres of 17th-century French literature such as tragedy, and comedy, novels or poems, or focus on some of the major themes of 17th-century literature in general, Mme de Lafayette, La Rochefoucauld, La Bruyère, etc. The class is entirely conducted in French.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FRN 532: Seminar in 17th-Century French Literature
Special topics in 17th-century French literature. Intensive reading and analysis of selected texts by authors such as Descartes, Pascal, La Fontaine, La Rochefoucauld, La Bruyère, Mme de Sevigné, Mme de Lafayette, among others. Changing topic. The class is entirely conducted in French.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

FRN 541: Studies in 18th-Century French Literature
A study of the major texts of the 18th-century expressing the struggle between absolutism and the emerging forces of Enlightenment, preromanticism. It may include the works of Montesquieu, Voltaire, Diderot, Rousseau, Beaumarchais, and Laclos, among others, as well as the works of lesser-known authors who also helped reshape the literary scene during that time

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

FRN 542: Seminar in 18th-Century French Literature
Special topics in 18th-century literature, such as "Le roman initiatique," and "Eros in fiction," are studied through the works of major writers of the period as well as those
of lesser-known figures, in particular women writers.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

FRN 552: Studies in 19th-Century French Literature
Close reading of selected works by major novelists of the period, such as Balzac, Stendhal, Flaubert, Zola; themes such as Paris versus the provinces, money and decadence; or 19th-century poetry by Baudelaire, Mallarme, Verlaine, and Rimbaud, with an introduction to some important critical approaches to these texts.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

FRN 561: Seminar in 20th-Century French Literature
Special attention to a literary trend, a movement of ideas, or a single author of the first half of the century. Topics are considered in parallel with the political and social contexts, and with other artistic mediums such as cinema, painting, or photography. Possible topics: Avant-garde & Surrealism, Existentialist writers, War Literature, Marcel Proust, Jacques Prevert, etc.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

FRN 562: Studies in 20th and 21st-Century Literatures
Focused examination of contemporary French literary texts and recent Francophone writings of Belgium and Switzerland. Questions may address the limits of fiction and representation in the novel, the status of modern theater and poetry, the new impact of visual and technological devices, human relationships in the global world.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

FRN 564: Seminar in Francophone Literature
Close examination of the literatures written in French of the Francophone world outside of France. This course will pose and explore questions such as: What is Francophone literature? What is the function of writing in French in a Francophone context? Attention is paid to the issue of critical approaches to these texts. Topics vary from year to year and may include texts from any of the French-speaking territories outside of France.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

FRN 570: Special Topics in French Literature
Courses given in the past have covered a single author, French women writers, French poetry of 1664-1674 and other topics.
3 credits, Letter graded (A, A-, B+, etc.)

FRN 571: Free Seminars
Courses given in the past have covered a single author, genre, and other topics.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

FRN 581: Independent Individual Studies
May be repeated for credit as the topic changes.
Prerequisite: must be enrolled in a graduate program.
Fall, 1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

FRN 591: Language Acquisition I
Elementary French I intended for graduate students from other programs.
1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

FRN 592: Language Acquisition II
Elementary French II intended for graduate students from other programs.
1-4 credits, Letter graded (A, A-, B+, etc.)

FRN 593: Language Acquisition III
Intermediate and Advanced French intended for graduate students from other programs.
1-6 credits, Letter graded (A, A-, B+, etc.)

FRN 595: Practicum in Teaching
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

FRN 599: Thesis Research
Fall and Spring
1-6 credits, S/U grading
May be repeated for credit.

FRN 800: Summer Research
May be repeated for credit.

GEO 500: Geosciences Research Seminar
Meetings in which first-year graduate students and undergraduates with senior standing learn about the research activities of the Geosciences faculty.
Fall, S/U grading

GEO 502: GIS for Geologists
A practical introduction to geographic information system software. Participants learn to use direct measurement and mathematical techniques to compute the location of features and gain practical experience in rendering imagery and tabular geographic data as layers on maps. The course consists of two three-hour sessions per week for the first five weeks of semester, which include fieldwork, lectures, demonstrations and software-based analysis of data.
This course meets with GEO 588 (Geological Field Methods for Earth Science Teachers) for the first five weeks of the semester. Students may not take GEO 502 and GEO 588 for credit.
Fall, 1 credit, Letter graded (A, A-, B+, etc.)

GEO 503: Mineral Equilibria
Covers the basics of the application of the principles of chemical thermodynamics to the resolution of geochemical and petrological problems. Begins with the first law and continues through phase transitions, properties of fluids, definitions of fugacity and activity of major and trace elements in fluids and molten solutions; configurational entropies; models quantifying nonideal mixing in solid solutions. Additional topics include interpretation of calorimetric studies and/or solubilities of minerals in aqueous solutions.
Prerequisites: Physical chemistry and thermodynamics, or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 505: Experimental Petrology Laboratory
The course is designed to give the student experience in some or all of the following techniques of experimental petrology: evacuated silica-glass tube experiments, one-atmosphere quenching experiments (with and without controlled atmospheres), 1- to 5-kbar hydrothermal systems (using oxygen buffers where necessary), gas-media experiments up to 7 kbar, and solid-media, piston-cylinder experiments.
Requirements: Completion of a project involving several of the above techniques; written report Spring, 1 credit, Letter graded (A, A-, B+, etc.)

GEO 506: Theoretical Petrology
Theory of phase diagrams, Schreinemaker’s rules, heterogeneous equilibria, experimental systems of petrologic interest, and properties of solutions.
Prerequisites: Metamorphic and igneous petrology and physical chemistry or thermodynamics; or permission of instructor Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 507: Petrogenesis
Discussion of the origin and evolutionary history of selected types of igneous and metamorphic rocks by integrating the principles of heterogeneous phase equilibria, trace-element and isotopic geochemistry, crystal chemistry, and geologic occurrence.
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

GEO 508: The Rock-Forming Minerals
Study of the crystal chemistry, intracrystalline cation distribution (homogeneous equilibria) stability, and paragenesis of the rock-forming minerals. Special emphasis is placed on amphiboles, feldspars, micas, and pyroxenes.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 510: Dimensions of Global Change
This course is designed to be an intense study in global climate change science. The emphasis will be on modern climate change however, by studying the contributions of paleoclimatology we can gain insight into how the climate system operates. To understand modern climate change and predictions, it is necessary to develop an understanding of natural climate forcing, natural variability and feedbacks in the climate systems. Adding to natural variation are the impacts of anthropogenic forcing. The course will examine the measured and predicted consequences of these anthropogenic forcing.
Offered Fall and Summer, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 511: Computer Programming for the Geosciences
An introduction to object-oriented programming in Java for geoscience students. Participants are required to develop interactive programs to serve as educational or research tools pertaining to topics within the geosciences. These programs, or applets, include a graphical user interface that enables users to control parameters and observe results. The applets are posted on the World Wide Web.
Prerequisite: Geosciences graduate standing Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 512: Structure and Properties of Materials
An introductory course that will explore materials from the viewpoint of their structure and chemistry and how these affect applications. Different states of matter (crystals, quasicrystals, glasses, liquids) will be discussed and their similarities and differences, focusing on the crystalline state. Nanomaterials and their peculiarities in terms of structure and properties will also be considered. Particular attention will be paid to (1) Materials for energy and environment applications, (2) materials for technological applications, and (3) Earth and planet-forming materials.
3 credits, Letter graded (A, A-, B+, etc.)

GEO 513: GIS Fundamentals I
This course provides the basic concepts underlying modern geographic information science and technology. Emphasis is placed on the principles of GIS for collecting, storing, characterizing, and maintaining data and computer-based techniques for processing and analyzing spatial data. The course includes three hours of lecture, in class exercises and homework projects each week. This is a computer based class with the majority of students work involving GIS computer software. Prerequisite: working knowledge of spreadsheet software
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

GEO 514: Introduction to Physical Hydrogeology
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 515: Geohydrology

GEO 517: Crystal Chemistry
The structure/property/composition relationships in solids. An introduction to the common structure types and how they illustrate principles useful in understanding more complex solid-state materials. Applications of modern scattering techniques to the study of solids, particularly Earth materials, are also included.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 518: Carbonate Sediments
An intensive study of the formation, deposition, lithification, and diagenesis of carbonate sediments. Lectures and seminars emphasize principles of carbonate deposition, facies relationships, and chemistry. Laboratories emphasize binocular and petrographic analysis of recent and ancient carbonates.
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

GEO 519: Geochemistry of Natural Waters
A comprehensive quantitative treatment of the processes controlling the chemistry of polluted and unpolluted surface and groundwater. Topics covered include thermodynamics and kinetics of water-rock interaction; mineral solubility; chemical speciation; redox reactions; adsorptions; carbonate chemistry; and speciation, mobility, and toxicity of metal ions. Based on a knowledge of these processes, the chemical composition of a wide variety of surface and groundwaters is interpreted. Water-quality criteria and their application are also discussed.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 520: Glacial Geology
History of glaciation on earth, formation and dynamics of glaciers and ice sheets; processes of glacial erosion and deposition; and the nature of glacial sediments and landforms particularly relating to the development of Long Island.
Prerequisite: Physical Geology
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 521: Isotope and Trace Element Geology
Application of radiogenic isotopes and trace elements to the petrogenesis of igneous, metamorphic, and sedimentary systems including water-rock interaction in diagenetic
and hydrothermal systems. Evaluation of radiogenetic techniques for determining the ages of rocks and minerals.  
**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 522: Planetary Sciences**

The chemical, physical, and petrologic properties of meteorites are reviewed. These data and data for the moon and the terrestrial planets are used to form a picture of the origin, chemical evolution, and accretion of planetary material.  
**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 523: Geodatabase and Design**

Concepts of geodatabase design and management in geographic information systems (GIS), SQL statements, geographic data types and functions, data entry, and techniques of geographic information structure applications.  
**3 credits, Letter graded (A-, B+, etc.) May be repeated for credit.**

**GEO 524: Organic Contaminant Hydrology**

There are a host of chemical, biological, and physical processes that affect the transport and fate of organic chemicals in natural waters. This course concerns understanding these processes and the structure-activity relationships available for predicting their rates. The major focus of this class is on contaminant hydrology of soil and aquifer environments, and includes the principles behind remediation and containment technologies. This course is offered as both MAR 524 and GEO 524.  
**Prerequisite: GEO 526 or MAR 503 or permission of instructor**

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 525: GIS Fundamentals II**

GIS Fundamentals II will introduce the applied use of Geographic Information Systems (GIS) which is now used extensively in analytical studies. The course emphasizes the applications of GIS in solving real-world problems. Students are expected to gain an understanding of GIS theory, methodology and most importantly application. Students are also expected to demonstrate abilities of spatial thinking, spatial analysis, and be able to solve practical spatial problems utilizing a GIS.  
**3 credits, Letter graded (A-, B+, etc.) May be repeated for credit.**

**GEO 526: Low-Temperature Geochemistry**

Fundamental principles of chemical thermodynamics and kinetics, including isotope effects, as they pertain to geochemical processes occurring in surface and near-surface environments. Consideration is also given to mass transfer process and reaction pathways.  
**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 528: Carbonate Geochemistry**

Examination of the mineralogical and chemical characteristics of the rock-forming carbonates with emphasis on stabilities in the geological environments. Includes study of phase relations; trace and minor element chemistries; and mechanisms of growth, dissolution, and replacement. Use of current research techniques as applied to carbonate minerals.  
**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 530: The Geology of Mars**

Overview of Mars as a planetary system. Evolution of the planet and its atmosphere through time. Detailed discussion of processes that have shaped the martian surface, including erosion, sedimentation, volcanism, impact cratering, physical and chemical weathering. Comparison of geologic processes on Mars and Earth. Discussion of past and future spacecraft missions to Mars. Three hours of lecture per week.  
**3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 531: Crystalline Solids**

Principles of symmetry, single-crystal, and powder X-ray diffraction techniques and elements of crystal structure determination are considered. Use of crystallographic data in the study of mineral systems. Laboratory in diffraction techniques includes extensive use of digital computers.  
**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 532: Solid-State Geochemistry**

The application of crystallographic techniques to problems in mineral chemistry. Concepts of the crystal lattice, order-disorder, atom radii, chemical bonding, atom coordination, solid solutions, and physical properties of minerals. Emphasis on silicate and sulfide crystal structures.  
**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 533: Geochemistry of the Terrestrial Planets**

A brief overview of basic principles of geochemistry, including origin of the elements, geochemical and cosmochemical classification of the elements, and a geochemical perspective of the periodic table. This is followed by an examination of the compositions and chemical interactions among the major geochemical reservoirs of the terrestrial planets, including their cores, mantles, crusts, and where relevant, sedimentary shells.  
**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 535: Regional Structure and Tectonics**

Formation and development of continental crust in Phanerozoic mountain belts. The structure and origin of ocean crust, magmatic arcs, and continental margin sequences are studied using geophysical, geochemical, and geologic data from ancient and modern examples.  
**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 540: Solid Earth Geophysics**

An overview of solid earth geophysics. Topics include earthquake and exploratory seismology, gravity, magnetics, geochronology, and heat flow. There is an emphasis on how all of these techniques shed light on the nature of the Earth's interior and dynamics.  
**Prerequisite: Physical geology, undergraduate physics and calculus**

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 542: Inverse Theory**

Introduction to the basic concepts of inverse theory and its application to the study of the internal structure of the Earth and related problems.  
**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**GEO 543: Stratigraphy**

The history and practice of defining units of layered rocks and interpreting their spatial relationships. Topics include the basis for the geologic time scale, lithostratigraphic versus chronostratigraphic units, biostratigraphy, magnetostratigraphy, facies patterns and Walther's law, subsurface stratigraphy, and the application of stratigraphy to geological problems. One three-hour laboratory per week. Laboratory work emphasizes practical techniques in stratigraphy.  
**Prerequisite: GEO 546 or undergraduate mineralogy and petrology**

**Fall, 4 credits, Letter graded (A, A-, B+, etc.)**

**GEO 546: Mineralogy and Petrology**

An introduction to mineralogy and petrology, including crystallography, crystal chemistry, mineral identification, and the processes that govern the formation of igneous and metamorphic rocks. Two three-hour laboratories per week.  
**Prerequisite: Undergraduate physical geology and one year of undergraduate chemistry**

**Spring, 4 credits, Letter graded (A, A-, B+, etc.)**
GEO 547: Remote Sensing in Geosciences
Comprehensive study of commonly used image analysis methods in earth, environmental and planetary sciences. Discussion of physical principles that are the basis for remote sensing techniques. Participants gain practical experience in geologic and environmental problem-solving using satellite imagery.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 549: Structural Geology
Principles of structural geology, including the recognition and the mechanics of crustal structural features. Topics include folding and faulting, stress and strain, and the nature of brittle and ductile lineations and foliations in the crust. One three-hour laboratory per week.
Prerequisite: Undergraduate physical geology Spring, 4 credits, Letter graded (A, A-, B+, etc.)

GEO 550: Global Tectonics
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 551: Physics of the Earth I
Study of the internal structure and properties of the Earth as revealed by field and laboratory investigations. Topics include the rotation and figure of the Earth, gravity anomalies, solid-earth tides, geomagnetism and paleomagnetism, electromagnetic induction, and heat flow and the Earth's present and past thermal states. May be taken independently of GEO 552.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 552: Physics of the Earth II
Study of the Earth's structure and properties based on evidence from seismology and high-pressure geophysics. Topics include fundamental principles of elastic wave theory, body and surface wave propagation in layered media, earthquake source mechanisms, free oscillations of the Earth, and rheological properties of the Earth's interior. May be taken independently of GEO 551.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 556: Solid-State Geophysics
Application of lattice dynamics and equations of state of solids to studies in high-pressure, high-temperature geophysics. Reviews experimental data from physical acoustics, static and shock wave compression, and theoretical results from finite strain and atomistic models.
Prerequisite: GEO 551 and 552, or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 562: Early Diagenesis of Marine Sediments
The course treats qualitative and quantitative aspects of the early diagenesis of sediments. Topics include diffusion and adsorption of dissolved species; organic matter decomposition and storage; and diagenesis of clay materials, sulfur compounds, and calcium carbonates. The effects of bioturbation on sediment diagenesis are also discussed. This course is offered as both MAR 562 and GEO 562.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 564: Numerical Hydrology
Numerical solution methods for the equations of incompressible flow in porous media with special emphasis on groundwater flow. Finite difference and finite element methods for steady-state and transient flows-boundary conditions, range of validity and stability of the numerical schemes, and numerical artifacts. The approach is hands on, with example problems being computed. This course is offered as both GEO 564 and AMS 562.
Prerequisite: AMS 526 or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 567: Sedimentary Rocks and Crustal Evolution
An examination of major and trace elements and isotopic composition of terrigenous sedimentary rocks within a framework of tracing the composition and evolution of the continental crust. Emphasis is placed on interpreting sedimentary compositions in terms of provenance and sedimentary history (e.g., weathering, diagenesis, recycling). Relationships between sediment composition and tectonic setting is also examined.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 570: Earthquake Mechanics
A survey of fundamental mechanics aspects of earthquake rupture; reviews concepts of fracture mechanics, elastodynamics, and experimental rock mechanics. Topics include state of stress in the lithosphere, theoretical models of earthquake instability, energetics of faulting, representation of dynamic elastic field generated by earthquakes, and relation of seismic signals to the kinematics and dynamics of seismic source.
Prerequisite: GEO 552 or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 572: Advanced Seismology
Course is intended to expose the student to topics that are at the forefront of current seismological research. Examples include wave propagation in heterogeneous media, earthquake source studies, tsunami generation, and seismic network data analysis.
Prerequisite: GEO 552
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 573: Physics of Rocks
Fundamentals of the physical properties of rock in relation to seismology, hydrogeology, geophysical prospecting and geotechnical engineering. Topics include: composition, pore structure and fabric of rocks; elasticity, anelasticity and plasticity; seismic velocity and anisotropy; poroelasticity; electrical, magnetic and hydraulic transport properties.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 581: Coastal Engineering Geology
Concepts of the mechanics of earth materials and the physics of surficial processes with applications to the coastal environment and engineering. This course is also offered as mar 581.
Prerequisites: Enrollment in MESP or OEN program or instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GEO 585: Directed Studies
Special studies directed by various faculty members.
GEO 588: Geological Field Methods for Earth Science Teachers
Geologic mapping techniques, geochemical analytical approach, and hydrological methodologies applied in the field to examples on Long Island. These approaches are designed for developing research projects for secondary students in earth science.
Prerequisite: Permission of Instructor
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GEO 607: Topics in Geophysics
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GEO 609: Topics in Mineralogy and Crystallography
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GEO 696: Geoscience Colloquium
A weekly series of research seminars presented by visiting scientists as well as by the faculty. Required every semester of all geoscience graduate students.
Fall and Spring, S/U grading
May be repeated for credit.

GEO 697: Geoscience Seminar
Presentation of preliminary research results and current research problems by students and faculty. Required every semester of all geoscience graduate students.
Fall and Spring, S/U grading
May be repeated for credit.

GEO 698: Geoscience Special Seminar
A weekly series of specialized seminars in which graduate students and faculty discuss specific topics within the subgroups of geology. Research is reviewed, and theses are discussed.
Fall and Spring, S/U grading
May be repeated for credit.

GEO 699: Dissertation Research on Campus
Independent research for Ph.D. degree. Open only to candidates for the Ph.D. who have passed the preliminary examination.
Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

GEO 700: Dissertation Research off Campus - Domestic
Independent research for Ph.D. degree. Open only to candidates for the Ph.D. who have passed the preliminary examination.
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health insurance and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

GEO 800: SUMMER RESEARCH
May be repeated for credit.

GER

Germanic Languages and Literature

GER 500: Intensive Reading German
This course is designed for graduate students in other programs to understand German prose. Students learn the basic structures of German grammar, acquire general and specialized vocabulary, and translate a variety of texts, including some from their academic areas of interest. In certain programs, successful completion of this course satisfies a language requirement, while in others it serves as preparation for their own foreign-language exam or testing procedure.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GER 506: Advanced Stylistics
Advanced stylistics and discourse analysis. Designed to deepen the advanced student's knowledge of the syntax, structure, and stylistic versatility of the German language.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GER 539: Contrastive Structures: German-English
Contrastive study of the phonological, morphological, syntactic, and semantic structures of German and English.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
GER 541: Literature of the Goethe Period
A study of the literature and culture of Germany during Goethe’s lifetime, 1749-1832.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GER 544: German Fiction
Major authors of modern German fiction are read and discussed. Texts many include works from 19th and 20th century authors. The course may also focus on works by a single author.
3 credits, Letter graded (A, A-, B+, etc.)

GER 545: 20th-Century German Poetry
Intensive reading and discussion of 20th-century German poetry, including works by Rilke, Trakl, Brecht, Benn, and Kirsch. The course may also focus on a single poet or movement in the 20th century.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GER 546: 20th-Century German Drama
A survey of representative plays of the 20th century, including works by Hauptmann, Hofmannsthal, Kaiser, Sternheim, Toller, Fleisser, Horvath, and Brecht. The course may also focus on the works of a single dramatist.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GER 547: Special Author Studies Tutorial
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GER 548: Special Period Studies Tutorial
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GER 551: History of the German Language
Proceeding from several characteristics of language in general and from the position of German within the Indo-European language family, this course addresses: the periodization of German language history; internal developments from Indo-European to modern German; the most important cultural events on the path of German from the tribal dialects to a unified language; and relations of borrowing between German and other languages. Texts from the different periods are examined for their linguistic features as well as for content.
3 credits, Letter graded (A, A-, B+, etc.)

GER 558: Middle High German
An introduction to Middle High German grammar with representative reading from the Middle High German classics.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

GER 562: Historical Germanic Linguistics
An introduction to the principles and methods of historical linguistics as applied to problems in the Germanic branch of Indo-European (early tribal movements, attempts at dialect grouping, dialect geography, etc.). Part of the course will be devoted to readings in Gothic, Old Norse, and Old High German with a comparison of the morphologies of these languages.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

GER 581: Independent Study
May be repeated for credit.

GER 591: Language Acquisition I
Elementary German I intended for graduate students from other programs.
1-4 credits, Letter graded (A, A-, B+, etc.)

GER 592: Language Acquisition II
Elementary German II intended for graduate students from other programs.
1-4 credits, Letter graded (A, A-, B+, etc.)

GER 593: Language Acquisition III
Intermediate and Advanced German intended for graduate students from other programs. The requirements for the course will include a graduate-level component to be determined by the instructor. May be repeated for credit.
1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GER 595: Practicum in Teaching
Fall and Spring, 1-3 credits, S/U grading. May be repeated for credit.

GER 599: Thesis Research
GER 599 Thesis Research. One-six credits. S/U grading. May be repeated for credit.
1-6 credits, May be repeated 6 times FOR credit.

GER 601: Special Author
Tutorial to be arranged with appropriate staff member.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GER 602: Special Period

GSS

GSS 509: Digital Cartography
Maps portray spatial relationships among selected phenomena of interest and increasingly are used for analysis and synthesis. Cartography is the knowledge associated with the art, science, and technology of maps. Digital computer cartography still follows the same fundamental principles and still requires a broad understanding of graphicity as a language (as well as numeracy and literacy). This course will provide an introduction to cartographic principles, concepts, software and hardware necessary to produce good maps, especially in the context (and limitations) of geographic information systems (GIS).
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GSS 513: GIS Fundamentals I
This course provides the basic concepts underlying modern geographic information science and technology. Emphasis is placed on the principles of GIS for collecting, storing, characterizing, and maintaining data and computer-based techniques for processing and analyzing spatial data. The course includes three hours of lecture, in class exercises and homework projects each week. This is a computer based class with the majority of students working in a GIS computer software. Prerequisite: working knowledge of spreadsheet software.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

GSS 523: Geodatabase and Design
Concepts of geodatabase design and management in geographic information systems (GIS), SQL statements, geographic data types and functions, data entry, and techniques of geographic information structure applications.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GSS 525: GIS Fundamentals II
GIS Fundamentals II will introduce the applied use of Geographic Information Systems (GIS) which is now used extensively in analytical studies. The course emphasizes the applications of GIS in solving real-world problems. Students are expected to gain an understanding of GIS theory, methodology and most importantly application. Students are also expected to demonstrate abilities of spatial thinking, spatial analysis, and be able to solve practical spatial problems utilizing a GIS.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GSS 526: GIS Project Management
This course will enable students to addresses issues unique to a GIS operation such as: identify implementation issues for a GIS project or program; be prepared to assist in decision making procedures that involve management; incorporate strategies for success in your workplace; understand some of the legal issues about the use of GIS data; and be aware of the GIS industry outlook for employment and education.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GSS 554: Geospatial Science for the Coastal Zone
The use of spatial date is becoming increasingly critical in the decision management process and planning of the coastal zone. This course will use GIS and Remote sensing tools to collect and analyze data for integrating into the management, planning, and monitoring of the coastal geomorphology and ecosystems. Offered in Fall.

3 credits, Letter graded (A, A-, B+, etc.)

GSS 555: GIS and Remote Sensing
This course provides a basic overview of the technology by which aircraft and satellite data are produced and utilized in analyses to answer questions within a geographic context. Students will learn to identify sources of remotely sensed imagery appropriate for common applications; acquire, manipulate, and interpret aerial photographs and satellite imagery/data; and incorporate remote sensing data into Geographic Information Systems.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

GSS 575: Geospatial Teaching Practicum
The teaching practicum provides teaching experience, carried out under faculty supervision. Student will work with a faculty member as assistant in a regularly scheduled course and student will be assigned a specific role to assist in teaching the course. The student will meet with the instructor on a regular basis to discuss intellectual and pedagogical matters relating to the course.

0-3 credits, S/U grading
May be repeated 3 times FOR credit.

GSS 587: Geospatial Research
This course is intended to provide graduate students in the Geospatial Science program an opportunity to obtain research experience. A written report is required. Prerequisite: Permission of instructor 1-3 credits, Letter graded (A, A-, B+, etc.)

1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

GSS 588: GIS Internship
The GIS Internship is designed to provide students experience in the real workplace. Interns are expected to function as a GIS professional and work within the existing host facility structure or on a free standing project. Interns will complete assigned tasks by hosting facility such as GIS data entry, data retrieval, GPS field work, documentation, or general GIS facility duties. These activities will be monitored by both a representative of the host facility and the instructor.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HAX

Health and Rehabilitation Sciences

HAX 600: Doctoral Seminar
Provides a venue for faculty and doctoral students to discuss all aspects of their research. Researchers will present different branches of translational science and discuss linkage between research agendas. Provides opportunity for data to be viewed and analyzed by investigators with different perspectives and tools for analysis. Offered in the Fall.

S/F graded
May be repeated 1 times FOR credit.

HAX 602: The International Classification (ICF) of Health Across the Lifespan
Introduces the dynamic interaction that takes place between health, disability and contextual factors as identified in the International Classification of Functioning, Disability and Health (ICF) model. This model will be examined from the perspective of clinical and translational science for individuals from the prenatal period through senescence. Offered in the Fall.

3 credits, Letter graded (A, A-, B+, etc.)

HAX 620: Rehabilitation and Disability
Introduces the Science of Rehabilitation and the Science of Disability. Presents models of rehabilitation and disability research and discusses controversies and commonalities between these areas. Forms the groundwork of future coursework in rehabilitation and movement sciences.

3 credits, Letter graded (A, A-, B+, etc.)

HAX 632: Teaching and Learning
This course will introduce students to adult learning principles and strategies for effective teaching of cognitive psychomotor and affective skills and behaviors in academia. Individual teaching/learning philosophical orientations, characteristics of the adult learner, learning styles, self-directed learning, and reflective practice will be explored.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HAX 634: Motor Learning and Motor Control
This course will introduce the various theories underlying human motor control. Students will actively synthesize and analyze current theory and research related to motor control and skill acquisition through examination of relevant literature. This course places emphasis on determining the implications of this work for future research, educational and/or clinical practice. Includes early and contemporary theory, skill acquisition facilitation, practice, feedback, transfer of training, modeling, part vs whole training, imagery, implicit learning, explicit learning and memory systems.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HAX 653: Research Methods: Design and Statistics
This course presents process and skills needed to develop independent research studies, including but not limited to, formulating a research question or hypothesis, conducting literature searches, critically appraising scientific literature, and selecting appropriate research designs and methods. This information will be presented in the context of protecting human subjects and health information based on the policies and procedures of the Committee on Research Involving Human Subjects (CORIHS) and IACUC.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.
HBA

**Anatomical Sciences**

**HBA 521: Gross Anatomy of Head, Neck, and Trunk**
Tutorial laboratories with emphasis on dissections of the human head, neck, and trunk.
8 credits, Letter graded (A, A-, B+, etc.)

**HBA 531: The Body**
A lecture and laboratory with emphasis on dissection of the entire human body. Topics include functional and topographic anatomy, embryology, clinical correlations, and an introduction to radiology.
8 credits, S/F graded

**HBA 540: Human Anatomy for Physical Therapists**
Lecture followed by laboratory dissection of the human body. Regional approach to the gross anatomy of the human body for physical therapy graduate students (DPT). The course is organized in three modules: (1) Gross anatomy of the limbs and musculoskeletal system. Lectures will cover the regional anatomy of the body as well as conceptual information about the peripheral nervous system, the heart and respiratory system. Module two covers the brain, head and neck. Lecture will address the anatomy and organization of the central nervous system, the cranial nerves, introduction to the anatomy of the special senses and mastication. Module three will offer an expanded view of the functional anatomy of the limbs and musculoskeletal system. Lectures will address the functional anatomy of the hand and foot as well as posture and locomotion. In module three clinical faculty will address the latest developments in radiology and skeletal imaging, and the clinical anatomy of the back, shoulder, elbow, hand, hip, knee, and foot.
6 credits, Letter graded (A, A-, B+, etc.)

**HBA 541: Evolutionary Anatomy**
A lecture and laboratory with emphasis on dissection of the entire human body. Includes functional and comparative anatomy with special emphasis on the muscle morphology and organization of the limbs. Module one covers the back, thorax, abdomen, pelvis and perineum. Lectures will cover the regional anatomy of the body as well as conceptual information about the peripheral nervous system, the heart and respiratory system. Module two covers the brain, head and neck. Lecture will address the anatomy and organization of the central nervous system, the cranial nerves, introduction to the anatomy of the special senses and mastication. Module three will offer an expanded view of the functional anatomy of the limbs and musculoskeletal system. Lectures will address the functional anatomy of the hand and foot as well as posture and locomotion.
4 credits, Letter graded (A, A-, B+, etc.)

**HBA 542: Advanced Human Anatomy for Physical Therapists**
Regional approach to the gross anatomy of the lower limb for physical therapy graduate students (DPT). The course is presented in conjunction with HYAS19, Kinesiology for Physical Therapists. This module will offer an expanded view of the functional anatomy and organization of the hip, thigh, leg and foot. Labs will be three hours, one day per week. Enrollment will be limited to DPT students.
S/U grading

**HBA 550: Vertebrate Evolution**
Survey of the fossil record of vertebrate evolution. The course emphasizes the origin, phylogeny, comparative and functional morphology, biogeography, and paleontology of vertebrate animals. Laboratory included. The lectures and laboratories will utilize an extensive collection of comparative anatomical material, fossil casts, and slides.
Prerequisite: Previous course in human or vertebrate anatomy and permission of instructor.
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

**HBA 551: Phylogenetic Systematics, Biogeography and Comparative Methods**
This course will provide students with a familiarity in the practical application of modern phylogenetic methods and the use of phylogenies in framing evolutionary hypotheses. The course will have both a lecture and laboratory component with lectures including in-class discussions of assigned readings. Lab exercises will be devoted to hands-on experience with available software for phylogenetic and comparative methods. Comparative methods examined will include a focus on historical biogeography as well as ancestral state reconstruction, rates of evolution and diversification, and analysis of adaptation and key innovations.
4 credits, Letter graded (A, A-, B+, etc.)

**HBA 556: Studies in Functional Morphology**
Introduction to the theory and methods of functional morphology. Various methods of analysis and the application of experimental techniques such as electromyography or bone strain analysis are discussed as they pertain to the understanding of the interaction between form and function. Special emphasis is placed on the analysis of human and nonhuman primate morphology, and the application of this analysis to interpretation of the fossil evidence for human and nonhuman primate evolution. This course is offered as both HBA 556 and DPA 556.
Prerequisite: Permission of instructor.

**HBA 563: Aspects of Animal Mechanics**
An introduction to biomechanics. Covers freebody mechanics and kinetics as applied to vertebrate locomotion. Considers the structure and physiology of muscle as it relates to adaptations of the muscular system.
This course is offered as both HBA 563 and DPA 563.
Prerequisites: Introductory physics and biology or permission of instructor.
Spring, 2 credits, Letter graded (A, A-, B+, etc.)

**HBA 564: Primate Evolution**
The taxonomic relationships and evolutionary history of primates as documented by their fossil record and structural and chemical evidence. Emphasis on primates prior to the origin of the human lineage. This course is offered as both HBA 564, DPA 564 and HBA 564.
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

**HBA 565: Human Evolution**
A survey of the fossil record of hominin evolution through the Pliocene and Pleistocene with emphasis on the morphological structure and function of locomotor, masticatory, and neural systems. Includes utilization of comparative anatomical material and an extensive cast collection. This course is offered as both HBA 565, DPA 565 and HBA 565.
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin
HBA 582: Comparative Anatomy of Primates
The comparative anatomy of living primates. Laboratory dissection with emphasis on relating structural diversity to behavior and biomechanics. This course is offered as both HBA 582 and DPA 582.

Prerequisite: HBA 364 and previous course in human or vertebrate anatomy and permission of instructor.
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

HBA 590: Projects in Anatomical Sciences
Individual laboratory projects closely supervised by faculty members to be carried out in staff research laboratories.

Prerequisite: Permission of instructor.
Fall and Spring, 1-6 credits, S/U grading
May be repeated 3 times FOR credit.

HBA 690: Graduate Seminar
Seminars by graduate students on current literature in the areas of the anatomical sciences.

Prerequisite: Permission of instructor.
Fall and Spring, 1 credit, S/U grading
May be repeated for credit.

HBA 692: Advanced Topics in Anatomical Sciences Literature
Tutorial readings in anatomical sciences with periodic conferences, reports and examinations arranged with the instructor.

Prerequisite: Permission of instructor.
Fall and Spring, 1-2 credits, S/U grading
May be repeated for credit.

HBA 695: Practicum in Teaching
Practical instruction in the teaching of anatomical sciences carried out under faculty supervision.

1-4 credits, S/U grading
May be repeated for credit.

HBA 699: Dissertation Research on Campus
Original investigation under supervision of thesis adviser and committee.

Prerequisite: Advancement to candidacy (G5); permission of thesis advisor. Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

HBA 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

HBA 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must receive clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

HBA 800: Full-Time Summer Research
Full-time laboratory research projects supervised by staff members.
S/U grading
May be repeated for credit.

HBC 501: Principles of Pharmacology
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

HBC 502: Advanced Principles of Pharmacology
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

HBC 506: Graduate Pharmacology Colloquium
Research seminars in pharmacology and toxicology presented by faculty and distinguished scientists from academic and industrial institutions. A 1 hr. Journal Club/Discussion Session precedes seminar to review a reference paper relevant to the research concepts to be presented. Students are expected to develop an understanding of the scientific principles given in the colloquium. Students are required to give a formal presentation. Co-scheduled with BCP 406. Offered
Spring, 2 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

HBC 531: Molecular Foundations of Medicine
An integrated course covering the important aspects of biochemistry, cell biology, human and molecular genetics, and histology. Includes lectures, small group conferences and laboratories and stresses the clinical relevance of the basic science material.
8 credits, Letter graded (A, A-, B+, etc.)

HBH 501: Principles of Pharmacology
Fall, 4 credits, Letter graded (A, A-, B+, etc.)

HBH 502: Advanced Principles of Pharmacology
Spring, 4 credits, Letter graded (A, A-, B+, etc.)

HBH 506: Graduate Pharmacology Colloquium
Research seminars in pharmacology and toxicology presented by faculty and distinguished scientists from academic and industrial institutions. A 1 hr. Journal Club/Discussion Session precedes seminar to review a reference paper relevant to the research concepts to be presented. Students are expected to develop an understanding of the scientific principles given in the colloquium. Students are required to give a formal presentation. Co-scheduled with BCP 406. Offered
Spring, 2 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.
HBH 511: Pharmacology: Principles & Practice
Continuation of HBH 510. Covers the action of drugs acting in the cardiovascular, respiratory, gastrointestinal, renal, and endocrine systems, as well as anti-coagulant, anti-inflammatory, anti-microbial and antitumor agents. Includes the discussion of specific cases taken from the clinical practice.
2 credits, Letter graded (A, A-, B+, etc.)

HBH 531: Principles of Medical Pharmacology
Basic principles that underlie actions of drugs on physiological processes with particular reference to their therapeutic and toxic actions. For medical and dental students.
5 credits, Letter graded (A, A-, B+, etc.)

HBH 545: Biochemical Laboratory Techniques
Introduces theoretical principles and experimental techniques used in modern biochemical research. Lectures and homework assignments explore topics in basic molecular and cellular techniques. Prerequisites: Admission to Health Sciences Center program.
Fall, 1 credit, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

HBH 546: Biochemical Laboratory Techniques
Continuation of HBH 545. Lectures and demonstrations present topics in chromatography, mass spectrometry, protein sequencing, sedimentation, electrophoresis, ligand binding, basic pharmacological methods and statistical analysis of data. Includes procedures for the safe handling of toxic chemicals and radioisotopes. Prerequisites: Permission of instructor, admission to graduate Health Sciences Center program.
Spring, 1 credit, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

HBH 560: Proposal Preparation in Regulatory Biology
A literature-based course focusing on major research areas in molecular and biochemical pharmacology. The first part of the course will expose students to a series of examples of recent grant proposals. The second part of the course will feature student presentations of their research proposals. Due to the coordination of this course with the Qualifying Exam, registration is limited to Pharmacology graduate students.
Fall and Spring, 2 credits, S/U grading
May be repeated 2 times FOR credit.

HBH 580: Selected Topics in Pharmacology
Student seminars and readings on topics arranged through consultation with staff.
0-1 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HBH 585: Advanced Structural Biology/Structural Methods in Drug Discovery
This course is designed for students that want to gain theoretical and practical experience in macromolecular structure determination through NMR spectroscopy and/or X-ray crystallography. The course is organized into two modules: NMR spectroscopy and X-ray crystallography. Students may elect to take one or both modules. Emphasis will be placed on practical aspects of structural determination, including sample preparation, data collection and processing. In each of the modules, students will be guided through a complete structural determination project. A final project report per module will be required. Familiarity with Linux is desirable. Students are encouraged to contact instructors prior to enrolling. Crosslisted as BSB580 and HBH585.
Spring, 0-4 credits, S/U grading

HBH 590: Pharmacology Seminars
Advanced research seminars by staff and visiting lecturers.
Prerequisites: Full-time pharmacology graduate status
Fall and Spring, 0-1 credits, S/U grading
May be repeated for credit.

HBH 599: Graduate Research in Pharmacological Sciences
Original research projects under faculty supervision.
Prerequisites: Full-time pharmacology graduate status
Fall, 0-12 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HBH 601: Practicum in Teaching Pharmacology
Practical experience and instruction in the teaching of pharmacology carried out under faculty orientation and supervision.
Prerequisites: Full-time pharmacology graduate status
Fall and Spring, 0-1 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HBH 631: Graduate Pharmacology I
Basic principles of pharmacology will be discussed including pharmacokinetics and pharmacodynamics in both normal and various disease states. Major problems in human pharmacology will be considered including obesity, diabetes, hypertension and heart failure. Underlying physiology as well as pathophysiologic background will be presented. Drug design and development will be discussed from both scientific and socio-economic perspectives.
Prerequisites: Graduate Biochemistry, Physiology HBY 561 or consent of instructor.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

HBH 632: Graduate Pharmacology II
This course introduces second-year graduate students to chemotherapy agents used to combat bacterial and viral infections as well as cancers. The course develops a detailed understanding of the strategies involved in identifying drug targets in these two diverse therapeutic settings. The antibacterial lectures emphasize the problem of drug resistance and the need to develop new agents to combat resistant organisms. The anti-cancer lectures begin with a comprehensive analysis of the molecular basis of cellular transformation leading to neoplastic disease. Lectures on cancer therapy emphasize the contrast between conventional cytotoxic chemotherapy and novel therapeutic approaches guided by recent developments in cancer research. Novel computational biology and structural biology approaches are featured throughout the course. Each student is expected to make two formal journal-club style presentations during the course and to actively participate in group discussion.
0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

HBH 655: Neuropharmacology
An advanced course for graduate students interested in developing an understanding of neuropharmacology and research on this topic. Following a general introduction to the nerve cell structure, synaptic and chemical transmission, three themes receptors, receptors as channels, and G-protein-coupled receptors are developed. Recent advances in cell and molecular biology provide the framework for instruction and discussion. This course is offered as both HBH 655 and BNB 655. Prerequisite: Admission to Graduate Health Sciences Center Program.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
Introduction to the structural and functional organization of cells and tissues and to the way structure relates to function. Particular emphasis is placed on nuclear and chromosomal structure, signal transduction, protein translocation, the cytoskeleton and the extracellular matrix. The interaction of cellular structures and components and their regulation is stressed as is the organization and interaction of cells in tissues. The course is comparative and includes examples of cells and tissues from vertebrates, invertebrates, plants, and prokaryotic systems. Prerequisite: matriculation in graduate program or permission of instructor.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

**HBH 699: Dissertation Research in Campus**

Original investigation undertaken as part of the Ph.D. program under supervision of thesis adviser and committee. Prerequisite: Advancement to candidacy (G5); permission of thesis advisor. Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.

**Prerequisite:** Full-time pharmacology graduate status

Fall, 0-9 credits, S/U grading

May be repeated for credit.

**HBH 700: Dissertation Research off Campus - Domestic**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.

**Prerequisite:** Full-time pharmacology graduate status

Fall, 1-9 credits, S/U grading

May be repeated for credit.

**HBH 701: Dissertation Research off Campus - International**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must receive clearance from an International Advisor.

Fall, 1-9 credits, S/U grading

May be repeated for credit.

**HBH 800: Full-Time Summer Research**

Full-time laboratory research projects supervised by staff members. Summer Term.

**Prerequisites:** Full-time pharmacology graduate status

**S/U grading**

May be repeated for credit.

**HBH 503: Molecular Genetics**

Introduces the classical work and current developments in lower and higher genetic systems. Covers gene structure and regulation in prokaryotic and eukaryotic organisms, mutational analysis and mapping, transposable elements, and biological DNA transfer mechanisms. Bacteriophage as well as lower and higher eukaryotic systems are used to illustrate aspects of molecular genetic structure and function. This course is offered as both MCB 503 and HBM 503.

**Prerequisite:** matriculation in graduate program or permission of instructor.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**HBH 509: Experimental Molecular Genetics and Microbiology**

An introduction to modern microbiological research. The selection of laboratories is made in consultation with the student's advisory committee. By taking part in ongoing projects the student will learn experimental procedures and techniques and become acquainted with research opportunities in the department.

**Prerequisites:** Matriculation in a graduate program and permission of the graduate studies director and the lab director.

Spring, 1-8 credits, S/U grading

**HBM 522: Biology of Cancer**

A short course with the emphasis on cancer as a disease of man. Lectures address human cancer as seen by the clinician and as basic research relates to human disease. This course provides students with a link between courses in cell and molecular biology and the application of this basic information to tumor management. Offered as HBM 522 and HPH 659.

Spring, 2 credits, Letter graded (A, A-, B+, etc.)

**HBM 531: Medical Microbiology**

Information derived from molecular and experimental cellular biology is presented to provide a foundation for understanding the basic aspects of the growth, regulation, structure, and function of viruses and prokaryotic and eukaryotic cells. The properties of the infectious agents are correlated to human diseases caused by these agents. Laboratory experiments demonstrate basic techniques to identify and quantitate microorganisms.

**Prerequisite:** Permission of instructor; matriculation as a Stony Brook medical or dental student.

Fall, 1-4 credits, Letter graded (A, A-, B+, etc.)

**HBM 599: Graduate Research in Molecular Genetics and Microbiology**

Original investigations under faculty supervision.

**Prerequisite:** Permission of instructor

Fall and Spring, 1-9 credits, S/U grading

**HBM 640: Molecular Mechanisms of Microbial Pathogenesis**

This course covers the principles and molecular mechanisms of pathogenesis of a selected group of the best understood viral and bacterial pathogens. A major focus of the course relates to pathogen modification of host extracellular and intracellular signalling events, as well as pathogen-host interactions pertaining to the innate, humoral and cellular responses to infection. The material is presented by invited lecturers who are leaders in their fields. This courses is directed to graduate students, post-doctorate and medical fellows, and advanced medical students, who are contemplating careers in infectious diseases.
HBM 690: Molecular Genetics and Microbiology Seminar
A weekly meeting devoted to current work in the department. Enrolled students present seminars each week throughout the term. *Prerequisite: Permission of instructor.*
Fall and Spring, 1 credit, S/U grading. *May be repeated for credit.*

HBM 691: Readings in Molecular Genetics and Microbiology Literature
Readings in microbiology literature covering areas of molecular biology and genetics. *Prerequisite: Permission of instructor.* Fall, 1 credit, Letter graded (A, A-, B+, etc.) *May be repeated for credit.*

HBM 692: Experimental Methods in Molecular Genetics and Microbiology
The goal of this course is to introduce students to the rationale underlying the wide array of new methods in biology, as well as to promote the critical analysis of scientific literature. Lectures will be given about various scientific methods and approaches, and journal articles relating to the concepts introduced will be assigned. A separate discussion section will be held to review and critique the articles, to be led by the students. 1 credit, Letter graded (A, A-, B+, etc.)

HBM 693: Research Proposal Preparation in Molecular Genetics and Microbiology
A course, based upon the literature in molecular genetics and microbiology, to instruct students in scientific writing and the preparation of research proposals. The course will be organized in three parts. In the first section of the course, students will become familiar with the components of the research proposal and will read and evaluate proposals written by the training faculty. Lectures given by the course co-directors will cover the basics of scientific writing, research proposal preparation and the problems and concerns commonly voiced by reviewers of research proposals. In the second section, students will develop two short proposals in the area of molecular genetics and microbiology that are unrelated to their graduate research. One of these short proposals will be selected for development into a full proposal. In the third section, students will develop and write the full proposal. The students' skills in proposal preparation will be enhanced by critiquing the short and full proposals presented by other students in the second and third sections of the course.

Offered: Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)

HBM 695: Advanced Readings in Molecular Genetics and Microbiology
A seminar in changing topics in molecular genetics and microbiology such as virology, bacteriology, cancer biology, vaccines, drug discovery, mycology and parasitology. 1 credit, May be repeated 1 times FOR credit.

HBM 699: Dissertation Research on Campus
For the student who has been advanced to candidacy. Original research will be under the supervision of the thesis advisor and advisory committee. *Prerequisite: Advancement to candidacy (G5); permission of thesis advisor. Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.* Fall, 1-9 credits, S/U grading. *May be repeated for credit.*

HBM 700: Dissertation Research Off Campus - Domestic
*Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.* Fall, 1-9 credits, S/U grading. *May be repeated for credit.*

HBM 701: Dissertation Research Off Campus - International
*Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.*

All international students must received clearance from an International Advisor. Fall, 1-9 credits, S/U grading. *May be repeated for credit.*

HBM 800: Full-Time Summer Research
Full-time laboratory research projects supervised by staff members. *S/U grading. May be repeated for credit.*

HBN

Neuroscience

HBN 531: Neuroscience

HBP

Pathology

HBP 511: Pathobiology for Graduate Health Care Practitioners
For graduate students who have obtained primary health care baccalaureate degrees through the case study approach. Covers the underlying principles of modern experimental pathology. Focuses on the clinical aspects of the body system, including relevant underlying biochemistry, structure, or pathophysiology at the organ, tissue, cell or molecular level. *Prerequisites: Undergraduate degree, health care experience, biochemistry or cell biology, anatomy and microbiology. Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HBP 531: General Pathology

Introduces the nature and causes of disease, death, reaction to injury, and repair. Analyzes associated structural changes in cells and tissues, with reference to their functional correlates. *Prerequisites: Histology, gross anatomy, physiology and biochemistry, prior or concurrent microbiology or permission of instructor.* Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HBP 533: Immunology

Principles of immunology for graduate students in the biological sciences, including definition of antigens and antibodies, specificity of the immune response, immunoglobulin structure, the genetics of immunoglobulin synthesis, cellular cooperation in the immune response, hypersensitivity, tolerance immunogenetics. Open to advanced undergraduates.
GRADUATE COURSE DESCRIPTIONS

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HBP 554: Advanced Immunology
Selected topics in immunology are discussed using original research literature as the central focus. Students present and discuss the literature in a seminar format.

Prerequisite: HBP 531 or 533 and permission of instructor

Spring, 2 credits, Letter graded (A, A-, B+, etc.)

HBP 556: Laboratory Medicine
A four-week full-time (6 hr, day) course dealing with clinical laboratory decision making and the basis for the laboratory evaluation of human evaluation of human disease. Didactic and practical presentations by interdisciplinary faculty. Intended principally for senior medical students, but also for advanced microbiology or biochemistry students interested in clinical applications.

Prerequisite: Permission of instructor

Spring, 6 credits, Letter graded (A, A-, B+, etc.)

HBP 561: Electron Microscopy for Experimental Pathologists
Uses electron microscope (EM), alone and in conjunction with other methodologies in studies of biological dysfunction. Special techniques include histochemistry, enzyme histochemistry, immunohistochemistry, diffraction, stereo-EM and scanning EM. Design of protocols, preparation and interpretation of data.

Prerequisite: Permission of instructor

Fall and Spring, 2-6 credits, Letter graded (A, A-, B+, etc.)

HBY 500: Short Term Research Projects in Physiology and Biophysics
Short term research project (rotation) under the supervision of a staff member.

Prerequisite: Must be a Graduate Student in the Dept. of Physiology & Biophysics.

Spring, 1-12 credits, Letter graded (A, A-, B+, etc.)

May be repeated 4 times FOR credit.

HBY 501: Physiology
Introduces normal function of human tissues and organs and their regulation by nervous and endocrine systems. Emphasizes the organization and function of physiological control systems and the maintenance of a constant internal environment. Enrollment restricted to fully matriculated graduate students, with permission of instructor. Only Fall.

4 credits, Letter graded (A, A-, B+, etc.)

HBY 501: Physiology
Introduces normal function of human tissues and organs and their regulation by nervous and endocrine systems. Emphasizes the organization and function of physiological control systems and the maintenance of a constant internal environment. Enrollment restricted to fully matriculated graduate students, with permission of instructor. Only Fall.

4 credits, Letter graded (A, A-, B+, etc.)
HBY 530: Cellular Physiology and Biophysics

Cellular structure and function. Topics include ion channels, excitability, transport, energetics and metabolism, contraction, secretion, and communication within and between cells. Emphasizes quantitative analysis of cellular processes.

1-3 credits, Letter graded (A, A-, B+, etc.)

HBY 531: Medical Physiology

A graduate-level introduction to the physiology of the organ systems with ultrastructural correlations. Ultrastructural correlations are demonstrated in a laboratory setting using histological preparations in conjunction with electron micrographs illustrating the relevant ultrastructure needed to understand the normal functioning of tissues and organs. The physiology of the major organ systems is addressed in a lecture format with the emphasis on problem solving. Relevant clinical correlations are addressed at the end of each block in so far as they illustrate how symptoms and signs of disease result from disordered physiology. Organ Systems addresses the structure and function of the cardiovascular, respiratory, renal, gastrointestinal, endocrine, skeletal, reproductive, and integumentary systems. Prerequisites: Admission to medical or dental school and permission of instructor. Only Spring.

8 credits, Letter graded (A, A-, B+, etc.)

HBY 554: Principles of Neuroscience

The aim of this course is to highlight and create an understanding as to how the human nervous system operates.

3 credits, Letter graded (A, A-, B+, etc.)

HBY 561: Statistical Analysis of Physiological Data

Statistical methods useful in analyzing common types of physiological data. Topics include probability, data distributions, hypothesis testing with parametric and non-parametric methods, ANOVA, regression and correlation, and power analysis. Emphasis is on experimental design and appropriate, efficient use of statistical software.

Offered Spring, 1 credit, Letter graded (A, A-, B+, etc.)

HBY 562: Model-based Analysis of Physiological Data

The analysis of common biochemical and physiological data by non-linear regression of data models and biophysical models of physiological and biochemical processes. Examples include binding kinetics, compartmental mass transfer and spectral analysis.

Prerequisite: Permission of instructor, HBY 561

Fall, 1 credit, Letter graded (A, A-, B+, etc.)

HBY 564: Experimental Techniques in Systems Physiology

A series of lectures and laboratory exercises designed to introduce students to in vivo experimental techniques used in systems physiology. Emphasis will be placed on the ethical use of rodents in biomedical research and the measurement of physiological variables. Data acquisition and analysis procedures used in cardiovascular, respiratory, neural, and renal physiology will also be covered. Only 2 credits, Letter graded (A, A-, B+, etc.)

HBY 570: Student Journal Club

Graduate student presentation on a selected topic with faculty consultation.

1 credit, Letter graded (A, A-, B+, etc.)

HBY 590: Special Topics in Physiology and Biophysics

Students seminars on topics to be arranged through consultation with faculty members. Prerequisite: Permission of instructor.

Offered Fall and Spring, 1 credit, S/U grading

May be repeated for credit.

HBY 591: Physiology and Biophysics Research

Original investigation under the supervision of a staff member.

1-12 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

HBY 600: Full-Time Summer Research

Full-time laboratory research projects supervised by staff members.

S/U grading

May be repeated for credit.

HBY 695: Practicum in Teaching in Physiology and Biophysics

Practical experience and instruction in the teaching of physiology and biophysics carried out under faculty orientation and supervision.

1 credit, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

HBY 699: Dissertation Research on Campus

Original (thesis) research undertaken with the supervision of a member of the staff. Prerequisite: Advancement to candidacy (G5); permission of thesis advisor. Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.

1-9 credits, S/U grading

May be repeated for credit.

HBY 700: Dissertation Research off Campus - Domestic

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and be advised by an International Advisor.

1-9 credits, S/U grading

May be repeated for credit.

HBY 701: Dissertation Research off Campus - International

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed.

1-9 credits, S/U grading

May be repeated for credit.

HCB Medical Humanities, Compassionate Care & Bioethics

HCB 501: Compassionate Care, Medical Humanities, and the Illness Experience

This course will introduce students to major interpretations of the illness experience, to several classical biographical and autobiographical accounts of illness, and to the important dynamic of compassionate care in the healing relationship. The patient-as-person.
will be emphasized throughout, as well as the ways in which respect for and empathy toward the patient impacts diagnostic accuracy, patient adherence, and patient and professional satisfaction. Some emotional dynamics of the illness experience will be addressed, such as hope, through the work of eminent physician-writers such as Jerome Groopman, MD. The dynamics of medical mistakes and forgiveness will be explored through psychiatrist Aaron Lazarre's influential writings on effective medical apologies. Some philosophical and metaphysical aspects of personhood and self-identity will be introduced.

Offered in
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 502: Landmark Cases in Bioethics
What is a life worth living? How do we decide, and who decides, when to use medical technologies such as incubators, ventilators, transplants and reproductive technologies? This is an intensive introduction to some of the cases in medical ethics that have changed the ways that we are born, cared for, and die in American hospitals. Examples of topics include: vaccination and public health; eugenics and human subjects research ethics; the right of privacy and health care; end-of-life planning and treatment; women’s bodies and fetal rights; disability rights; religious beliefs and health care; triage and allocation of scarce resources; mental illness and individual rights; global clinical trials; and, bioethics and culture. Offered in
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 503: Traditions and Values in Bioethical Conflicts
This course serves as an introduction to Western moral and religious traditions and to the positions about killing, saving, and enhancing that these traditions have informed. It explores the interface between religion and biomedical ethics and then delves into specific issues in health care in light of more general normative concerns such as justice, love, autonomy and rights, utilitarianism, self-sacrifice, gender, virtue, and community. The issues with which the course deals address the plights of real people, in the concrete, who come from particular backgrounds and whose set of values may make them sometimes recalcitrant to possibilities that technology has made (or is just now making) available.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 504: Special Topic in Biotechnology
Just because we can do it, does this mean that we should do it? This course takes a focused look at controversial practices in health care settings, such as organ donation and enhancements, which have been (and are continuing to be) made available with the advancement of technology. Ought we to regard that which technology makes available as uncontroversially good? If not, why not? What sorts of new issues regarding distributive justice, autonomy, utility, and compassion are ours to consider carefully because of the changing world in which we live?

Offered in
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 510: Literature, Compassion, and Medical Care
How does literature help us understand the nature of human illness and suffering? Can written works of art, ancient and contemporary, that depict moments of compassion and compassionate acts lay bare the moral, spiritual, psychological, and physical reality of suffering? There is a long association between literature and medicine, from the viewpoint of physician-writers, such as Anton Chekov and William Carlos Williams, whose literary skills have eclipsed their medical backgrounds. Sherlock Holmes and Doctor Watson were the creations of a physician-writer, Arthur Conan Doyle. Physicians portrayed in literature, such as Dr. Bernard Rieux, in Albert Camus' The Plague, have also explored the relationship between patient and doctor, the nature of healing. This semester-long course will study these relationships through reading of poetry, drama, fiction, memoir, and essay and reflect on the nature of suffering, the intrinsic human need for compassion, and the implications for health and healing.

Offered in
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 511: Bioethics, Disability & Community
Most people will experience disability at some point in their lives, and for some it will shape their social, personal, family, educational, and employment experiences. Viewpoints on disabilities which have emerged in policy and the broader culture have been explicitly challenged by emerging communities of people with disabilities who seek to speak for themselves and claim full inclusion in society. In this context, bioethicists and disability scholars have found points of both common cause and stark disagreement over issues such as neonatal and end-of-life care, the value and values inherent medical decisions and their outcomes. These bioethical debates occur in the context of debates over the rights of individuals with disabilities to self-determination, accommodations for work and schooling, and the potential for people with disabilities to make unique contributions because of--rather than despite--their disabilities. This course will consider major debates in bioethics in light of recent scholarship in disability studies, drawing on perspectives from philosophy, literature and narrative, history, and sociology.

Offered in
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 512: Altruism and Bioethics
What is altruism, and what are its evolutionary roots as a moral dynamic? What impact does altruistic action have on the human agent? Does it impact flourishing and health? When is it experienced as overwhelming by medical professionals? Where does altruism fit within medical and nursing professionalism? How is it related to compassionate care? What about the duty to treat in time of epidemic, auto-experimentation, pro-bono medical treatment, high-risk provision of healthcare in time of conflict, healthcare activism, and the commitment to the patient's good as a guiding professional ideal? How does the practitioner strike a balance between the care of patients and the care of the nearest and dearest or the care of the self? How does altruism correlate with pro-social behavior, happiness, and health? Offered in
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 513: Disease and Society
What is disease? How do the beliefs, politics, and economies of particular societies shape how diseases are defined, experienced, and treated? In this seminar, students will explore these questions by analyzing historical documents, scientific reports, and historical scholarship. We will look at disease from multiple perspectives as a biological process, clinical entity, population phenomenon, historical actor, and personal experience. We will pay special attention to how diseases have been recognized, diagnosed, named, classified and counted in different times, places, cultures, and settings based on different environmental and social conditions, medical ideas, diagnostic technologies, and available treatments. The course will begin with a review of major approaches to understanding the manifold relationships between disease and society. The remainder of the course will view disease and society relationships through the lens of specific issues, such as epidemic disease, consumption and affluence, globalization, and risk.

Offered in
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
HCB 514: Global Bioethics

Bioethics is an American invention. Ideas about medicine and morality, of course, go back to antiquity and are documented as medical ethics in Europe, medical morality in China, and under many other names in cultures around the world. Recently, the process of globalization of ideas, medical practices, clinical trials, and migration of patients has led to clashes of culture around issues such as the appropriate standards and control groups for clinical trials, organ transplantation, brain death, and end-of-life care. Issues of religion, morality, public policy, disability rights and policy, and health system structure and payment all shape how particular societies decide to manage divisive issues such as the beginning and end of life. This course will draw on a growing literature on global and transnational cases, policies, and traditions in the ethics of health, public health, and health care.

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 515: Health Policy, History & Ethics

Who gets sick? Who gets health care, what kind, and in what setting? This course covers the major health policy issues of the United States today, including the health status of the U.S. as a whole, the social and economic determinants of health, the role of personal and public health services in affecting health, the organization and financing of health services, and the multiple factors affecting health policies. We will explore the evolution of the US health care system in the past century, and debates about rights to health care or lack thereof, health disparities, conflicts of interest, and the ethics of health policy and practice.

Offered in Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 516: Ethical Issues in Human Reproduction

New technologies have modified human reproduction in numerous ways, raising profound questions about the moral status of human life and the nature of parental and sibling obligations. This course will investigate the values that attach to different relationships, both familial and general. It will cover questions around the treatment of infertility, surrogate mothering, the commodification of the body, and the elevated expectations of familial obligations that correspond to new reproductive technologies.

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 517: The Problem of Evil: Philosophical, Biological, and Social Dimensions

What is the nature of evil? Can it be the result of brain malfunction, something that is genetically predetermined? Or, is evil something which is part of or at least necessary to know the good? Alternatively, is evil an arbitrary designation, a perspective from which we can wrest ourselves given the right sort of reinvention? In this class, we shall address the problem of evil from scientific, social-scientific, and philosophical perspectives, using fiction and non-fictional sources. Examples of medical evil, such as the Nazi doctors or Tuskegee, can be introduced as case studies.

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 518: Empirical Bioethics

The formal study of bioethics attempts to define ethical courses of action in a world ever increasing in complexity. But in day to day practice, ethical outcomes are expressed through the individual decisions and resulting actions—of human agents. How do individuals form these judgments? How do people become motivated to engage in behaviors that are designed to benefit someone else? We will explore current scientific approaches to these questions with several areas of emphasis, including a) the neuroscience of compassionate care and altruism, b) cognitive and neuroscientific approaches to understanding judgment and decision making in ethical domains, and c) empirical approaches to quantifying the effects of ethically based policy decisions. Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 519: Public Health Law

This course is a survey of legal and policy issues that have special relevance for public health professionals. Topics may vary, but typically will include many of the following: structure of the U.S. legal system; power of state and federal governments in matters affecting health care; governmental power and the right to privacy; constitutional issues in social welfare benefits; governmental regulation of health care providers and payers; the scope and discretion of administrative agencies in health care; the antitrust laws; the fraud and abuse laws; and negligence in the delivery and financing of health care. The course is taught primarily by Socratic method.

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HCB 598: Independent Study

3 Credits, ABCF Grading

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

HCB 599: Special Projects Capstone Course

This course, to be offered in the second (spring) semester, is designed to satisfy the special projects requirement of our program. The first part of the course will be devoted to readings and discussions that further illuminate the methodologies of the interdisciplinary field of medical humanities, compassionate care, and bioethics. Students will develop an appreciation for the standards of high quality scholarship and research through review of carefully selected readings. This will prepare them for the second part of the course, where they pursue and present their own research based on the existing literature. This capstone course will be highly collaborative, entail substantial peer review, and be organized around the development of significant student projects which are intended to represent the beginnings of publishable papers. Our entire faculty will be involved in these projects according to their specific areas of expertise.

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HDO

Oral Biology and Pathology

HDO 500: Biology of the Oral Mineralized Tissues

This course deals with the basic chemistry, crystallography, ultrastructure, and metabolism of the calcium phosphates involved in the formation and physiological and pathological resorption of the various mineralized tissues found in or associated with the oral cavity (enamel, dentin, cementum, bone). Ectopic calculus formation will be examined. Prerequisites: HDO 560, 561, 562, and 563 or their equivalent. Fall and Spring

3 credits, Letter graded (A, A-, B+, etc.)

HDO 510: Salivary Metabolism and Secretion

Consideration is given to the normal and abnormal structure and function of the glandular systems found in the oral cavity. The composition, regulation, and functions of the
secretions from the major and minor salivary glands will receive particular attention.

3 credits, Letter graded (A, A-, B+, etc.)

HDO 520: Oral Microbial Systems
Consideration is given to the structural composition, metabolism, and environmental relationships of the bacterial systems formed and in association with the oral hard and soft tissues. Specific and mixed bacterial populations, such as those resident on extraoral mucosal surfaces and the skin and their role in oral disease will be dealt with. Prerequisite: HDO 560, 561, 562, and 563 or their equivalent. Fall and Spring

3 credits, Letter graded (A, A-, B+, etc.)

HDO 530: Molecular Biology and Pathology of the Periodontium
This course deals with the ultrastructure and biochemical composition of the periodontal tissues, remodeling of the extracellular matrix with an emphasis on the role of metalloproteinases; the microbial interrelations with the organic and inorganic components of the periodontal tissues, the biochemical dynamics of gingival inflammation and wound healing, and the metabolic processes responsible for the composition and flow of gingival crevicular fluid. Prerequisites: HDO 560, 561 and 563 or their equivalent. Fall and Spring

3 credits, Letter graded (A, A-, B+, etc.)

HDO 535: Epithelial Keratinization and Differentiation
The course examines the growth and differentiation of stratified squamous epithelia. Particular emphasis is placed on molecular events involved in the differentiation program. Consideration is also given to mechanisms involved in oral and cutaneous disorders. Prerequisites: Permission of instructor required; HBP 531 suggested; students must have had a background in cellular biochemistry molecular biology. Fall and Spring, 2 credits, Letter graded (A, A-, B+, etc.)

HDO 550: Oral Diagnostics and Therapeutic Technology, Lectures and Laboratory Techniques
Recent advances in the use and development of research technology for the early diagnosis and treatment monitoring of oral and systemic disease. Special attention is paid to the principles of technology transfer including patents and patenting; searching of on-line databases is a key component. The course includes relationships of dry mouth to salivary physiology, diabetes, and drug medications; salivary film measurements, wetting of oral surfaces, viscoelasticity and lubricity; the use of the Periotron and enzyme assays for the diagnosis of gingivitis and periodontal disease; instrumentation used in sensitive teeth measurement and evaluation of treatment effectiveness using oral compositions and iontophoresis; oral candidiasis and denture stomatitis and early detection and causes of dental caries; oral malodor measurements including use of the Halimeter and its use in the formulation of oral compositions. Application to clinical practice and clinical studies is covered.

3 credits, Letter graded (A, A-, B+, etc.)

HDO 560: Oral Biology and Pathology I
The first of four comprehensive courses on molecular structure, biochemical and physiological function, developmental anatomy and pathology of the various systems that constitute the oral apparatus. Covers the embryological development of the face and oral cavity and the biology and pathology of the oral mineralized tissues. Prerequisites: Undergraduate degree in basic science; permission of instructor. Fall and Spring

3 credits, Letter graded (A, A-, B+, etc.)

HDO 561: Oral Biology and Pathology II
The second of four comprehensive courses on molecular structure, biochemical and physiological function, developmental anatomy and pathology of the various systems that constitute the oral apparatus. Covers the biology and pathology of the periodontal structures and the microbiology of the oral cavity. Prerequisites: Undergraduate degree in basic science; permission of instructor. Fall and Spring

3 credits, Letter graded (A, A-, B+, etc.)

HDO 562: Oral Biology and Pathology III
This course is the third of four comprehensive courses on molecular structure, biochemical and physiological function, developmental anatomy, and pathology of the various systems that constitute the oral apparatus. The course consists of the following two units of instruction: (1) the biology and pathology of the salivary glands and their products and (2) the biology and pathology of the periodontal structures. Prerequisites: Undergraduate degree in basic science and permission of instructor Fall and Spring

3 credits, Letter graded (A, A-, B+, etc.)

HDO 563: Oral Biology and Pathology IV
This course is the last of four comprehensive courses on molecular structure, biochemical and physiological function, developmental anatomy and pathology of the various systems that constitute the oral apparatus. Covers the biology and pathology of the oral sensory systems and the biology and pathology of oral motor systems. Prerequisites: Undergraduate degree in basic science and permission of instructor. Admission to Graduate Health Sciences Center Program.

3 credits, Letter graded (A, A-, B+, etc.)

HDO 590: Research Projects in Oral Biology and Pathology
Individual laboratory projects closely supervised by faculty members to be carried out in their research laboratories.

3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 2 times FOR credit.

HDO 599: Graduate Research
Original investigations undertaken with supervision of a faculty member.

1-12 credits, Letter graded (A, A-, B+, etc.)

May be repeated 5 times FOR credit.

HDO 690: Oral Biology and Pathology Seminars
Research seminars by students, staff, and visiting scientists. Prerequisite: permission of instructor, Fall and Spring

1 credit, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

HDO 695: Oral Biology and Pathology Teaching Practicum
Practice instruction in the teaching of oral biology and pathology at the undergraduate level carried out under faculty orientation and supervision.

3 credits, Letter graded (A, A-, B+, etc.)

HDO 699: Thesis Research Oral Biology and Pathology
Dissertation Research, Prerequisite: Advancement to Candidacy Passing.

Fall, 1-9 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

HDO 700: Dissertation Research off Campus - Domest
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate
student insurance plans and should be advised by an International Advisor.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

HDO 702: Oral Pathology
Covers the clinical and histopathologic manifestations of acquired, inherited and neoplastic diseases of the human oral cavity. Includes benign and malignant tumors of bone, odontogenic and non-odontogenic cysts and tumors, mucosal and salivary gland diseases, and oral manifestations of systemic diseases. Letter graded (A, A-, B+, etc.)

HDO 704: Translational Oral Biology
Covers the biochemical, physiological, microbiological and electronic principles involved in a variety of techniques used as aids in the diagnosis of oral diseases. Letter graded (A, A-, B+, etc.)

HDO 705: Oral Medicine
Introduces the principles of patient care related to stomatologic and dermatologic disease, neurologic abnormalities, hematologic disturbances, and the medically compromised patient. 16 course hours Prerequisites: HDO 701
Letter graded (A, A-, B+, etc.)

HDO 706: Oral Facial Genetics
Focuses on the utilization, preparation and analysis of basic human genetics in clinical situations. Covers genetic disorders of the craniofacial complex and dentistry for the multiple handicapped patient. 30 course hours Prerequisite: HD 501 or permission of instructor
Letter graded (A, A-, B+, etc.)

HDO 707: Clinical Pharmacology
Covers pharmacology in dental practice emphasizing clinical usage of antibiotics, sedatives, tranquilizers and analgesics. Drug interactions and side effects are discussed. 18 course hours Prerequisite: HD 608
Letter graded (A, A-, B+, etc.)

HDO 803: Oral Pathology Conference II
Clinicopathologic case presentations and development of differential diagnosis skills. 11 course hours Prerequisites: HDO 702, HDO 703
Letter graded (A, A-, B+, etc.)

HDO 805: Summer Research
SUMMER RESEARCH
S/U grading

HDO 821: Year IV Clinic: Oral Diagnostics
The clinical continuation of HDO 704 in which the principals of oral diagnostics are applied to patient care.
Letter graded (A, A-, B+, etc.)

HIS 500: Historiography
Introduction to historiography through reading and writing about interpretations of history, historical methods, and major historians. Term paper on historian of choice.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 501: Early Modern Europe Seminar:1450-1789
Field seminar in early modern European history, 1450-1789. Surveys the major historical problems and interpretations from the Renaissance to the coming of the French Revolution.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 502: Introduction to Late Modern Europe
Field seminar in late modern European history, 1789-1945. Surveys the major historical problems and interpretations from the French Revolution through the Second World War.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 516: Theme Seminars on Empire, Modernity, and Globalization

HIS 517: Theme Seminars on Empire, Modernity, and Globalization

HIS 521: Introduction to United States History to the Civil War
Field seminar in U.S. history from the founding of the British colonies to the beginning of the Civil War. Surveys the major topics and interpretations. Required for M.A. students in U.S. history.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 522: Introduction to United States History Since the Civil War
Field seminar in U.S. history from the Civil War to the Cold War. Surveys the major interpretations.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 524: Core Seminar: History, Theory and Practice
Introduction to the theory, practice and writing of history through the reading of theoretical and historical texts and the writing of a research paper. This course meets over the entire academic year, for 3 credits per semester, and is mandatory for all new Ph.D. students. Students entering with an M.A. take it at the discretion of their advisor.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 525: Core Seminar: History, Theory and Practice
Introduction to the theory, practice and writing of history through the reading of theoretical and historical texts and the writing of a research paper. This course meets over the entire academic year, for 3 credits per semester, and is mandatory for all new Ph.D. students. Students entering with an M.A. take it at the discretion of their advisor.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 526: Core Seminar: History Theory and Practice
Introduction to the theory, practice and writing of history through the reading of theoretical and historical texts and the writing of a research paper. This course meets over the entire academic year, for 3 credits per semester, and is mandatory for all new Ph.D. students. Students entering with an M.A. take it at the discretion of their advisor.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 527: Core Seminar: History, Theory and Practice
Introduction to the theory, practice and writing of history through the reading of theoretical and historical texts and the writing of a research paper. This course meets over the entire academic year, for 3 credits per semester, and is mandatory for all new Ph.D. students. Students entering with an M.A. take it at the discretion of their advisor.
3 credits, Letter graded (A, A-, B+, etc.)

HIS 532: Theme Seminar: Gender, Religion and Modernity
May be repeated 5 times FOR credit.

HIS 535: Theme Seminars on Gender, Sexuality and Reproduction

HIS 540: The Black Power Movement
This course examines the Black Power Movement. Stokely Carmichael's call for "Black Power!" broke through the commotion of everyday politics during 1966's Meredith March Against Fear. Soon after, and for the next decade, Black Power galvanized African American politics, engendering radical
movements for social, political, and cultural transformation that impacted blacks in the United States and beyond. An emerging historiography traces the roots of Black Power in the postwar black freedom movement, finding cultural and political touchstones for future Black Power activism among civil rights renegade, trade unionists, and black nationalists. We will examine works produced during the Black Power era and new scholarship to analyze the Black Power Movement's legacy in the politics and culture of African Americans. Permission of advisor is required. This course is offered as both HIS 540 and AFS 540. 
3 credits, Letter graded (A, A-, B+, etc.)

**HIS 541: Introduction to Colonial Latin American History**
Field seminar in colonial Latin American history. Surveys major historical problems and debates from the colonial period through the wars for independence. Required for M.A. in Latin American history.
3 credits, Letter graded (A, A-, B+, etc.)

**HIS 542: Modern Latin American History Seminar**
Field seminar in modern Latin American history. Surveys major historical problems and debates from the post-independence period to the present. This course is offered as both CEG 517 and HIS 542.
3 credits, Letter graded (A, A-, B+, etc.)

**HIS 543: Theme Seminars on Gender, Sexuality, and Reproduction**

**HIS 552: Theme Seminar: Mass Media and Journalism in International Perspectives**

**HIS 553: Theme Seminars on Nation, State and Civil Society**
Topics vary by semester.
3 credits, Offered Fall and/or Spring, 3 credits, Letter graded (A, A-, B+, etc.) May be repeated 3 times FOR credit.

**HIS 554: Theme Seminars on Nation, State, and Civil Society**

**HIS 555: Theme Seminars on Nation, State, and Civil Society**

**HIS 557: Special Seminars**
Topics to be arranged. The seminar is built around actual research activities of students and faculty. The following topics have been covered: Cultural Theory; Sociology of Technology; Micro-sociology; Advanced Topics in Marxist Theory; Sociology of Emotions; Historical Methods; Ethnic Relations; Biosociology; Comparative Stratification; Max Weber; Sociology of the Future; Science of Sociology and Everyday Life; The Study of the World's Advanced Societies; Methods of Behavioral Observation; Social Structure; Sociology of the Family; Cognitive Sociology; Sociology of Work; Transnational Social Movements; Economic Sociology; War and Revolution; Sociology of Gender; Sociology of Culture; Development of Capitalism; Film as a Sociological Research Tool; Funding and Grant Writing; The Three Faces of Social Psychology; A Structural Approach to Organizational Behavior; Professionals and Professionalism; Sociology of Modernity; Globalization and Immigration; Research Support in Sociology; Sociology of Sexual Behavior; Global Sociology; Gender and the Law; Poverty and Homelessness. 3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

**HIS 562: Modern African History and/or Asian History Seminar**
Field seminar in modern African history. Surveys major topics such as nationalism, anticolonial movements, and modernization.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated 2 times FOR credit.

**HIS 563: Introduction to South Asian History**
Surveys major topics such as nationalism, anticolonial movements, legacies of British imperialism, and modernization.
3 credits, Letter graded (A, A-, B+, etc.)

**HIS 564: Introduction to Chinese History**
Field seminar in modern Chinese history. Surveys major historical topics from modernization to revolution to reform and sociocultural change. For MA, MAT, PhD students. 
3 credits, Letter graded (A, A-, B+, etc.)

**HIS 565: Introduction to Japanese History**
Field Seminar in Modern Japanese History surveys major historical topics from reform and modernization to imperialism and postwar reconstruction. For MA, MAT, PhD students. 
3 credits, Letter graded (A, A-, B+, etc.)

**HIS 570: Theme Seminars in Environment, Science and Health**
Spring

**HIS 571: Theme Seminars in Environment, Science and Health**
Spring

**HIS 572: Theme Seminars in Environment, Science and Health**
Spring

**HIS 581: Supervised Teaching**
Teaching practicum that usually accompanies a student's assistantship.
3 credits, S/U grading

**HIS 582: Teaching Practicum**
Practicum in teaching methods for new assistants. (MA. Workshop required deleted from the curriculum)
3 credits, S/U grading

**HIS 584: Directed Readings for M.A. Candidates**
Specialized tutorials based on contractual relationship between individual student and faculty. Required for M.A. students.
1-3 credits, S/U grading
May be repeated for credit.

**HIS 585: Directed Readings for M.A. Candidates**
Specialized tutorials based on contractual relationship between individual student and faculty. Required for M.A. students.
1-3 credits, S/U grading
May be repeated for credit.

**HIS 586: Directed Readings for M.A. Candidates**
Specialized tutorials based on contractual relationship between individual student and faculty. Required for M.A. students.
1-3 credits, S/U grading
May be repeated for credit.

**HIS 587: Teaching Practicum I: American Controversies**
HIS 587: Teaching Practicum I: Controversies in American History
HIS 588: Teaching Practicum II: Controversies in American History
Offered Fall every year, 1 credit, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**HIS 588: Teaching Practicum II: American Controversies**
HIS 587: Teaching Practicum I: Controversies in American History
HIS 588: Teaching Practicum II: Controversies in American History
HIS 595: Reading Colloquium in Women’s History
A topics course dealing with such subjects as women in social movements, the place of gender in particular historical circumstances, imperialism and woman, changing views of sexuality, or relations between family policies and other political programs. This course offered as both HIS 595 and WST 595.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HIS 601: Research Seminars on Social and Cultural History

HIS 603: Research Seminar on Social and Cultural History

HIS 615: Research Seminars on Empire, Modernity, and Globalization

HIS 616: Research Seminars on Social and Cultural History

HIS 617: Research Seminars on Empire, Modernity, and Globalization

HIS 622: Migration, Diaspora and Transnationalism

HIS 623: Research Seminars on Ethnicity and Migration

HIS 631: Research Seminar: The Social History of Medicine and Health

HIS 632: Research Seminars on Gender and Sexuality

HIS 633: Research Seminars on Gender and Sexuality

HIS 634: Research Seminars on Gender and Sexuality

HIS 652: Research Seminar: Oral History: Methodology and Theory
Topics vary by semester.
3 credits, S/U grading
May be repeated 3 times FOR credit.

HIS 653: Research Seminars on Nation, State, and Civil Society

HIS 654: Research Seminars on Nation, State, and Civil Society

HIS 655: Research Seminars on Nation, State, and Civil Society

HIS 656: Research Seminars on Nation, State, and Civil Society

HIS 657: Research Seminars on Nation, State, and Civil Society

HIS 662: Directed Readings for Ph.D. Candidates
Specialized tutorials based on contractual relationship between individual student and faculty member.
1-18 credits, S/U grading
May be repeated for credit.

HIS 664: Directed Readings for Ph.D. Candidates
Specialized tutorials based on contractual relationship between individual student and faculty member.
1-18 credits, S/U grading
May be repeated for credit.

HIS 665: Directed Readings for Ph.D. Candidates
Specialized tutorials based on contractual relationship between individual student and faculty member.
1-9 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HIS 666: Directed Readings for Ph.D. Candidates
Specialized tutorials based on contractual relationship between individual student and faculty member.
1-18 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HIS 667: Directed Readings for Ph.D. Candidates

HIS 668: Directed Readings for Ph.D. Candidates

HIS 669: Dissertation Research on Campus
Dissertation research under direction of advisor.
Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

HIS 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

HIS 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.
HPD 521: Introduction to Clinical Research

This seminar series course provides a broad-based introduction to the fields of population health and clinical science research. This course will prepare participants to become critical consumers of the peer-reviewed literature. Class lectures will cover a wide range of topics, which include: framing a research question, formulating a research hypothesis, evaluating the peer-reviewed literature, exploring study design options, conducting human subjects’ research ethically/ responsibly, selecting clinical outcomes, and evaluating analytical alternatives. Offered in Summer, 1 credit, Letter graded (A, A-, B+, etc.)

HPD 566: Clinical Trials

This course introduces the design, conduct, and analysis of clinical trials. Topics include types of clinical trials, study design, treatment allocation, randomization and stratification, quality control, sample size requirements, patient consent, and interpretation of results. This course is intended for doctoral level students. (Co-scheduled with HPH 566 Clinical Trials). Offered Spring, 2 credits, Letter graded (A, A-, B+, etc.)

HPD 567: Clinical Outcomes Research

This course will provide an overview of the field of clinical outcomes assessment. The specific topics covered include: risk factors identification, clinical outcomes selection, risk adjustment methods, patient safety monitoring, and provider-based quality improvement performance reporting. Students will be introduced to a broad range of clinical outcomes including (but not limited to) short term mortality, treatment-related morbidity, health related quality of life, condition specific metrics, patient satisfaction, health plan member satisfaction, utility theory, and cost effectiveness analysis. An emphasis will be placed in this course on learning how clinical outcomes research can provide data-driven approach to influence patient, provided, program, and policy decisions. Offered Summer/Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HPD 592: Applied Data Management Using SAS

This course provides students with an introduction to the principles of public health and clinical research-related informatics and data management using the SAS systems. Lectures and labs will be aimed at developing hands-on skills about how to create, maintain, and manage databases using the SAS Systems for Windows, a major software package used frequently in public health and clinical outcomes research. 1 credit, Letter graded (A, A-, B+, etc.)

HPD 601: Human Subjects: Ethics and Responsible Conduct of Research

This introductory course incorporates three components focused upon identifying: 1) the ethical principles associated with human subjects# research; 2) the primary tenets of responsible conduct of research; 3) academic career planning. This course provides a philosophical basis for current research ethics practices, identifies outstanding ethical issues and controversies in clinical and translational science and research, and provides students with knowledge and access to resources such that they may to address the ethical challenges that may arise most effectively. The course provides a more in-depth exploration of the ethics and responsible conduct of clinical and translational science research that can supplement current mandated training in the area. 1 credit, Letter graded (A, A-, B+, etc.)

HPD 619: Independent Study

Intensive reading under supervision of one or more instructors, of material not covered in the formal curriculum, or execution of a research project under the supervision of one or more faculty members. Generally a written deliverable (e.g. manuscript) will be required. Instructor consent required. 0-6 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

HPD 650: Seminar Series: Clinical Applications of Molecular Medicine

This course will provide an overview of the field of molecular medicine, with a focus on cutting edge technologies related to the current and future clinical applications to improve early detection, to enhance diagnostic testing, to monitor treatments, and to counsel patients on their prognosis. As applied to clinical patient care questions, the specific molecular medicine topics discussed will include: DNA, RNA, proteomics, and chromosome assays. Pending the specific lecturers and topics coordinated, students will be introduced to a broad range of biomarkers for disease such as cancer, pulmonary/heart diseases, autism, and immune-related disease challenges. An emphasis will be placed in this course on learning how molecular markers can be applied in a clinical setting to augment the patient and provider decision-making process. (NOTE: Students should have an introductory knowledge of cellular and molecular development biology, as well as a general laboratory background). Offered in Spring, 1 credit, Letter graded (A, A-, B+, etc.)

HPD 681: Advanced Social Determinants of Health

This course will build on the prior HPH 523 and further examine the current evidence supporting an association between social determinants (e.g., socioeconomic status, physical living conditions, individual characteristics, social support, etc) and health. Students will review and critically examine the current literature on the social determinants of population health with the goal of identifying gaps in this literature which may be filled by future research. Concepts relating to the social determinants of health – e.g., identification of current priority areas, theoretical frameworks and perspectives, intervention, research methodology, etc. will be addressed as each comes up in the context of the reviewed journal article. Using publicly available data sets, students will choose a research topic related to an identified gap in the current research on the social determinants of health, propose a project to examine this topic or need which can be accomplished using publicly available data sets, conduct the analysis and write up their project in a format suitable for submission for publication. Offered Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HPD 682: Statistical Methods in Clinical Outcomes Research

The purpose of the course is to familiarize students with some major topics in clinical outcomes research, the statistical models commonly employed, and statistical problems that need to be overcome. Specific topics of interest may include: risk factor analysis; static models; risk factor/disease progression analysis/dynamic models; survival analysis (including multivariable survival analysis); volume-outcomes research; and forecasting models. Statistical techniques and challenges will be discussed within the context of each research topic as they arise. By the end of this course, students should be broadly familiar with these issues, and should be able to evaluate published clinical outcomes research in terms of the appropriateness of models chosen and how well the statistical problems have been addressed, and the reliability of the
results. Prerequisites: HPH 507 Biostatistics II
or equivalent course. Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HPD 686: Mentored Research Project
in Population Health and Clinical Outcomes Research
This course will expose doctoral students to
a project with which they are not currently
familiar in the field of population health or
clinical science. Each student will select
a faculty mentor for their course project.
Students will identify (with the pre-approval
of their mentor and course director) a specific
problem to address and/or a component of
the mentor's project to complete. Following
IRB approval or waiver (if applicable), the
mentored project will be initiated. Final grade
will be based upon the research proposal,
project plan, and final project report submitted.
3 credits, Letter graded (A, A-, B+, etc.)

HPD 693: Practicum in Teaching
The course is a supervised teaching experience
with the Master of Public Health program.
Fall, 3 credits, S/U grading

HPD 694: Graduate Seminar in
Research Writing
The course will provide mentored writing for
dissertation and scientific publications.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HPD 699: Dissertation Research On
Campus
This course is normally taken by advanced
PhD students when they conduct research
towards their theses. Only PhD students who
have been advanced to candidacy (G5 status)
can take this course. Students who have the
G3 and G4 status and participate in a research
project with their advisor can register for HPD
619 Independent Study.
Prerequisite: Must be advanced to candidacy
(G5); permission of instructor
Summer, 0-9 credits, S/U grading
May be repeated for credit.

HPH 501: Introduction to the Research Process
This course provides an overview of the
research process including formulation of a
research problem, conceptualization of the
research design, construction of the instrument
for data collection, selection of a sample,
collection of data, and writing a research report.
Topics include how to identify a research question
and, correspondingly, how to formulate a clear, concise hypothesis or set of hypotheses; reasons and procedures
for reviewing the literature; overview of
observational and interventional research
designs; review of measurement theory, types
of scales, and commonly used measures in
public health-related research; data collection
methods including survey and qualitative
methods; and the ethical conduct of research.
Through the introduction of these topics, the
course provides a general background for
individuals who are interested in learning the fundamentals of how to prepare a research proposal.
2 credits, Letter graded (A, A-, B+, etc.)

HPH 504: Surveillance & Control of Infectious Diseases
This course introduces the methods of
surveillance and control of infectious
diseases in the community and in health
care organizations including the design,
implementation, and evaluation of surveillance
systems and the analysis of surveillance
system data. The course focuses on infectious
diseases common in the United States, but also
discusses the global situation. Bioterrorism
will be discussed.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 505: Topics in Population Health Studies
This course presents current topics and issues
in population health studies.
1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HPH 506: Biostatistics I
This is part 1 of a 2-term course and is
intended to provide students and researchers
in public health with an introduction to the
principles of statistical methods and their
application in biomedical and public health research. Students are expected to enroll
in parts 1 and 2 sequentially within the
same academic year. This course includes
introductions to the use of computers
for statistical analysis, summarizing and
exploring data, probability theory, discrete
and continuous probability distributions,
populations and samples, sampling
distributions and statistical inference,
hypothesis testing, sample size and power,
two-sample comparisons, analysis of variance,
association and correlation, simple linear
regression and simple logistic regression.
Prerequisites: HPH 506.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 507: Biostatistics II
This is part 2 of a 2-term course and is
intended to provide students and researchers
in public health with an introduction to the
principles of statistical methods and their
application in biomedical and public health research. Students are expected to enroll
in parts 1 and 2 sequentially within the
same academic year. This course includes
introductions to the use of computers
for statistical analysis, summarizing and
exploring data, probability theory, discrete
and continuous probability distributions,
populations and samples, sampling
distributions and statistical inference,
hypothesis testing, sample size and power,
two-sample comparisons, analysis of variance,
association and correlation, simple linear
regression and simple logistic regression.
Prerequisites: HPH 506.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 508: Health Systems Performance
This course introduces students to the
system that we have developed to deliver
health care in the United States, with
international comparisons. The topics include
the organization and financing of health care
systems, access to health care including health
insurance, regulation and policy issues, and the
health care workforce
3 credits, Letter graded (A, A-, B+, etc.)

HPH 514: Epidemiology for Public Health
This course presents basic epidemiologic
concepts used to study health and disease
in populations. It provides an overview of
the major causes of morbidity and mortality,
including methods of measurement (e.g.,
incidence, prevalence). Observational and
experimental epidemiologic studies will be
described and their advantages and
disadvantages compared. The course aims for students to begin developing the skills needed to evaluate data, interpret reports, design, and conduct studies. Students will be introduced to the various areas of epidemiologic studies, including cancer, molecular/genetic, environmental, occupational, social and behavioral, and infectious disease surveillance.

The course comprises both lectures and small group seminars for in-depth discussions of previously assigned topics. Prerequisites: HPH 502 and HPH 562.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 516: Environmental and Occupational Health
This course is designed to provide the fundamentals of environmental and occupational health and to educate students on issues related to major environmental and occupational concerns. It will provide a forum for the discussion of local and national environmental and occupational public health issues. The content of the course will focus on major pollutants, their detection, impact on health, and principles of remediation. Using various teaching techniques, students will be exposed to current environmental and occupational topics and approaches to prevention and treatment. The course will emphasize the most recent research in the field.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 519: Independent Study
Intensive reading, under supervision of one or more instructors, of material not covered in the formal curriculum, or execution of a research project under the supervision of one or more faculty members. Permission of MPH Academic Coordinator is required.

0-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated 5 times FOR credit.

HPH 521: Introduction to Clinical Research
This introductory seminar series provides a broad-based overview of clinical science research methods, as well as guidance for critically reviewing the peer-reviewed literature. Class lectures, exercises, and interactive small group sessions will cover framing a research question, formulating a research hypothesis, critically appraising the literature, exploring study design options, conducting research ethically and responsibly, selecting clinical outcomes, and evaluating analytical alternatives. Students enrolled in the Graduate Program in Public Health can not use this course (earn credit) to their degree requirements.

1 credit, Letter graded (A, A-, B+, etc.)
May be repeated 3 times FOR credit.

HPH 523: Social and Behavioral Determinants of Health
This course introduces students to population health as one of the organizing concepts in public health and the orientation that differentiates public health from medicine. Consistent with public health tradition, health is discussed from an ecological perspective, and the course presents current knowledge about the multiple determinants of population health including socioeconomic status, the physical environment, medical care, individual behavior, and genetics and the interaction of these factors. Also covered is the measurement of population health, sources of data and methods for assessing population health improvements.

2 credits, Letter graded (A, A-, B+, etc.)

HPH 530: History of Public Health and Medicine
This course explores major themes and interpretations in the history of public health and medicine since the 18th century. Particular emphasis is placed on the influence of social and cultural developments on medicine and public health, and vice versa. American developments will be placed in a broad comparative perspective including both Western and non-Western nations.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 534: Spatial Analysis: Health Applications
This course is an intermediate level graduate course in the application of spatial methods for analyzing environmental exposure and disease data. Students with backgrounds in epidemiology, public health, environmental health, biostatistics, community health, biology, sociology, psychology, marine and atmospheric sciences, geosciences, demography, and geography are particularly encouraged to participate. Although the course will focus on examples related to human health, graduate students in other disciplines will find the course useful for specific and appropriately defined research purposes. Techniques for spatially analyzing point patterns and aggregated data in polygons will be introduced, including autocorrelation, clustering analysis, geostatistical smoothing, and approaches for spatial regression. Consideration of space-time variability will also be covered. This course includes theoretical elements so that the student will learn to appreciate strengths and weaknesses of different spatial approaches. Prerequisite: Course in GIS or equivalent, as determined by consent from the instructor. NOTE: Students need a foundational knowledge of Geographic Information Systems (GIS) software. This requirement can be met by completing GSS 313: GIS Design and Application I (if available), by completing other Introduction to GIS courses at Stony Brook or elsewhere, or by self-teaching using the following book: Getting to Know ArcGIS Desktop by Tim Ormsby, Eileen Napoleon, and Robert Burke.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 542: Introduction to Global Health 1
This course will provide health personnel with a basic awareness of the problems of the worlds’ population with special focus on the poorest. To promote these objectives, this course has been designed to introduce medical and public health students to key population health topics from a global perspective, with special emphasis placed on the health and welfare of women and young children in low-income countries. The health impact of emergent and re-emergent infectious diseases will be reviewed, including HIV, tuberculosis, malaria and sexually transmitted infections. Malnutrition will be discussed. Students will be introduced to demography and the impact of population increases on the global environment. There will be discussions of the health problems of immigrants to the U.S. from tropical countries.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 546: Introduction to Global Health 2
This course will provide health personnel with a basic awareness of the problems of the worlds’ population with special focus on the poorest. To promote these objectives, this course has been designed to introduce medical and public health students to key population health topics from a global perspective, with special emphasis placed on trends in morbidity and mortality, maternal and perinatal mortality in low-income countries, and war, catastrophe and displaced persons. The health impact of emergent infectious diseases will be reviewed including water-borne diseases, emerging antibiotic resistance, bioterrorism, and parasitic disease. The design and effectiveness of foreign aid programs will be discussed. Students will be introduced to demography and the impact of population increases on the global environment. There will be discussions of the health problems of immigrants to the U.S. from tropical countries. Finally, students will learn about vaccinations and other safety issues related to traveling and working in the tropics.

3 credits, Letter graded (A, A-, B+, etc.)
HPH 550: Theories of Social and Behavior Change
In this survey course, students learn about the major social and behavioral theories used in health promotion. Rather than simply cataloguing each theory in turn, this course takes a “constant comparative” approach to the learning of theories, in which theories are dissected to their core elements and compared to each other in order to understand the points of convergence and divergence among them. The goal in taking this comparative approach is application: by knowing the core elements of various theories, students will more easily be able to choose appropriate theories to explain community health problems of interest. In addition to covering traditional individual-level behavior change theories, this course will focus on community and social change theories, challenging students to think about the role of social context on health behavior and community health promotion. After learning about commonly-used social and behavioral theories, students will learn about and critique theories that are less-commonly used but have important implications for health promotion.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 551: Introduction to Health Communications
This course provides an overview of health communications. It is designed to be a skills-building rather than theory-based course. Therefore, assignments are hands-on, often requiring students to reach beyond their comfort zone. As this is a survey course, topics provide an introduction to health communications as it relates to providers and patients, healthcare organizations, community groups, and public health and other government agencies. The course introduces health communications topics including health literacy, social marketing, and new communications technologies. Through the introduction of these topics, the course provides a general background in health communications in the context of a current public health communications issue such as pandemic influenza. Students will be expected to be abreast of health care news in all forms of media and be prepared to participate in weekly discussions about how stories have been covered. Students will also be interviewed by a journalism student in the Stony Brook School of Medicine’s Clinical Skills Center, write a news profile, write a press release, write an op-ed article, and develop a social marketing tool for a current public health. As this is a communications course, class participation is essential.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 552: Planning and Implementing Community Health Initiatives
In this course, students learn how to develop theoretically-informed and evidence-based community health initiatives. Over the course of the semester, students work on developing their own culturally-competent community health initiatives, each of which is targeted at a particular population with a specific health need. Each student learns how to assess community needs and assets using a variety of methods, elaborate an initiative’s theory of change through use of logic model, design theoretically-informed intervention activities appropriate to the needs/assets identified, create a budget and organizational structure, and engage key stakeholders at every facet of development and implementation of the community health initiative. Students work together in the same small group over the course of the semester to get/give feedback and hone their individual projects. Through this intense group work, students both (1) learn how to apply course concepts to several particular community health problems and (2) gain skills for working in teams on community health initiative planning and implementation. Prerequisite: HPH 550.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 553: Evaluating Community Health Initiatives
This course prepares students to plan, implement, and utilize an evaluation of a community health initiative. Basic principles and practices of evaluation are addressed, including identifying the goals of a community health initiative; designing an evaluation plan that can determine if the initiative’s goals are achieved; implementing an evaluation plan; interacting with stakeholders; and using evaluation results to improve performance.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 554: Principles of Health Education & Promotion
This course aims to provide students with the historical, theoretical, and philosophical foundations of health education and promotion. Students will be given the tools to work with community and patient populations. Students will be equipped with the knowledge, skills, and attitudes to raise people’s health awareness, as well as the tools needed to teach people how to reduce their risk of disease and promote health. All students will be required to design a health education and promotion program using the knowledge and skills learned in the course.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 555: Demographic Theory and Methods
This course introduces students to the basic theory and methods employed in the study of demography. The students will understand life table methodology, population projection, sources of demographic data, patterns in global fertility and mortality, the demographic transition, current patterns in fertility, marriage and work, abortion and contraception, and fertility/mortality interrelationships.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 559: Advanced Research Methods
This course will provide students with an in-depth review of principles of public health research methods. Emphasis will be placed on conceptualization of research questions, evaluation of research design, sample size, and issues related to potential threats to validity within a public/applied setting. Additionally, students will become familiar with how to evaluate methods used in published literature and to design their own research projects. Course topics will include how to obtain secondary data, sample size calculation, risk adjustment, bias, confounding, and interaction. The instructor will work with students as they develop their own analytic project proposals. Students will be expected to implement their proposed research in HPH 560 Advanced Biostatistics in the following semester.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 560: Advanced Biostatistics
Students learn to formulate a scientific question in terms of a statistical model, leading to objective and quantitative answers. Topics may include analysis of variance, regression, including details of data-analytic techniques and implications for study design, measures of association, 2x2 tables, stratification, matched pairs, logistic regression, model building, analysis of rates, and survival data analysis using proportional hazards models. The course stresses applications in epidemiology, and other areas of public health research. Prerequisite: HPH 507 and HPH 559.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 562: Data Management and Informatics
This course provides students with an introduction to the principles of public health informatics and data management using the SAS systems. Lectures and labs will be aimed at developing hands-on skills about how to create, maintain, and manage databases using the SAS Systems for Windows, a major software package used frequently in public health and clinical research. In addition,
the student will learn how to retrieve and summarize information about population health from major public health information systems in the U.S.

2 credits, Letter graded (A, A-, B+, etc.)

**HPH 563: Cost Benefit and Cost Effectiveness Analysis**

The course will introduce the uses and conduct of cost benefit and cost effectiveness analyses as decision-making aids in the health care research. It will provide students with an understanding of the roles and limitations of cost benefit and cost effectiveness analyses and criteria for evaluating those studies. Critical issues regarding measuring cost and effectiveness, evaluating outcomes, discounting, and dealing with uncertainty will be discussed. Prerequisites: HPH 507 and HPH 562

2 credits, Letter graded (A, A-, B+, etc.)

**HPH 564: Qualitative Methods**

In this course, students learn about the logic, theory, and methods of qualitative research within population health and related fields (e.g., social welfare, nursing, medicine, sociology, and psychology). The course begins with an introduction to the epistemological and ontological underpinnings of qualitative inquiry, with special attention to how these factors affect the types of research questions often asked (and answered) by qualitative researchers. Students then learn the nuts-and-bolts of qualitative research design and data collection through review of existing qualitative studies and hands-on application. Homework and in-class exercises over the course of the semester give students practice in (a) designing a feasible qualitative research study, and (b) collecting three kinds of qualitative data: participant observation, in-depth interviews, and focus groups. The course concludes with an overview of steps for data analysis, including coding, memo-writing, and triangulation. Emphasized throughout the course are methodological issues germane to qualitative (and quantitative) research: reflexivity of the researcher, appropriate treatment of human subjects, and obtaining quality data.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 575: Public Health Internship**

This course is an applied internship in a public, not-for-profit, or private sector organization that provides a public health service. Students will gain practical public health skills through a semester long internship. The student will work in the organization and prepare a weekly journal of activities, as well as a paper at the conclusion of the course, applying program knowledge to the internship activities. Graduate Graded and may be repeated for credit. MPH Academic Coordinator consent required.

0-12 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

**HPH 580: Practicum**

The Practicum is a planned experience in a supervised and evaluated public health-related practice setting. A journal of fieldwork and a project, with a written report, are required. Students will be expected to demonstrate their "capacity to organize, analyze, interpret and communicate knowledge in an applied manner." Health departments, as well as a variety of other local organizations, offer a wide array of potential sites for the Practicum experience. Permission of MPH Academic Coordinator is required.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 581: Capstone Seminar: Population Health Issues**

This course will assist students in synthesizing the basic public health knowledge through completion of a Capstone Project. Most core and concentration course work must be complete before the student can participate in the Capstone Seminar. Permission of MPH Academic Coordinator is required.

3 credits, S/F graded

**HPH 585: Introduction to Biostatistics & Epidemiology**

This course is an introduction to the principles of statistical methods and epidemiology and their application in the health sciences. The student will develop a basic understanding of statistics, epidemiology, and interpretation of research studies in order to communicate risk and scientific evidence to colleagues and the public, directly or through the press. Prereq: Permission of department required for Non HSC students.

4 credits, Letter graded (A, A-, B+, etc.)

**HPH 599: Maintenance of Matriculation**

This course is for students who are maintaining matriculation while engaging in consultation with faculty regarding completion of courses and/or master's project. Students will be graded S/F.

0-3 credits, S/F graded

May be repeated for credit.

**HPH 620: Parameters of Social and Health Policy I**

Introduces students to United States social policy, with special emphasis on political, economic and social factors that have affected its historical development, particularly in reference to oppressed groups. Explores relationship of social policy to social work practice.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 621: Parameters of Social and Health Policy II**

Utilizes frameworks for social policy analysis. Explores continuing dilemmas in policy development. Stresses effects of social movements and social change on social policy. Prerequisite: HWC 509

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 633: Childhood Sexual Abuse and Long-Term Sequelae: Assessment and Intervention**

This course focuses on the assessment and clinical intervention with adults who were sexually abused in childhood. Treatment for eating disorders, substance abuse, self-injurious behavior, sexual dysfunction, PTSD and dissociative identity disorder (DID) are addressed as well as other health related issues emanating from the trauma of childhood sexual abuse. Cultural, legal, political, and ethical dilemmas are also examined. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 636: Community Analysis and Health Promotion**

Explores diverse concepts of community, analyzes a range of community structures, processes and power relationships. Investigates contemporary models, strategies and tactics of community organizing and health promotion in the United States and in selected other countries and emphasizes efforts made by poor people, ethnic minorities of color and women to organize and mobilize community groups and movements. Highlights group and community analysis and organization skills. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 656: Risk Assessment, Regulation, and Homeland Security**

The course focus is on risk assessment associated with nuclear, chemical and biological weapons as it relates to Homeland Security. Topics include air dispersion, uncertainty analysis, exposure measurements, epidemiology, toxicology, regulatory issues, risk management, risk communication, risk perception, and risk preparedness. The course will also cover laws and regulation, discouraging terrorism, and disaster
preparedness, various acts passed by the U.S.
Congress to regulate water, air, and controlled
substances. Offered as EST 560 or HPH 656.
Prerequisite: Undergraduate or equivalent
physics, math and chemistry.
Fall and Spring, 4 credits, Letter graded (A,
A-, B+, etc.)

HPH 657: Demographic Economics I
This course deals with the economics of the family. It utilizes recently developed
techniques in economics and demography to
deal with questions concerning marriage,
divorce, fertility, contraception, the
intrafamily distribution of resources, and the
intergenerational distribution of resources.
Students will do original theoretical and
empirical research under the professor's
supervision. Prerequisite: ECO 501; Graduate
standing in the Economics department or
permission of the Graduate Program Director.
Spring, 3 credits, Letter graded (A, A-, B+,
etc.)

HPH 658: The Use of Remote Sensing
and GIS in Environmental Analysis
An introduction to the use of aerial and
satellite imagery in environmental analysis and the
manipulation of geographic data sets of all
types using Geographic Information Systems.
This course is designed to teach students in
archaeology, physical anthropology, and related disciplines, how satellite
imagery combined with various maps can be
manipulated using GIS software to perform
powerful geographic analysis. Although
students are eventually likely to use these
tools in many different parts of the world, this
course focuses on Long Island as a research
area, and each student designs and completes a
research project on a particular section of the
area, focusing on the habitats of local
wildlife, the locations of archaeological sites,
coastal regimes, etc. This course presumes
computer literacy and familiarity with database
management. Offered as ANT 526 and DPA
526 or HPH 658.
Spring, 3 credits, Letter graded (A, A-, B+,
etc.)

HPH 660: Engineering Economics
This is a course in advanced cost justifications
for business and projects. The objective is
to give the student a better understanding of
what is required to justify, budget, plan and
carry out technological projects in industry
today. The student will also understand how
management decisions are influenced by
financial analysis when making budgetary
project plans.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 661: Methods of Socio-
Technological Decision Making
Focus is on the application of decision-making
techniques to analyze problems involving
technology, particularly its social impacts.
Areas of study include decision making under uncertainty, decision making in a
passive vs. active environment, sequential
decisions, estimating payoffs, forecasting,
and technology assessment. These systems-
analysis techniques are used to formulate
and solve a variety of socio-technological
problems, especially those that arise in
educational, industrial, and environmental
professions.
Prerequisite: Graduate standing in department
or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HPH 662: Systems Approach to
Human-Machine Systems
General systems theory concepts such as
feedback, stability, tipping point, resilience,
recursion, hierarchy, and complexity will be
discussed, and used to analyze examples of
complex systems drawn from nature, business, technology, and education.
The course will address the use of feedback,
information and communication, structure,
and cybernetics to manage complex systems.
Students will prepare a study of a complex
system and its management incorporating
these general concepts. Offered as EST 582
and HPH 662. Prerequisite: EST 581 or
permission of instructor, Graduate standing in
the department, Spring
3 credits, Letter graded (A, A-, B+, etc.)

HPH 664: Health Economics II
Theoretical and econometric analysis of
selected aspects of the health care delivery
system, such as the demand for medical
services, the supply and distribution of
physician services, the utilization of non-
physician medical personnel, alternative
models of hospital behavior, third-party
insurance reimbursement, national health
insurance and cost, and price inflation in the
hospital and long-term care sectors. Offered as
ECO 646 or HPH 664.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 667: Long Island's Groundwater
This course will cover basic groundwater
concepts in unconsolidated sediments, and
examine contamination issues in light of Long
Island's particular hydrogeology, land use,
and waste management history. Mathematical
principles will be discussed but not stressed;
scientific and technical papers discussing
particular concepts or problems, including
important local examples, will be closely read.
Prerequisite: Permission of instructor. Offered
as MAR 521 or HPH 673.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

HPH 684: Environmental and Waste
Management in Business and Industry
Environmental and waste management practices in industrial and other institutional
settings. Technologies of hazardous waste
prevention, treatment, storage, transportation,
and disposal are considered. Topics include
information systems and software tools for
environmental audits, regulatory monitoring
and compliance, cost estimation, recycling
programs, air, land and water emissions
controls and permits. Employee health, safety,
and education and quality management and
examined. Field trips to several Long Island
institutions.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 686: Risk Assessment and Hazard
Management
A case-study approach to the assessment
of risk and the management of natural and
technological hazards, with emphasis on those
that can harm the environment. The course
focuses on technological hazards involving
energy, transportation, agriculture, natural
resources, chemical technology, nuclear
technology, and biotechnology, and on natural
hazards such as climatic changes, droughts,
floods, and earthquakes. The first part of the
course consists of readings on risk assessment
and hazard management and discussions of
published case studies. During the second part
of the course, students conduct Offered as EST
593 or HPH 686.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 687: Diagnosis of Environmental
Disputes
Diagnosis of disagreements about
environmental and waste problems. Tools for
evaluating disputes about (a) scientific theories
and environmental models, (b) definitions
and analytical methodologies for estimating
risk, “real” cost, net energy use, and life-
cycle environmental impact, (c) regulatory
and legal policy, (d) siting of controversial
environmental facilities, and (e) fairness and
other ethical issues. These diagnostic tools are
brought to bear upon case studies of pollution
prevention, recycling, nuclear waste disposal,
and climate change.
3 credits, Letter graded (A, A-, B+, etc.)

HPH 688: Principles of Environmental
Systems Analysis
This course is intended for students interested in developing computer models for technology assessment and for environmental and waste management. Concepts developed in EST 595 Environmental Systems Engineering and Analysis are applied to real-world problems. Techniques in model development are presented in the context of applications in surface and groundwater management, acid rain, and health risks from environmental contamination. Offered as EST 596 or HPH 689.

Prerequisite: EST 595 or permission of instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HWC

Social Work

HWC 500: Field Education I
Placement in practice settings under supervision of a licensed M.S.W. Students will be graded S/F. Must be taken concurrently with HWC 513.
4-6 credits, S/F graded

HWC 501: Field Education II
A continuation of HWC 500. Students will be graded S/F. Must be taken concurrently with HWC 514. Prerequisites: HWC 500 and 513.
4-6 credits, S/F graded

HWC 502: Field Education III
Placement in advanced social work practice settings. Supervision provided by a licensed M.S.W. Students will be graded S/F. Must be taken concurrently with HWC 515 and 516. Prerequisites: HWC 500, 501, 513 and 514
4-6 credits, S/F graded

HWC 503: Field Education IV
A continuation of HWC 502. Students will be graded S/F. Must be taken concurrently with HWC 517 and 518. Prerequisites: HWC 502, 515 and 516
4-6 credits, S/F graded

HWC 504: Human Behavior and the Social Environment I
Introduces a framework for understanding how individuals and families grow, develop and change within their social environment. Critiques interpersonal, intrapersonal and sociostructural theories and their impact on special populations which have been exploited and alienated in society.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 505: Psychopathology and Psychopharmacology
This course focuses on the concepts of mental health, mental disorders and the influence of culture on both. The mental health concerns of diverse social, racial and ethnic groups, particularly those historically devalued and oppressed are covered. In addition, the use and misuse of the classification system of the Diagnostic Statistical Manual (DSM-IVTR) are examined. This examination includes the distinction between major mental disorders and other forms of dysfunctional behavior and the recognition of symptoms. Assessment of psychosocial functioning within a multicultural and gender role frame is emphasized. Social work values, roles, responsibilities and ethical considerations are detailed throughout the course. The role of the social worker as an integral member of the interdisciplinary mental health team is discussed. Prerequisites: HWC 500, 501, 504, 513 and 514
3 credits, Letter graded (A, A-, B+, etc.)

HWC 506: Social Work in Health
This course recognizes the centrality of health as an issue in all people’s lives. The issue of health and well-being are issues of concern regardless of practice setting or intervention modality utilized. It is with this in mind, that the School embraces the concept of health as an organizing principle and theme. Serves as an introduction to the concept of health and its connection to social work. The healthcare delivery system, managed care, healthcare financing, epidemiology, ethics, and complimentary medicine are addressed. The impact of race and culture on both. The mental health concerns of diverse social, racial and ethnic groups, particularly those historically devalued and oppressed are covered. In addition, the use and misuse of the classification system of the Diagnostic Statistical Manual (DSM-IVTR) are examined. This examination includes the distinction between major mental disorders and other forms of dysfunctional behavior and the recognition of symptoms. Assessment of psychosocial functioning within a multicultural and gender role frame is emphasized. Social work values, roles, responsibilities and ethical considerations are detailed throughout the course. The role of the social worker as an integral member of the interdisciplinary mental health team is discussed. Prerequisites: HWC 500, 501, 504, 513 and 514
3 credits, Letter graded (A, A-, B+, etc.)

HWC 507: Master's Project
Students complete a master's project under the sponsorship of a faculty member. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 508: Continuation of Master's Project
A continuation of HWC 507 for students who did not finish their Master's Project during the term in which they had registered for it. Students will be graded S/F. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective. Prerequisite: HWC 507
S/F graded

HWC 509: Parameters of Social and Health Policy I
Introduces students to United States social policy, with special emphasis on political, economic and social factors that have affected its historical development, particularly in reference to oppressed groups. Explores relationship of social policy to social work practice.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 510: Parameters of Social and Health Policy II
Utilizes frameworks for social policy analysis. Explores continuing dilemmas in policy development. Stresses effects of social movements and social change on social policy. Prerequisite: HWC 509
3 credits, Letter graded (A, A-, B+, etc.)

HWC 511: Research I
Examines the basic concepts and methods of data collection (e.g., surveys, experimental designs, field research, unobtrusive designs) used in social research. Primarily prepares the student to understand and develop a research proposal and to critique methods used in research articles that address critical issues in social work practice.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 512: Research II
Provides instruction in the computation, interpretation and application of data analytic procedures used in social research. Covers procedures such as descriptive statistics, correlations, chi-square and t-test. Examines their relevancy for analyzing issues in social work practice. Prerequisite: HWC 511
3 credits, Letter graded (A, A-, B+, etc.)

HWC 513: Social Work Practice I
Provides a foundation for generalist practice, including the knowledge base, values and skill development necessary for effective...
practice with individuals, families, groups and communities. Students are introduced to the helping process across client systems and across the life span through a strengths perspective and empowerment approach to practice. Students are also introduced to the concept of resilience as a foundation to their understanding of human development. Must be taken concurrently with HWC 500.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 514: Social Work Practice II**
A continuation of HWC 513. Revisits the helping process in greater depth with specific reference to special consideration for work with families, groups, communities and organizations. The broad range of social work roles across client systems is considered. Deepens knowledge of generalist practice and skill development. Must be taken concurrently with HWC 501 and 504.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 515: Advanced Social Work Micro Practice I**
Focuses on the helping process with integration of increased understanding of the significance of transactions between people and their environments. Emphasizes development of advanced theory and practice skills. A focus is placed on developing assessment and diagnosis skills alongside understanding client's defenses, coping mechanisms, and the genetic, familial, cultural, and social factors that influence psychiatric diagnoses. The evaluation of intervention effectiveness, service delivery in an agency context, professional role and conduct are woven throughout the course. Must be taken concurrently with HWC 502 and 516. Prerequisites: HWC 500, 501, 513 and 514

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 516: Advanced Social Work Macro Practice I**
Emphasizes the understanding of theories and the development of advanced skills key to practice with groups, communities and organizations. Focus is placed on leadership development in the health and social welfare fields. Must be taken concurrently with HWC 502 and 515. Prerequisites: HWC 500, 501, 513 and 514

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 517: Advanced Social Work Micro Practice II**
Emphasizes professional responsibilities for ongoing self-assessment and developing a critically reflective stance to practice. Concentrates on skill development and working with populations at risk; a concurrent major focus is placed on the different theoretical perspectives, evidence-based social work practice models and interventions. A critical analysis of case material and social systems designed to meet client system needs is stressed toward the development of micro or clinical interventions within a variety of settings and client systems, most particularly the individual, family, group, organization, and community. Must be taken concurrently with HWC 503 and 518. Prerequisites: HWC 502, 515 and 516

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 518: Advanced Social Work Macro Practice II**
Emphasizes advanced theory and practice skills in community organization and program development. Focus is placed on strategic planning, management, evaluation, policy analysis and development, program development, and organizational analysis and change as applied in the health and social welfare fields. Must be taken concurrently with HWC 503 and 517.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 520: Advanced Social Work Practice with the Aged**
This course examines concepts and strategies for working with the elderly at the primary, secondary and tertiary levels of intervention. It presents and critically analyzes a variety of approaches in working with the elderly and their families. Interventions with the well elderly living in the community, the elderly who suffer some disabilities but who are still living in the community and the elderly who are institutionalized are examined. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 521: Ethnic Sensitive Social Work Practice**
Provides a theoretical framework and focuses on the development of the skills necessary to provide effective culturally sensitive social work services to diverse individuals, families, groups and communities. The special problems faced by groups traditionally devalued and oppressed are examined. Emphasizes skills in working for institutional change and social justice. Co-scheduled with HWC 321. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 522: Human Sexuality**
This course identifies personal attitudes and judgments about sexually related behaviors. Critically examines factual information derived from research in human sexuality and covers a wide range of sexual behavior from a knowledge base. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 523: Growing Old in America:**
*The Social Conditions-Policy and Practice Implications*
Explores the social, political and economic conditions related to aging including long-term care in this society. Identifies social policies and program formats that enhance wellness and support dependencies from a positive perspective. Co-scheduled with HWC 323. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 524: Children and Adolescents Who Grieve**
Focuses on issues related to bereavement in children and young people. Children and adolescents who struggle with the crisis of loss is a special population that is often overlooked. Students explore the emotional response of young people who grieve. Mental health professionals that provide treatment to this population must acquire specialized knowledge and skills to assist in healing wounded children. Upon completion, students will have gained an increased understanding of the developmental implications of loss in childhood, assessment of bereavement, and treatment interventions specific to bereaved children and adolescents. Co-scheduled with HWC 324. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 525: Anger Management**
Focuses on issues related to anger management in children and young people. Children and adolescents who struggle with the crisis of loss is a special population that is often overlooked. Students explore the emotional response of young people who grieve. Mental health professionals that provide treatment to this population must acquire specialized knowledge and skills to assist in healing wounded children. Upon completion, students will have gained an increased understanding of the developmental implications of loss in childhood, assessment of bereavement, and treatment interventions specific to bereaved children and adolescents. Co-scheduled with HWC 324. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 526: The Social Conditions-Policy and Practice Implications**
Explores the social, political and economic conditions related to aging including long-term care in this society. Identifies social policies and program formats that enhance wellness and support dependencies from a positive perspective. Co-scheduled with HWC 323. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 527: Children and Adolescents Who Grieve**
Focuses on issues related to bereavement in children and young people. Children and adolescents who struggle with the crisis of loss is a special population that is often overlooked. Students explore the emotional response of young people who grieve. Mental health professionals that provide treatment to this population must acquire specialized knowledge and skills to assist in healing wounded children. Upon completion, students will have gained an increased understanding of the developmental implications of loss in childhood, assessment of bereavement, and treatment interventions specific to bereaved children and adolescents. Co-scheduled with HWC 324. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

**HWC 528: Human Sexuality**
This course identifies personal attitudes and judgments about sexually related behaviors. Critically examines factual information derived from research in human sexuality and covers a wide range of sexual behavior from a knowledge base. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)
HWC 529: Complementary and Alternative Medicine

Human service workers are often required to discuss issues of health and healing. Many individuals, by virtue of their culture, experiences and/or choice, often adhere to a combination of nontraditional and traditional beliefs regarding healthcare. This course familiarizes students with those methods and beliefs most often found in specific cultures. Students will develop an appreciation of each practice in order to interact with clients from a strengths perspective and will gain an international perspective on healthcare modalities. Co-scheduled with HWC 329. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 530: Case Management in Human Services

Case management has grown dramatically in the human service field over the last twenty years in response to the growing service needs of individuals and families facing complex life situations and issues. Examines both the macro level and micro level issues facing case managers and agencies as they provide quality services to often oppressed populations. Co-scheduled with HWC 330. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

2 credits, Letter graded (A, A-, B+, etc.)

HWC 533: Family Intervention in Health and Mental Health

This course focuses on family and marital problems. Environmental, social, economic, psychological and institutional pressures that affect family functioning are examined. Emphasis is placed on intervention skills. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

2 credits, Letter graded (A, A-, B+, etc.)

HWC 534: Treatment of Alcoholics and Substance Abusers

This course covers alcoholism and substance abuse as family illnesses and their stages of development, as well as the impact these illnesses have on the families of active and recovering alcoholics and substance abusers. Self-help groups and on traditional and relatively recent modalities used in the treatment of addicted individuals and their families are focused on. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 537: Family Intervention in Adolescence

This course focuses on adolescent development, developmental risk factors, and the impact these factors have on the family unit. The course provides a review of current sociocultural and historical trends affecting the family and a discussion of the family's role in the development of the child. Co-scheduled with HWC 337. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 538: Death and Dying: Loss and Separation

This course explores student values, attitudes, fears and conceptions relating to death and dying. Issues of loss and separation in relation to various age groups, cultural orientations and societal expectations are examined. The focus is on the acquisition of bereavement counseling skills. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 539: Ancestral Health Practices

There is an increasing integration of complementary medicine and allopathic medicine. As health professionals, it is important to understand the beliefs and practices of our clients in order to maximize their options and choices. Professionals must be knowledgeable about the healing traditions anchored in different cultures and ethnicity. Co-scheduled with HWC 339.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 540: Social Issues in Popular Culture

Movies have been a useful medium that can illustrate current social issues and family dynamics as well as policy and research dilemmas. Each week a film with a central practice/research/policy issue provides the basis for a lecture and class discussion. Topics focus on a variety of social issues such as family dynamics, bereavement, adoption, domestic violence, abuse, residential placement, policy and research. Co-scheduled with HWC 340. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 541: Youth and Violence

Examines the etiology of youth at risk for violence, using ecological and interpersonal perspectives. Family, school and community risk factors are outlined as well as assessment, intervention and treatment issues. Successful prevention programs are highlighted. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 542: Social Work with Children: The Social Worker's Role

This course is designed to provide an understanding of the special issues and concerns surrounding work with children. Professional dilemmas and guidelines to aid practice are identified. Special issues involved in work with young children are highlighted. Although the focus is on direct work with children, a family-centered approach is presented. Practitioner roles, the impact of service settings, policy and legislation affecting this area of practice are reviewed as is the knowledge base that serves to guide practice, including formulations of practice theory and empirical research findings. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 543: Social Work with Children: The Social Worker's Role

This course is an examination of the history and development of alcohol and substance abuse problems in the United States. It focuses on the etiology, psychopharmacology and legal ramifications of the use of licit and illicit substances in our culture. The course provides information on a variety of services available to drug abusers, addicted individuals and their families in the fields of prevention, education and treatment. Co-scheduled with HWC 344. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 544: Overview of Substance Abuse

Movies have been a useful medium that can illustrate current social issues and family dynamics as well as policy and research dilemmas. Each week a film with a central practice/research/policy issue provides the basis for a lecture and class discussion. Topics focus on a variety of social issues such as family dynamics, bereavement, adoption, domestic violence, abuse, residential placement, policy and research. Co-scheduled with HWC 340. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 545: Individual, Group and Family Treatment of Alcoholics and Substance Abusers

This course covers alcoholism and substance abuse as family illnesses and their stages of development, as well as the impact these illnesses have on the families of active and recovering alcoholics and substance abusers. Self-help groups and on traditional and relatively recent modalities used in the treatment of addicted individuals and their families are focused on. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 546: Working with Adult Children of Alcoholics and Substance Abusers

This course focuses on adult children of alcoholic parents and how parents' illness affects their children's social, emotional, and educational development from infancy to adulthood and into old age. Survival roles of children in alcoholic families and how these affect adult functioning are discussed. Examines the continuing effect family alcoholism has on adult children and the intervention strategies used in treatment. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 547: Managing Conflict

A major concern for health and human service managers is conflict in organization, community and group settings. The various types of conflicts and the concepts of negotiation and mediation as interventive strategies are considered. Didactic and experiential learning experiences are utilized. Focus is on analyzing conflict situations and selecting interventive strategies to reduce, contain or heighten the conflict situation. Oppressive conditions, structures and processes are considered major determinants of human suffering and individual and social
HWC 548: Adolescent Development and Health Promotion
The effect on adolescent development of physiological changes, relationships with peers and family, and societal expectations are examined. Emphasis is on the development of assessment and engagement skills for working with adolescents and their families to help counteract adolescent self-destructive behavior and promote well-being. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 549: Overview of Social Work with Special Populations
This course examines the issues that social workers must consider when working with traditionally disenfranchised populations. Emphasis will include micro and macro issues when intervening with gay and lesbian individuals, members of diverse racial and ethnic groups, and women, as well as others. The historic as well as contemporary experiences of these individuals' interactions with the health and human service delivery system will be explored. Co-scheduled with HWC 349. Enrichment Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 550: Culture-Centered Approach to Social Work Practice
This course provides students with an opportunity for self growth while preparing to work with individuals and their families from a culture-centered value base. Culture-centered foundation practice provides students with a frame of reference for better understanding and appreciation of the difference of their own culture from the cultures of others. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 551: Law and Social Change
This course introduces students to the interrelationship of the legal process in the United States and the profession of social work. Focuses on the legal process in general, social welfare law, in particular, and the implications for effective social work practice.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 552: Lesbians and Gay Men: Issues in Health Care
This course is an examination of the critical impact that healthcare policies and services have on lesbians and gay men in American society. Issues related to access to care, discrimination, services, health insurance, healthcare resources within geographical areas and the health status of lesbians and gay men are examined. It focuses on the issues that lesbians and gay men encounter in their interactions with the healthcare system. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 553: Chemical Dependency in Special Populations
This course covers alcoholism and substance abuse with populations that have been traditionally devalued and oppressed. It focuses on development of skills and sensitivity to the needs of ethnic groups, women, the elderly, the mentally ill and LBGTQ people who are chemically dependent. Policy and practice issues related to these populations are considered. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 554: Special Populations
This course covers alcoholism and substance abuse with populations that have been traditionally devalued and oppressed. It focuses on development of skills and sensitivity to the needs of ethnic groups, women, the elderly, the mentally ill and LBGTQ people who are chemically dependent. Policy and practice issues related to these populations are considered. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 555: Supervision in Health and Human Service Organizations
This course prepares social workers for the variety of tasks related to supervisory practice in health care agencies. Supervision is introduced as a teaching process, as an administrative function and as a program development tool. Emphasis is on helping workers function effectively with culturally diverse clients, populations at risk and the chronically ill. Content includes: historical perspective of supervisory practice; supervisor and agency structure; the organizational context of practice; learning theories; concepts of power, authority and accountability; ethical and clinical issues; supervisory techniques, skill and self awareness; staff and program development and evaluation. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 556: Proposal Writing in the Health and Human Service Fields
This course provides a comprehensive study of the principles and methods used to prepare program, training, research, demonstration and other types of proposals. Extensive workshop practice in developing appropriate writing skills and in locating and accessing funding sources is included. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 557: Issues in Health Care
This course is an examination of the critical impact that healthcare policies and services have on lesbians and gay men in American society. Issues related to access to care, discrimination, services, health insurance, healthcare resources within geographical areas and the health status of lesbians and gay men are examined. It focuses on the issues that lesbians and gay men encounter in their interactions with the healthcare system. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 558: Human Services Administration
An introduction to the practice of administration of public and non-profit agencies, theories of management including alternative decision-making models, understanding of organizational structure and process, external and internal functions including interagency collaboration and personnel and financial management, affirmative action and ethical issues. The course combines theory with case examples, practical exercises and other experiential learning modes. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 559: Mental Health Evidence-Based Practice for Social Workers
This course develops the knowledge and skills necessary for working with individuals with a diagnosis of serious mental illness using recovery-oriented evidence-based practices. This course is designed for M.S.W. students and M.S.W. mental health practitioners. The course familiarizes students with evidence-based practices, within a recovery-oriented paradigm, as a general approach to practice as well as specific evidence-based interventions to use for individuals with a diagnosis of serious mental illness. Students should have a basic knowledge of serious mental illness as pre- or co-requisite, however a review will be provided. Research literature is examined to determine the various levels of support for specific interventions and essential principles for translating research into practice. Appropriate treatment outcomes that reflect effective quality mental health practice are identified. Focus is on providing assessment and treatment to a diverse group of individuals with a diagnosis of serious mental illness. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.
3 credits, Letter graded (A, A-, B+, etc.)
This course examines personal and institutional racism in the United States and the effect racism has on the delivery of services to individuals who do not fit the traditional "American model". It examines the historical relationship between racism and social welfare policies, programs and practice, and contemporary strategies for change. Co-scheduled with HWC 361. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 563: Homelessness, Politics and Public Health

This course analyzes homelessness as an issue of social policy, including its history, recent causes and current demographics. It emphasizes the political and economic context that has made homelessness a major social problem. Co-scheduled with HWC 363. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 568: The Workings of the Brain: Practice Issues for Social Workers

Addresses the organization, development and functions of the brain and how this influences how we think, feel and behave. Causes of organic changes in the brain such as substance abuse, disease and injury are addressed. Advances in neuroscience that have aided in diagnosis and social work practice are covered. Innovative treatment modalities such as EMDR, biofeedback and vagal nerve implants are presented. Strongly emphasizes the combination of science and practice issues. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 569: Childhood Sexual Abuse and Long-Term Sequelae: Assessment and Intervention

This course covers the impact of historical and contemporary developments within the field of child welfare. It examines the evaluation of child welfare services and the role of child care workers. It also examines out-of-home care, foster care, group home care and institutional care within the context of traditional public/voluntary structure of services and the social/political context. Services in relation to the changing roles of the family and emergence of child care are covered. Co-Scheduled with HWC 375. Enrichment Elective.

2 credits, Letter graded (A, A-, B+, etc.)

HWC 577: Program Evaluation

This course provides an in-depth analysis of the technical requirements of program evaluation and the organizational and political constraints that influence the evaluation process. Techniques in the design and implementation of evaluation research in the health and human services fields are covered. Advanced Practice Elective. Prerequisites: HWC 511 and 512

3 credits, Letter graded (A, A-, B+, etc.)

HWC 578: Advanced Social Work with Groups

This course explores the principles and practice of group work in assisting clients to maximize psychosocial functioning. Class members will participate in an experience that encourages them to realize the power of group work process and usefulness of this modality. Group work techniques, context, dynamics, skills and the role of the group facilitator are discussed. In presenting group work with special populations students learn about the impact of issues including development, discrimination, illness, addiction and separation on the commonality of the human experience as it presents in group practice. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 579: Special Topics in Social Work

This course examines significant timely issues confronting the profession. Topics include violence as a public health problem, issues of aging, racism, gender, AIDS, the media, and others. Topics vary each term as faculty develop specific modules that address one or more of these issues. This course may also be offered as an advanced practice elective depending on topic. Some topics may be identified as appropriate for the Healthcare Specialization. Depending on topic it may be co-scheduled with HWC 379.

1-3 credits, Letter graded (A, A-, B+, etc.) May be repeated 4 times FOR credit.

HWC 580: Overview of Family Violence

This course is an overview of the phenomenon of family violence in the United States including child abuse, intimate partner violence (IPV) and elder abuse. Incidence and prevalence regarding each form of family violence will be reviewed as well as etiology, current evidence-based treatment modalities and competing political ideologies. Particular focus will be on the current research for each type of family violence and policy directives that emanate. This course also explores theories of etiology, including patriarchy, intergenerational family dynamics and substance abuse. It examines programmatic approaches and programs for batterers and prevention strategies. Co-scheduled with HWC 380. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 581: Public Health and Community Health Intervention

This course examines many of the critical public health issues of today. Students gain an understanding of the concepts underlying social epidemiology and develop an appreciation of the ways in which the health status of different populations in this country is differentially impacted. Community health planning strategies (e.g. health promotion and health education) are examined. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 582: Organizational Dynamics and Legal and Ethical Issues in Health Care

This course examines some of the traditional, as well as newer, models through which healthcare services are delivered. Particular emphasis is given to the issue of access to health services as well as the location of the professional social worker within these systems. Students gain the ability to conceptualize many of the critical ethical and legal issues impacting the field today. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 584: Community Analysis and Health Promotion

Explores diverse concepts of community, analyzes a range of community structures, processes and power relationships. Investigates contemporary models, strategies and tactics of community organizing and health promotion in the United States and in selected other...
countries and emphasizes efforts made by poor people, ethnic minorities of color and women to organize and mobilize community groups and movements. Highlights group and community analysis and organization skills. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HWC 588: Qualitative Health Research Methods
The class works as a team on a joint project. Topics include problem formulation, instrument construction, sampling strategy, interviewing, data transcription and data analysis. Advanced Practice Elective. 3 credits, Letter graded (A, A-, B+, etc.)

HWC 589: Biostatistics
This course is an introduction to the analysis and interpretation of quantitative data using bio-statistical methods. It examines three interrelated issues: the nature of quantitative data and their relationship to social, psychological and biological concepts, the different ways data can be presented to help others understand research questions and the answers to those questions, and the basic and intermediate bio-statistical techniques available for analyzing data. Focuses on how data relate to research questions that are of interest to workers in the healthcare field. This course meets the requirement for an elective in the Healthcare Specialization. Advanced Practice Elective. 3 credits, Letter graded (A, A-, B+, etc.)

HWC 590: HIV/AIDS
This course focuses on the central aspects of the HIV/AIDS Pandemic, including the state of medical knowledge, HIV/AIDS and the law, prejudice and discrimination, AIDS activism and organizing, grief/death/dying, psychosocial issues, redefining the medical model, homophobia, racism, sexism and ableism in research, treatment and policy, IV drug use, drug treatment and other related issues. Upon completion of this course, students will have met the educational requirements established by the HIV Primary Care Medicaid Provider Agreement. This requirement is needed to conduct HIV pre- and post-test counseling in hospitals and clinic settings. Co-scheduled with HWC 390. This course meets the requirement for an elective in the Healthcare Specialization. Enrichment Elective. 3 credits, Letter graded (A, A-, B+, etc.)

HWC 592: Community Building in Higher Education
This course introduces the Student-Community Development Model as an integrated application of social work, community organization and social work practice modalities. The course works together on a joint project that aims to create community on campus. Open only to students in the SCD Specialization. Advanced Practice Elective. 3 credits, Letter graded (A, A-, B+, etc.)

HWC 593: Student - Community Development Seminar I
This course introduces the Student-Community Development Model as an integrated application of social work, community organization and social work practice modalities. It introduces historical developments in higher education, student development theory and how political, socio-economic, cultural and health issues impact higher education. How these systems influence and shape student and community wellness on the college campus is emphasized. Contemporary higher education organizational structures, planning modalities and intervention strategies are examined to support social work practice in this setting. Advanced Practice Elective 3 credits, Letter graded (A, A-, B+, etc.)

HWC 594: Student - Community Development Seminar II
This course builds upon the content covered in HWC 593 and continues an examination of how societal systems influence and shape higher education. By utilizing alternative conflict management and mediation models, this course explores organizational structures and appropriate intervention strategies for advancing positive systems change. A variety of contemporary social issues on college campuses are examined to inform and support social workers as change agents within the arena of campus life. Leadership development and social work practice roles in this setting are emphasized. Advanced Practice Elective Pre-requisite: HWC 593 3 credits, Letter graded (A, A-, B+, etc.)

HWC 595: Independent Study
Independent study with an individual faculty member. Designation as enrichment or advanced practice elective is determined with faculty sponsor. 1-3 credits, Letter graded (A, A-, B+, etc.) May be repeated 3 times FOR credit.

HWC 598: Issues in Higher Education
This course examines current issues which arise in institutions of higher education utilizing alternative conflict management and mediation models to provide the framework to examine a variety of social issues on college campuses. It explores such issues as diversity, violence, substance abuse and mental health. Enrichment Elective. 3 credits, Letter graded (A, A-, B+, etc.)

HWC 599: Maintenance of Matriculation
For students who are maintaining matriculation while engaging in consultation with faculty regarding completion of courses and/or the Master's Project. Students will be graded S/F. 1 credit, S/F graded. May be repeated 6 times FOR credit.

HWC 600: Statistics I
Provides instruction in the computation, interpretation, and application of data analytic procedures used in social research. Discusses procedures such as descriptive statistics, chi-square, and t-tests, while examining their relevancy for analyzing issues in social work practice. Fall Term. 3 credits, Letter graded (A, A-, B+, etc.)

HWC 601: Statistics II
Introduces students to multivariate techniques used in the analysis of various kinds of data. Analysis of Variance, Multiple Regression Analysis, Logistic Regression Analysis, and Log-Linear Regression Analysis, as well as more advanced techniques, such as path analysis and survival analysis, are discussed. 3 credits, Letter graded (A, A-, B+, etc.)

HWC 602: Research Methods I
Presents an overview of the variety of research methodologies utilized in social science and social work, with the goal of providing students with the knowledge and competencies needed to develop and conduct their own research. The course will lead to a sophisticated understanding of the research process including the formulation of research questions, hypothesis development and testing, and choice of research method, involving both quantitative and qualitative methods. Material on quantitative designs will include experimental and quasi-experimental designs, data collection methodologies, scaling, instrument development, and sampling procedures. Material on qualitative designs will address focus groups interviews, key informant interviews, participant observation, unobtrusive observation, text and content analysis, and the use of archival and historical data. Special attention is given to ethical and political issues in the conduct of research. 3 credits, Letter graded (A, A-, B+, etc.)
GRADUATE COURSE DESCRIPTIONS

Fall 2013

HWC 603: Research Methods II
A continuation of HWC 602 Research Methods I.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 604: Naturalistic and Qualitative Research
Considered is the application of alternative research methods for different questions. The distinction between quantitative and qualitative approaches and methods in the analysis of qualitative data is explored.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 606: Research Practicum I
Students undertake significant and methodologically rigorous research involving design, implementation, analysis, and dissemination of a research project. The substantive areas will include health, mental health, or substance abuse. School of Social Welfare faculty, affiliated faculty members from the Health Sciences Center and University social science departments, and principal investigators in community research projects will serve as preceptors. Students will spend ten hours each week for two semesters in a practicum setting. Students have a supervised hands-on, practical experience with an ongoing research project. Typical activities include data analysis, interpretation of results, research report writing, subject recruitment and screening, instrument development, or data collection. The primary objective is to strengthen students’ ability to synthesize various phases and components of social research. A focus is on articulating linkages among the research questions, the data gathered to address these questions, the techniques selected for manipulating and analyzing the data, and the interpretation of findings. Students are encouraged to pursue publication stemming from the practicum. While the research practicum may not necessarily expose students to the specific population or problem of greatest interest to them, the skills or competencies mastered can prepare students methodologically to carry out their dissertation research plans.
3 credits, S/U grading

HWC 607: Research Practicum II
A continuation of HWC 606 Research Practicum I.
3 credits, S/U grading

HWC 608: Social Welfare Policy Analysis I
An analytical approach to public policy formulation in the areas of health, mental health, and substance abuse involving the impact of environmental forces on policy content. Considered are the effects of various institutional arrangements and political processes as well as inquiry into the consequences of various contemporary public policies. Tools and frameworks of policy analysis are examined. Policy alternatives and policy development and implementation are also considered.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 609: Social Welfare Policy Analysis II
A continuation of HWC 608 Social Welfare Policy Analysis I. Prerequisite: HWC 608. Spring
3 credits, Letter graded (A, A-, B+, etc.)

HWC 610: Organizational Theory and Social Welfare Administration
The focus is on theories and methods available to planners and administrators who function in complex organizational settings. Decision making, political and economic factors, information systems, value conflicts, and adaptations of rational models to emerging realities will be studied. Health and mental health programs will be utilized as exemplars.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 611: Knowledge Building in Social Work: The Philosophy of Applied Social Research
An examination of the major currents of thought that shape the meta-theoretical, theoretical, and methodological issues related to knowledge building in social work. The impact of pragmatic philosophy on the current “science versus non-science” debate within social work is reviewed. Special attention is given to epistemological approaches and their relation to qualitative and quantitative research strategies.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 612: Social Science Theory for Social Welfare
In this course, we explore the nature of social theory and the normative project of social welfare by examining theories of social justice, human rights and oppression. We consider the nature and structure of power, the role of ideology and their impact in a society defined by inequality. Social Construction and critical theory are particularly relevant as their assumptions align well with those of social welfare. Lastly, we explore the tensions and possibilities of democratic theories and ideals, given the current context, as a means to further social welfare’s normative project. Throughout the course, students are challenged to explore existing theory and, importantly, to learn and engage in the process of theorizing, themselves.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 613: Seminar in Social Work Education
Focus is on the place of social work education in the university with attention to issues of current concern such as the integration of professional education with the scholarly research focus of other academic disciplines. Consideration will be given to educational program structure, content, curriculum development, evaluation, and teaching methodologies. Students will be required to teach a course in the B.S.W. or M.S.W. curriculum under mentorship of a senior faculty member.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 614: Teaching Practicum
The teaching practicum is a supervised experience in teaching at the master's or undergraduate level in the School of Social Welfare, or in some aspect of academic administration, such as curriculum development, project planning, and/or proposal development. The educational practicum is typically available to doctoral students in the third year. An individualized plan will be developed for implementing the teaching practicum. Practica may include teaching a section of a required graduate/undergraduate course, working as a teaching assistant with a faculty member, and/or co-teaching and working with the curriculum committees and area sequences in curriculum development.
3 credits, S/U grading

HWC 615: Dissertation Seminar I
Students are expected to survey the current state of the art in their area of interest and to develop a written prospectus on a question suitable for dissertation research. In the second semester, students will refine dissertation proposals through presentation and critique in the seminar. Specific techniques and alternatives in studying a variety of dissertation questions are compared.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 616: Dissertation Seminar II
A continuation of HWC 615 Dissertation Seminar I.
3 credits, Letter graded (A, A-, B+, etc.)

HWC 679: Special Topics in Policy Research
Discusses timely policy research issues such as violence as a public health problem,
agging, racism, gender, AIDS, poverty and international social work. Topics vary each term as faculty develop specific modules that address one or more of these topics.

Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HWC 695: Independent Study

HWC 699: Dissertation Research on Campus
Dissertation research under direction of advisor.
Prerequisite: Advancement to candidacy (G5).
Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading

HWC 700: Dissertation Research Off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

HWC 701: Dissertation Research Off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must receive clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

HWC 800: Full Time SUMMER RESEARCH
F T SUMMER RESEARCH

S/U grading
May be repeated for credit.

ISE

Information Systems

ISE 503: Data Management
This course provides an understanding of the issues in managing database systems as an essential organizational resource. Students learn the enterprise data architecture components, data storage configurations, and information retrieval methods. It expands from the relational model to the multidimensional model, object-relational techniques, and web accessed data. The course includes concepts, principles, issues, and techniques for managing corporate data resources. Techniques for managing the design and development of large database systems including logical data models, concurrent processing, data distribution, database administration, data warehousing, data cleansing, and data mining. Students will use current methods and tools for database design and development. Limited to CSE/ISE graduate students; others, permission of instructor.
3 credits, Letter graded (A, A-, B+, etc.)

ISE 504: Analysis, Modeling, and Design
This course provides an understanding and application of system analysis and design processes. Students evaluate and choose appropriate system development methodologies and design a system. Students learn the importance of effective communication and integration with users and user systems. The course emphasizes interpersonal skill development with clients, users, team members, and others associated with the development, operation, and maintenance of systems. The course includes the system development life cycle; analysis and design techniques; information systems planning and project identification and selection, requirements collection and structuring, process modeling, data modeling, design of interface and data management, system implementation and operation, system maintenance, and change management implications of systems, and globalization issues in systems. Students will use current methods and tools such as rapid application development, prototyping, and visual development.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

ISE 506: Quantitative Computer Architecture
Explores the physical structure of a computer; machine representation of information; architecture and organization of various mainframe, mini-, and microcomputers; primary and secondary storage; and input and output communication. Architectural choices are compared and used to determine resulting function and performance. Architectural trade-offs are also identified.
3 credits, Letter graded (A, A-, B+, etc.)

ISE 507: Project Management
The course focuses on both the technical aspects of project management as well as the human aspects. Technical components include project definition, work breakdown structure development, and the use of optimization techniques for planning a project and optimizing schedules. Graphical approaches to project definition are addressed, as are needs analysis, preliminary design, and detailed design and implementation. Human aspects of project management include forming a project team, managing performance, and resolving conflicts.
3 credits, Letter graded (A, A-, B+, etc.)

ISE 516: Systems Engineering Principles
An introduction to the full range of system engineering concepts, tools and techniques. These elements are applied to both large- and small-scale projects. The course provides a review of the stages of an integrated, top-down, life-cycle approach to design engineering -- from analysis of customer requirements to maintenance and support, from definition of system operational concepts through material disposal and ability and maintainability engineering, human factors, safety, logistics engineering, quality engineering and value-cost engineering. The course also includes a treatment of crucial management issues, such as the planning and development of System Engineering Management Plans (SEMPs), work breakdown structures (WBSs), cost projections and supplier selection and management.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

ISE 517: Human Factors in Systems Engineering
The course focuses on techniques to integrate human factors into the design of systems so that the systems match human abilities and limitations. The course addresses techniques to translate system requirements into project specific design requirements. The course addresses physiological and mental characteristics of humans and emphasizes methods used to generate human factors inputs.
for engineering work products. The course describes the effect of human factors on each stage of development. Limited to CSE and ISE graduate students; others, permission of instructor. Cannot be used towards M.S. or Ph.D. degree in Computer Science.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

ITAL

ITALIAN

ITAL 500: Reading Italian
Designed to prepare graduate students to read contemporary research in their respective disciplines published in Italian, the course presents systematic instruction in the fundamentals of reading comprehension and in specialized subject-oriented vocabulary.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ITAL 501: Contemporary Italy
Analysis of contemporary Italy and its civilization through the study of the development of its historical, cultural, political, and social characteristics. Designed for potential teachers of Italian at the college as well as secondary school levels, this course emphasizes and traces the evolution of the character and institutions of contemporary Italy.

3 credits, Letter graded (A, A-, B+, etc.)

ITAL 502: Special Topics in Italian Cinema
A topics course given in Italian on Italian cinema. Topics may include films of a particular actor, director, genre, theme, or historical period. Smeester supplements to the Bulletin contain specific description when course is offered. May be repeated for credit as topic changes. Prerequisite: advanced oral and written proficiency in Italian.

3 credits, Letter graded (A, A-, B+, etc.)

ITAL 507: Italian Linguistics: Diachronic Development and Synchronic Structures
An examination of the linguistic evolution and the synchronic grammars (phonology, morphology, syntax) of standard Italian and some Italo-Romance dialects.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ITAL 508: Syntax and Composition
This course analyzes and discusses finer points of Italian grammar and investigates diverse writing styles. Students will develop grammatical drills from elementary through advanced levels. Literary masterpieces are translated to demonstrate types of style and possible alternatives in writing.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ITAL 510: Advanced Conversation and Composition
An examination of Italian in the context of contemporary Italy, with an eye to the effects of globalization and localism on language and culture. Class readings and conversations focus on today's multifaceted Italy, steering clear of stereotyped images and misconceptions.

Prerequisite: Graduate status.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ITAL 511: History of the Italian Language
A study of the development of the Italian language beginning with its Latin origins, and continuing through modern times.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ITAL 512: Italian Dialects
The linguistic structures of the many languages (i.e., "dialects") spoken in Italy are analyzed. Consideration is also given to the sociolinguistic situation.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ITAL 513: Romance Linguistics
This course examines the linguistic evolution of the Romance languages from the classical period through modern times. The synchronic grammars of Italian, French, and Spanish are examined.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ITAL 516: Seminar on Dante
Dante's Vita Nuova and Divina Commedia are analyzed within their historical, social and moral context of 13th- and 14-centuries Europe. Offered as ITL 516 and CEI 526.

3 credits, Letter graded (A, A-, B+, etc.)

ITAL 522: Seminar in Italian Humanism and Renaissance Literature
Analysis of the works of such writers as Petrarch, Boccaccio, Ariosto, Machiavelli, Castiglione, Aretino, Tasso, and Michelangelo. Study of the relation of the individual works of these writers to broader historical, cultural, and intellectual developments of the period.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ITAL 551: Studies in Italian Romanticism
Italian romanticism is compared with the movement as it took place in other countries, such as England, Germany, and France. The works of Foscolo, Leopardi, and Manzoni are studied in the philosophical and sociological contexts of the period.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ITAL 552: Studies in the Modern Novel
A study of the development of the Italian novel from Verga to the latest trends. Stress is placed on the major shifts in sensibility occurring at the beginning of the 19th century and after World War II.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ITAL 562: Studies in Contemporary Literature Contemporary Italian Poetry: The Quest for Meaning
Studies in 20th century literature.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ITAL 581: Independent Individual Studies
Fall and Spring, alternative years, 1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ITAL 591: Language Acquisition I
Elementary Italian I intended for graduate students from other programs.

1-4 credits, Letter graded (A, A-, B+, etc.)

ITAL 592: Language Acquisition II
Elementary Italian II intended for graduate students from other programs.

1-4 credits, Letter graded (A, A-, B+, etc.)

ITAL 593: Language Acquisition III
Intermediate and Advanced Italian intended for graduate students from other programs. The requirements for the course will include a graduate-level component to be determined by the instructor. May be repeated for credit.

1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ITAL 595: Practicum in Teaching
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

JRN 501: Communicating Science: Distilling Your Message
Current and future scientists and health professionals will learn to communicate clearly and engagingly with different kinds of audiences, at different levels of complexity, using different forms. We’ll examine the basics of clear, two-way communication, including knowing and being responsive to your audience, overcoming "the curse of knowledge", having a point, avoiding jargon, using storytelling techniques, being personal, asking questions, and introducing complexity in stages. Students will start by crafting a short, controversial statement about their work and why it matters. We’ll expand that to a longer statement, convert it into a brief piece of writing, such as a letter to the editor or a blog post, practice answering questions about it from the public and from the media, plan a public presentation, and learn to apply these skills in the classroom. Skills learned in this course can help scientists and health professionals communicate more effectively with students, potential employers or funders, public officials, family and friends, the press, and colleagues in other disciplines.

JRN 502: Communicating Science: Writing for the Public
Students will practice writing about specific and health material clearly and vividly, in ways non-scientists can understand. They will learn to use analogies, examples and metaphors to illuminate unfamiliar concepts, practice using numbers clearly and translating statistics into conversational English, learn about scientific terms and concepts that are commonly misunderstood by the public. They will learn to introduce complexity gradually, to avoid overwhelming the reader while not "dumbing down" their material. Students will learn to write for different formats, including blogs, letters to the editor or to funders, and op-eds or commentary pieces.

JRN 503: Communicating Science: Improvisation for Scientists.
This innovative course uses improvisational theater techniques to help students speak more spontaneously and connect more directly and responsively with their audience and with each other. After warm-up exercises, emphasizing physical freedom and verbal spontaneity, students take part in two- and three-person exercises and situational improvisations that focus on paying attention to your listeners, and altering your approach to meet their needs. At the beginning and end of this course, students will deliver a short oral statement about their research or a scientific topic that interests them, so they can measure their progress. This course is not about acting; it’s about helping current and future scientists and health professionals connect with their audiences. Science graduate students who had several sessions of improvisation training in a pilot session reported communicating better as teachers, researchers, students, and family members. A glimpse of the process can be seen in a short videos on the web page of Stony Brook’s Center for Communicating Science: www.stonybrook.edu/journalism/science.

JRN 504: Communicating Science: Using Digital Media
Science and health information increasingly travels by digital media, as new ways emerge for scientists to communicate directly with the public, without the intermediaries of press or public relations. Students will learn how to use blogs, podcasts, Twitter and other forms of social media for two-way communication with different segments of the public, including colleagues in other disciplines. The course will include hands-on instruction in working with digital media, tailored to students’ interests and levels of experience.

JRN 505: Communicating Science: Connecting with the Community
Students will learn how to use communication techniques, cultural competency, and health literacy concepts to reach and mobilize the community and key stakeholders on health- and science-related issues related to their research, outreach or community education objectives. The course will incorporate role-playing and community networking skills to help students make connections with key people and groups relevant to their current interests and work. This will require contact with the instructor before the start of the course to discuss students’ projects, plans or interests.

JRN 506: Communicating Science: Advanced Writing for the Public
This course is for graduate students in the sciences who have taken JRN 502. Communicating Science: Writing To Be Understood, and want to continue developing and practicing their ability to write about science clearly and vividly for non-expert readers.

JRN 507: Introduction to Science and Health Concepts and Institutions
In this course, aspiring journalists without a background in science will be introduced to the values, culture, practices and language of the
fields they are learning to cover. The course will explore scientific methods in theory and practice; the structure of scientific and medical education, research and funding in the United States, including the role of business and entrepreneurship; the conventions of scientific publication and conferences; ethical issues, including conflict of interest, transparency and access to information. This course is intended primarily for journalism graduate students.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 510**: Basic Reporting and Writing for Journalism

This course, for students without a journalism background, aims to help students master the basic elements of reporting and writing news and feature stories that are clear, accurate and fair. Students will gain practical experience through reporting on campus and community events, with frequent writing and rewriting assignments. Coverage will begin with breaking-news reports, such as coverage of speeches or crimes, and move on to news features, profiles and in-depth news stories. Students will learn the basic skills of journalism, such as developing story ideas; finding, assessing and interviewing sources; researching topics; identifying the important elements in a story; explaining information clearly, concisely, and fairly.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 515**: Television Reporting and Editing

This course, for students who have no background in broadcast reporting, introduces students to the basics of reporting, writing and editing news stories for television. Students will begin learning how to develop ideas for television, to use sounds and visuals properly, to do live reporting and to do basic video editing. Both on- and off-camera skills will be emphasized.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 520**: Techniques of Online Journalism

Students in this course will learn practical and conceptual skills in presenting news and feature stories online using web-based multimedia techniques. The class also will explore issues raised by the migration of news to the web, including questions of privacy and credibility, and challenges to traditional journalistic standards. Course includes weekly labs in the use of digital tools, including photography, video and information-rich graphics. This course is co-listed with JRN 320. It is intended for graduate journalism students who have little or no experience in producing online media packages.

Offered
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 525**: Health, Environment, Science and Technology Reporting

The core course of the journalism master's program, this will introduce students to the range of science, health and environmental coverage while providing intensive instruction and practice in reporting and writing in journalistic formats. The goal is for students to learn how to think critically about scientific claims and controversies and how to write clear, accurate and vivid stories for print or online media. Students will practice such skills as developing sources, interviewing experts, finding stories, online research, organizing material, using statistics correctly, and presenting technical information in lay terms. Field trips will introduce students to work being done at Brookhaven National Laboratory and Stony Brook University Medical Center. A variety of written forms will be explored including news and trend stories, explanatory or human interest features, profiles, blogging, and first-person essays. This is an intensive course that meets six hours a week and requires at least 12 hours a week of work outside class. Offered
Fall, 6 credits, Letter graded (A, A-, B+, etc.)

**JRN 530**: The Big Story: Science Issues Seminar

Students will be exposed to selected current issues in health, science, environment and technology, providing the context reporters need to provide sophisticated coverage. The course will be built around a series of visits by scientists and medical professionals who will discuss topics in which they are expert. Students will prepare for these encounters, question the experts, participate in the discussions, and produce journalistic reports. Topic areas will vary but may include climate change, energy research, food and drug safety, stem cell research, racial and economic health disparities, health care funding, ocean pollution, computer privacy, nanotechnology, and space exploration.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 550**: Investigative Reporting Techniques

Students will develop skills in investigative and in-depth reporting, with a focus on how these approaches can be used to produce deeper, more illuminating coverage of science, health, the environment and technology. Use of documents, human sources and computer-assisted reporting will be included.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 555**: Ethics, Law and Journalistic Judgment

Students will explore the rights and responsibilities of the U.S. press, with a focus on issues of law, ethics and editorial judgment that arise in science, health and environmental reporting. Case studies will be used to illuminate ethical dilemmas, from various points of view, including that of reporters, researchers, health care professionals, subjects and patients.

Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 570**: Advanced Reporting, Writing and Production for Broadcast

This course, for students who have learned the basics of broadcast reporting, writing and production, is offered in a workshop/production environment. It focuses on mastering the reporting of breaking news, live reporting and developing story ideas. Emphasis also is placed on shooting techniques. Students will produce longer-form reports. Co-listed with JRN 370.

Prerequisite: JRN 515 or permission of the department

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 571**: Television Production

This course is designed to introduce students to planning, assembling, producing and performing the elements of a newscast. Students will be exposed to the roles of key members of a newscast team, including producers, assistant producers, reporters, writers, anchors and video photographers and editors. There will be emphasis on developing decision-making and on-air skills, as students complete mini-newscasts and segments for broadcast. Students will be expected to meet strict deadlines and manage critical air time. Newscast segments will be showcased on JRN Web sites. Co-listed with JRN 371.

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**JRN 580**: Advanced Editing and Presentation for the Web

This course, designed for students interested in specializing in online news, will focus on content management and the presentation of news on the Web. Students will have...
the opportunity to manage a news Web site in real time, with emphasis on around-the-clock news judgment and presentation. Students will learn how to enhance online news through multi-media integration and reader/viewer interactivity. Students also will study information architecture, eye-tracking studies and different ways of making the Web more accessible for readers, including layering information. New course. ABCF grading. 3 credits.

3 credits, Letter graded (A, A-, B+, etc.)

JRN 581: Advanced Digital Storytelling

Students will combine their journalistic skills in reporting, writing and producing with advanced multimedia techniques to create an online "microsite" devoted to one major story, combining text with video, photos, blogs and interactive features. This course builds on skills acquired in JRN 520 and 580. Significant computer use will be required outside of class time.

3 credits, Letter graded (A, A-, B+, etc.)

JRN 587: Independent Study

Intensive study of a special topic or intensive work on a reporting project undertaken with close faculty supervision. May be repeated.

0-6 credits, S/U grading

May be repeated for credit.

JRN 588: Graduate Internship

Students participate in an appropriate internship in a journalism outlet or an institution devoted to the master's program content themes of science, health, environment and technology. The work must involve journalistic skills related to the educational goals of the program. Student interns will report regularly to a faculty member and will complete an internship project, including a portfolio of work done.

0-6 credits, S/U grading

May be repeated for credit.

JRN 590: Special Topics: Issues in Contemporary Journalism

This special topics course will deal with timely and contemporary issues that affect journalists and journalism. The issues could range from the press in wartime, an examination of the press' role covering war from World War II to the current war in Iraq, how the press covers presidential campaigns and journalists as novelists. May be repeated as the topic changes.

3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 1 times FOR credit.

JRN 591: Journalism Workshops

This 1-credit workshop course is designed to assist students in developing skills that will be useful in various journalism courses. Topics will rotate. Anticipated topics include On-Air Presentation, Audio Journalism, Databases, FOIL and Sunshine Laws, Editing Software. Colisted with JRN 391.

Fall and Spring, 1 credit, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

JRN 592: Journalism Without Walls Prep

This course will prepare students to take JRN 635, Journalism Without Walls, which features a reporting trip to an international or domestic locale. Students will learn about the politics, culture and social issues of the planned destination. Past destinations have included China, Russia and the U.S. Gulf Coast. In spring 2012, JRN 592 will prepare students to report from China in summer, 2012. Co-listed with JRN 392.

Fall and Spring, 1 credit, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

JRN 600: Master's Project in Journalism

In this capstone course, students will produce a long-form story of professional quality, in print, video or multimedia. Students attend a weekly seminar and work independently under the supervision of a faculty sponsor. Prerequisites: JRN 525, 530, 550, 555 and permission of department.

4 credits, Letter graded (A, A-, B+, etc.)

LIN 521: Syntax I

A study of formal grammar as one aspect of our knowledge of language. Concepts and elements of modern syntactic analysis are introduced and motivated using a variety of grammatical phenomena and processes, across a wide range of languages.

3 credits, Letter graded (A, A-, B+, etc.)

LIN 522: Phonetics

A study of articulatory phonetics and the international phonetic alphabet, with intensive practice in phonetic transcription from a wide variety of languages. Acoustic phonetics, speech perception, and the applications of phonetics to foreign language teaching.

3 credits, Letter graded (A, A-, B+, etc.)

LIN 523: Phonology I

An introduction to the formal study of sound patterns. Problems from various languages serve as the basis for developing a theory of the representation of sound structure.

3 credits, Letter graded (A, A-, B+, etc.)

LIN 524: TESOL Pedagogy: Theory and Practice

Theoretical and practical bases of language and literacy instruction. Inquiry into instructional approaches, standard-based lesson planning, reflective practices, and assessment in the teaching of speaking, listening, reading, and writing. Evaluation of resources and technologies.

3 credits, Letter graded (A, A-, B+, etc.)

LIN 525: Contrastive Analysis

A survey of linguistic typology and a comparison of various languages as a basis for understanding the errors made by language learners and devising strategies for teaching a foreign language. May be crosslisted with CEL 551.

3 credits, Letter graded (A, A-, B+, etc.)

LIN 526: Analysis of an Uncommonly Taught Language

Working from primary and secondary sources, students construct an outline of the phonology, morphology, and syntax of a language previously unknown to them.

3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

LIN 527: Structure of English

A description of the major sentence elements, subsystems, and productive grammatical processes of English. The justification of grammatical categories, interaction between systems and processes, and notions of standard and correctness are discussed with a view to their application in the ESL classroom.

3 credits, Letter graded (A, A-, B+, etc.)
LIN 529: Content-based Language and Literacy Development
Theory and practice of language and literacy development across disciplines. Students design standard-based curricular modules and assessment, engage in reflective and collaborative practices, and design and evaluate web-based technologies.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 530: Introduction to General Linguistics
An introduction to modern theoretical and applied linguistics, including phonology, morphology, syntax, language acquisition, historical linguistics, and sociolinguistics.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 532: Second Language Acquisition
Study of the acquisition of a second language by children and adults. The focus is on data; the systematicity of the learner’s errors, the ease of acquisition in childhood, etc.; the adequacy of theories (e.g. Interlanguage processes, the monitor model, the critical period) to explain data, and the reliability of methods of obtaining data. Students conduct an empirical study testing a current hypothesis.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 535: Historical Linguistics
A study of linguistic change. Some general topics to be discussed are the genetic classification of languages; language families, language, and prehistory; reconstruction; types of sound change; types of semantic change; borrowing.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 541: Bilingualism
Study of the social, linguistic, educational, and psychological aspects of bilingualism.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 542: Sociolinguistics
An introduction to major topics in sociolinguistics, including variation theory, language attitudes, language planning, language change, and pidgins and creoles.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 544: Language Acquisition and Literacy Development
In-depth exploration of the theories of literacy and language development of native English speakers and students who are English language learners pre-school through grade 12. The development and assessment of literacy skills among children at various stages of learning development and across disciplines will be examined. Attention will also be given to children with special needs and the integration of technology in the development of literacy skills.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 550: Selected Topics in Linguistics
Topics are announced each semester. The course may be repeated for credit if topic differs.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

LIN 555: Error Analysis
Study of the systematic errors made by foreign language learners and the potential of various linguistic theories to predict and account for these errors.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 571: Curriculum Design and Evaluation
An in-depth study of curriculum design and evaluation with a focus on needs analysis, goals and objectives, approaches to language learning and teaching, assessment, resources, and program evaluation.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 574: Managing Instruction, Assessment, and Resources
Investigation and evaluation of instructional planning and assessment, content-based curriculum development, and technologies for language and literacy development among English language learners in multi-level classrooms. Partnerships with colleagues, parents and the respective communities are explored.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 577: Field Experience for Teaching English as a Foreign Language
Prospective ESOL teachers receive supervised practice teaching by arrangement with selected Long Island schools. The student teacher reports to the school to which he or she is assigned each full school day for the entire semester. Applications must be filed in the academic year preceding that in which the student plans to take the course.
3 credits, S/U grading
May be repeated for credit.

LIN 582: Supervised Student Teaching in English as a Second Language: High School (Grades 10-12)
Prospective ESOL teachers receive supervised practice teaching by arrangement with selected Long Island schools. The student teacher reports to the school to which he or she is assigned each full school day for the entire semester. Applications must be filed in the academic year preceding that in which the student plans to take the course.
3 credits, S/U grading
May be repeated for credit.

LIN 591: Directed Readings
Students read and evaluate the literature on a topic of special academic interest or professional relevance under the direction of a faculty member.
1-3 credits, S/U grading
May be repeated for credit.

LIN 592: Directed Research
Students conduct research on a topic of special academic interest or professional relevance under the direction of a faculty member.
1-3 credits, S/U grading
May be repeated for credit.

LIN 600: Colloquium in Linguistics
An introduction to research in linguistics, with presentations by faculty and visiting scientists. Topics include current research questions and ethics of research and publishing.
Prerequisite: Permission of Department, G3Standing required for 3 credit option.
Fall and Spring, 0-3 credits, S/U grading
May be repeated for credit.

LIN 621: Syntax II
A detailed consideration of recent developments in syntactic theory, including treatments of constituency and word order, grammatical relations, typological variation and linguistic universals, and constraints on grammatical rules and representations.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 623: Phonology II
A study of recent developments in phonological theory, with particular attention to nonlinear models of phonological representation and constraint-based models.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 624: Morphology and Word Formation
The internal structure of words and the place of the word in syntax, phonology, and the lexicon. A variety of analytical methods -- distributional, experimental, and computational-- will be introduced.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 625: Semantics
An investigation of the role of semantics (the theory of meaning) in the overall theory of grammar, structured around such topics as formal semantics, the interaction of syntax and semantics, and lexical semantics.
3 credits, Letter graded (A, A-, B+, etc.)

LIN 650: Selected Topics: Graduate Seminar
Topics will be announced each semester. The course may be repeated for credit if topic differs.
0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

LIN 651: Syntax Seminar
Topic varies and relates to current issues in the field and research activities of faculty and students. Past topics have included A-dependencies, adjectival and adverbial modification, word order and antisymmetry.
0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

LIN 653: Phonology Seminar
Topic varies and relates to current issues in the field and research activities of faculty and students. Past topics have included interface issues (phonetics, morphology, syntax), functional motivations for phonological constraints (articulatory ease, perceptual salience, parsing considerations), intonation, and second language and loanword phonology.
0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

LIN 680: Qualifying Paper Workshop
Doctoral candidates will present and discuss their own research work.
1-3 credits, S/U grading
May be repeated for credit.

LIN 698: Graduate Practicum in Teaching
May be repeated for credit.

LIN 699: Dissertation Research on Campus
Independent research for the Ph.D. degree. Open only to candidates for the Ph.D. degree who have advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
1-9 credits, S/U grading
May be repeated for credit.

LIN 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus.
1-9 credits, S/U grading
May be repeated for credit.

LIN 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must receive clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

LIN 800: Summer Research
May be repeated for credit.

MAE

Mathematics Teacher Preparation

MAE 501: Foundations of Secondary Mathematics Curriculum
A re-examination of the current middle school and high school mathematics curriculum. A review of the techniques and discussion of the ideas from a more advanced point of view, including topics in algebra, geometry, elementary functions, and probability and statistics. Competence in basic secondary school mathematical ideas and techniques is tested.
3 credits, Letter graded (A, A-, B+, etc.)

MAE 510: Introduction to Methods of Teaching and Learning Standards
Introduction to the basic methods of teaching middle school and high school mathematics, including study of lesson designs based on National Council of Teachers of Mathematics (NCTM) and New York State standards, and the study of pedagogical techniques including cooperative learning and the uses of technology. Students also engage in guided observation of middle school and high school mathematics classes.
3 credits, Letter graded (A, A-, B+, etc.)

MAE 520: Advanced Methods of Teaching Secondary School Mathematics
The philosophy and goals of mathematics education, with an emphasis on implementation: curriculum development; teaching techniques and styles, and learning theories and styles; lesson planning and assessment. Students will plan an entire unit, the work sample, including lesson plans and assessments, for inclusion in the professional portfolio.
3 credits, Letter graded (A, A-, B+, etc.)

MAE 530: Directed Readings and Research Paper in Mathematics Education
Tutorial studies concerning current issues in mathematics education, including recent research and topics in the history of mathematics and their relation to teaching practice. Students write a research paper for inclusion in the professional portfolio.
Prerequisites: MAE 501 and 510. Enrollment Limit: 18
Fall, 1 credit, Letter graded (A, A-, B+, etc.)

MAE 540: Clinical Experience
Supervised classroom experience in both middle school and high school settings, including experience in a high needs district, individual tutoring, working with small groups, and working as an inclusion aide. Seminar discussions focus on classroom observations and experiences.
2 credits, Letter graded (A, A-, B+, etc.)

MAE 551: Supervised Student Teaching in Middle School
Student teaching under the supervision of an experienced teacher in middle school and high school settings. These courses must be taken simultaneously.
Prerequisites: MAE 520, 530, and 540; satisfaction of all other program requirements; permission of the Director of Mathematics Education.
Fall, 3 credits, S/U grading

MAE 552: Supervised Student Teaching in High School
Student teaching under the supervision of an experienced teacher in middle school and high school settings. These courses must be taken simultaneously.
Prerequisites: MAE 520, 530 and 540; satisfaction of all other program requirements; permission of the Director of Mathematics Education.
Fall, 3 credits, S/U grading

MAE 554: Student Teaching Seminar
The student teaching experience (MAE 551/552) serves as a focus for weekly discussions of teaching and learning styles and techniques, and classroom management issues. Includes N.Y. State mandated seminars on child abuse, substance abuse and school violence.
Prerequisite: Permission of the Director of Mathematics Education.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR

Marine Sciences

MAR 501: Physical Oceanography
Examines physics of ocean circulation and mixing on various scales with strong emphasis on profound effects of Earth's rotation on motions and distribution of properties. An introduction to physics of estuaries and other coastal water bodies.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 502: Biological Oceanography
Examines biological processes in the ocean, and introduces major ocean biomes and groups of organisms. A broad treatment of energy and nutrient cycling in coastal and open ocean environments.
Prerequisite: Enrollment in MAS program or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 503: Chemical Oceanography
Introduction to chemical oceanography. Topics include origin and history of seawater, major and minor constituents, dissolved gases, the carbon dioxide system, distribution of properties in the world ocean, isotope geochemistry, and estuarine and hydrothermal vent geochemistry.
Prerequisite: Enrollment in MAS program or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 504: Statistics and Experimental Design
This course has been devised to provide basic background and hands on experience to assist graduate students in developing key skills in an essential aspect of the research enterprise, namely statistics analysis and experimental design.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 505: General Circulation of the Atmosphere
This course provides an introduction to the general circulation of the atmosphere, covering aspects in observations, data analyses, and basic theories.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 506: Geological Oceanography
An introduction to the geological oceanography of the world ocean with emphasis on the coastal environment; discussions of the physical processes controlling the structure and evolution of the ocean basins and continental margins, the distribution of marine sediment, and the development of coastal features.
Prerequisite: Enrollment in MAS program or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 507: Marine Conservation
The fundamental concepts of conservation science, a synthetic field that incorporates principles of ecology, biogeography, population genetics, systematics, evolutionary biology, environmental sciences, sociology, anthropology, and philosophy toward the conservation of biological diversity will be presented within the context of the conservation of marine resources. Examples drawn from the marine environment emphasize how the application of conservation principles varies in different environments.
Prerequisite: Enrollment in MCP or MAS program or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 508: Found Mar Sci 1: Biogeochemical
This course provides an integrated view of the chemistry, geology and biology of the oceans, using the carbon cycle as an overarching theme to help students tie more specific concepts, mechanisms, and facts into a unified whole. Several other themes will also be embedded throughout the course, including other elemental cycles, timescales on which various processes operate, differences in how major ocean ecosystems (biomes) function, and the biogeochemical evolution of Earth.
Prerequisite enrollment in MAS program or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 509: Found Mar Sci 2: Physics of Oceans, Atmos, Climate
Introduction to principles of physics governing the patterns of ocean and atmospheric properties. Discussion of the theoretical basis for energy exchange between the two environments and how it governs the spatial and temporal scales of the fluid dynamics includes how these processes interact with climate.
Prerequisite enrollment in MAS program or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 510: Modeling Techniques in Chemical Oceanography
Derivation of solutions to advection-diffusion-reaction equations for marine sediments and waters. One- and multi-dimensional models are developed for dissolved and solid-phase substances in cartesian, cylindrical, and spherical coordinates. Effect of imposing multiple layers on these systems is examined.
Prerequisite: Permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 511: Benthic Ecology
This course focuses on the ecological interactions of benthic organisms and their habitat. Topics include life histories,
the roles of competition, predation and disturbance, feeding adaptations and food webs, interactions between benthic organisms and water motion, sediment chemistry, and other abiotic factors, and evolutionary history of benthic ecological processes.

Spring, 2 credits, Letter graded (A, A-, B+, etc.)

MAR 512: Marine Pollution
Review of the physical and chemical characteristics and speciation in the marine environment of organic pollutants, metals and radionuclides including bioavailability, assimilation by marine organisms, toxicity, and policy issues.

3 credits, Letter graded (A, A-, B+, etc.)

MAR 513: Numerical Models of Coastal Processes
Atmospheric aerosol particles have been recognized to contribute the largest uncertainties to the global radiative forcing estimates and thus climate and affect air quality. This course introduces graduate students to the physical and chemical properties of aerosol particles and how those affect the particles' role in the atmosphere. Knowledge of how these particles interact with their surroundings is crucial to assess the impact of aerosols on air quality and climate. This course covers the fundamental mathematical, physical, and chemical descriptions of aerosol particles such as particle size distributions, thermodynamics of aerosols, physical and chemical particle transformation, carbonaceous aerosol, aerosol cloud interaction (cloud condensation and ice nuclei), aerosol optical properties, aerosol climate effects, and gas-to-particle (heterogeneous) reactive processes.

3 credits, Letter graded (A, A-, B+, etc.)

MAR 514: Environmental Management
This is an introduction to environmental management, and will focus on the interplay between science and public policy. Concepts include problem identification and definition, collection and analysis of relevant data to produce information, and the roles of public perception and action in ultimately determining outcomes when consensus is not reached. Specific fields to which these concepts will be applied will be solid waste management and coastal management. Current local problems will be used to illustrate the broader conceptual issues. Offered as MAR 514, EST 540 and CEY 501. Prerequisite: Permission of instructor

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 515: Phytoplankton Ecology
The biology and ecology of marine phytoplankton. Covered are life cycles, growth, nutrient uptake, grazing, and the effects of environmental factors on growth and survival of phytoplankton. The characteristics of various classes are examined and are related to environmental conditions.

Prerequisites: General biology

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 516: Ecosystem Science for Fisheries Management
This course will provide an overview of the science and mathematical models that are typically used to inform Ecosystem-based Fisheries Management (EBFM). The course will review single-species models, multispecies models and full system models! Advantages and disadvantages of implementing these approaches into management and policy will be explored. No modeling experience is necessary. The course requires familiarity with quantitative methods, but emphasizes current literature and case studies where EBFM has been or is being implemented as main learning elements.

Offered in Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 517: Waves
Theory and observations of surface waves, internal waves, and planetary waves; wave-wave, wave-current, and wave-turbulence interactions; surface wave prediction; beach processes.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 519: Geochemistry Seminar
This course explores topics in low-temperature geochemistry as chosen by the instructors and participants. The seminar series is organized around a theme such as early diagenesis, estuarine geochemistry, or aquatic chemistry. Students are required to lead one of the seminars and to participate in discussions.

Prerequisite: MAR 503 or permission of instructor

Spring, 1 credit, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAR 520: New Production and Geochemical Cycles
Consideration of oceanic new production for a variety of ecosystems. Quantitative examination of the impact of new production on the transport and cycling of major and minor elements and pollutants.

Spring, 2 credits, Letter graded (A, A-, B+, etc.)

MAR 521: Long Island's Groundwater
This course will cover basic groundwater concepts in unconsolidated sediments, and examine contamination issues in light of Long Island's particular hydrogeology, land use, and waste management history. Mathematical principles will be discussed but not stressed; scientific and technical papers discussing particular concepts or problems, including important local examples, will be closely read.

Prerequisite: Permission of instructor. Offered as MAR 521 or HPH 673.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 522: Envir Toxicology & Public Health
Principles of toxicology and epidemiology are presented and problems associated with major classes of toxic chemicals and radiation to human and environmental health are examined in case study format.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 524: Organic Contaminant Hydrology
There are a host of chemical, biological, and physical processes that affect the transport and fate of organic chemicals in natural waters. This course concerns understanding these processes and the structure-activity relationships available for predicting their rates. The major focus of this class is on
contaminant hydrology of soil and aquifer environments, and includes the principles behind remediation and containment technologies. This course is offered as both MAR 524 and GEO 524.

**Prerequisite: GEO 526 or MAR 503 or permission of instructor**

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**MAR 525: Envir&Public Hlth Engineering/Sanitation**

Review of the interactions of humans with the atmosphere and water resources, especially in the Long Island coastal community. An introduction is provided to the field of environmental health and the practices relevant to an urban/suburban and coastal setting.

3 credits, Letter graded (A, A-, B+, etc.)

**MAR 526: Pollutant Responses in Marine Organisms**

This course examines physiological, biochemical, and molecular responses of marine organisms to contaminant stress. Material will be examined through review lectures on the topic and group discussion of the current literature.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 527: Global Change**

The course examines the scientific basis behind questions of global change and some of the policy implications of changes to the region and country. Topics include evidence and courses of past climatic changes, greenhouse gases and the greenhouse effect, analogues with other planets, the Gaia hypothesis, climate modeling, and deforestation and the depletion of ozone.

Prerequisite: Permission of instructor

Fall, 2 credits, Letter graded (A, A-, B+, etc.)

**MAR 528: Ocean Atmosphere Interactions**

This course discusses the fundamental physical mechanisms through which the ocean and atmosphere interact. These principles are applied to the understanding of phenomena, such as the El Nino Southern Oscillation, the effects of sea surface temperature on the distribution of low-level winds and development of tropical deep convection, and the effects of tropical deep convection and mid-latitude storms on the ocean's mixed layer. Both modeling and observational aspects are discussed. Material will be taken from selected textbooks, as well as recent literature.

Prerequisite: Permission of instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 529: Isotope Geochemistry**

This course deals both with the use of radio and stable isotope applications to the earth sciences.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 530: Organic Geochemistry**

Introduction to the organic chemistry of the earth, oceans, and atmosphere. Topics include production transformation and fate of organic matter; use of organic biomarkers and stable and radioisotopes; diagenesis in recent sediments; oil and coal production and composition; dissolved and particulate organic matter in seawater.

Prerequisite: Permission of instructor

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 531: Long Island Marine Habitats**

Focusing on six representative marine environments around Long Island, this course emphasizes the natural history of local marine communities, as well as quantitative ecology, hypothesis testing, and scientific writing.

Students visit the sites, measure environmental parameters, and identify the distribution and abundance of common plants and animals. Using qualitative and quantitative methods in the field and laboratory, the class determines major factors that control the community structure in each habitat.

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 532: Marine Protected Areas - Belize**

Marine Protected Areas (MPAs) are parts of the ocean that are zoned to exclude activities that is potentially detrimental to the ecosystem. Marine reserves is a special type of MPA, in which the harvesting of marine wildlife is prohibited. MPAs are rapidly gaining traction worldwide as a tool to preserve or restore ecosystems, protect endangered species or sustain nearby commercial and recreational fisheries. This course is designed to provide students with a robust background in the science behind the design, implementation and expected outcomes of establishing MPAs.

This field course will explore these issues in the context of the Belizean experience where students will travel to Belize and see a number of different MPAs and learn about the challenges, benefits and limitations of MPAs for marine conservation directly from local scientists, managers and rangers.

Summer, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 533: Instrumental Analysis**

Fundamental principles of instrumental chemical analysis and practical applications of molecular spectroscopy, atomic spectroscopy, mass spectrometry and chromatography. These instruments are widely used in environmental and oceanography problem solving. Lectures cover basic concepts of chemical analysis and the fundamental principles of the analytical techniques to be used. In the laboratory, students gain hands-on experience both by performing a series of required basic chemical determinations (nutrients and trace metals in sediments and in seawater) and by undertaking special projects. Students prepare written reports describing the methods, the theory underlying those methods, results, and figures of merit. Students also present their results orally in brief presentations.

Prerequisites: Permission of instructor

Fall, 4 credits, Letter graded (A, A-, B+, etc.)

**MAR 536: Environmental Law and Regulation**

This course covers environmental law and regulations from inception in common law through statutory law and regulations. The initial approach entails the review of important case law giving rise to today's body of environmental regulations. Emphasis is on environmental statutes and regulations dealing with waterfront and coastal development and solid waste as well as New York State's Environmental Quality Review Act (SEQRA) and the National Environmental Policy Act (NEPA). This course is cross-listed with CEY 503.

3 credits, Letter graded (A, A-, B+, etc.)

**MAR 537: Tropical Marine Ecology**

The goal of this class is to teach students about the ecology of the tropical coral reef environments through lectures, field trips, snorkeling trips, SCUBA diving trips and student designed research projects. The first half of the course will be devoted to formal lectures, demonstrations, and instructor-led field trips to provide students with a basic knowledge of the common organisms and the roles they play in various coral reef ecosystems. During the second half of the course, with help from faculty, students will develop and carry out individual research projects examining organismal ecology of coral reefs.

4 credits, Letter graded (A, A-, B+, etc.)

**MAR 538: Modern Methods of Data Analysis in Atmospheric and Ocean Sciences - Part I**

An introduction to basic statistical concepts and their applications to analysis of data in atmospheric and marine sciences. The topics
include distribution, statistical estimation, hypothesis testing, analysis of variance, linear and nonlinear regression analysis, and basics of experimental design. In-depth class discussions of the theoretical concepts are accompanied by extensive applications to data sets supplied by the instructor and the students. 

Prerequisites: Enrollment in MAS program or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

**MAR 540: Marine Microbial Ecology**
An historical perspective of the field, aspects of nutrition and growth, microbial metabolism, and trophodynamic relationships with other organisms. Emphasis on roles of microorganisms in marine environments such as salt marshes, estuaries, coastal pelagic ecosystems, and the deep sea, as well as microbial contribution to geochemical cycles. Contemporary and classical methodologies covered.

Prerequisite: MAR 502 or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 541: Foundations of Atmospheric Sciences I**
This course is intended to introduce graduate majors to the foundations in the atmospheric sciences necessary for future, more specialized courses. This course covers atmospheric thermodynamics, radiative transfer, tropospheric and stratospheric chemistry, and cloud microphysics.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 542: Foundations of Atmospheric Sciences II**
This course introduces cloud physics, atmospheric chemistry, boundary layer turbulence, and atmospheric radiation. This is the second course in a two-course series taught at the level appropriate to all students in atmospheric sciences.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 543: Environmental Biology**
Survey of the basic principles of and techniques for studying the population dynamics of marine fish and shellfish. Discussion of the theoretical basis for management of exploited fishes and shellfish, contrasting management in theory and in practice using local, national, and international examples. Includes lab exercises in the use of computer-based models for fish stock assessment.

Prerequisite: Calculus I or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 544: Atmospheric Radiation**
Discussion of the compositions and radiative components of planetary atmospheres. Blackbody and gaseous radiation with emphasis on the respective roles of electromagnetic theory and quantum statistics. Derivation of the equation of transfer and radiative exchange integrals, with application to energy transfer processes within the atmospheres of Earth and other planets.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 545: Paleoceanography and Paleoclimatology**
This course will provide an extensive overview of the methods used in paleoclimate research and an examination of important climate events during the Late-Mesozoic and Cenozoic eras. We will discuss proxies used to create paleoclimate reconstructions forcing mechanisms on interannual to million year time scales, climate effects on geological and biological processes, and the modeling of present climate and extrapolation to past and future climates.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 546: Marine Sedimentology**
Study of sedimentology in the marine environment including an introduction to fluid mechanics, sediment transport theory, quantitative models of sedimentation, and dynamic stratigraphy.

Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 547: Dynamical Oceanography I**
The first course in a two-course series on basic methods and results in dynamical oceanography. This course emphasizes unstratified fluids. Topics covered include but are not limited to basic conservation equations, effects of rotation, geostrophy, potential vorticity conservation, Ekman layers, and Ekman pumping.

Prerequisite: MAR 501 or permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 548: Dynamical Oceanography II**
Continuation of Dynamics I. Course covers some of the basic effects of stratification. Topics include potential vorticity for baroclinic motion and baroclinic instability.

Prerequisite: Dynamical Oceanography I
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 549: Current Topics in Atmospheric Sciences**
This course will discuss current research topics in atmospheric sciences and their connections with advance course materials.

Semesters Offered:
Fall and Spring, 0-2 credits, S/U grading
May be repeated 1 times FOR credit.

**MAR 550: Topics in Marine Sciences**
This is used to present special interest courses, including intensive short courses by visiting and adjunct faculty and courses requested by students. Those given in recent years include Nature of Marine Ecosystems, Science and Technology in Public Institutions, Plutonium in the Marine Environment and Problems in Estuarine Sedimentation.

Fall and Spring, 1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**MAR 551: Special Topics in Management**
This course involves in-depth examination and assessment of one or two topical problems and issues in the management of fisheries in the mid-Atlantic region. Fisheries management encompasses a diversity of disciplines and interests: biology, ecology, mathematics, law, policy, economics, analytical modeling, sociology, and anthropology. The class conducts a detailed and thorough review of one or two key fisheries management problems that incorporate component issues spanning this range of disciplines. Students form several teams, each team focusing on one aspect of the overall problem and preparing a report detailing that aspect and making recommendations on how management decisions can be improved.

Prerequisite: Permission of instructor
Fall and Spring, 1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**MAR 552: Directed Study**
Individual studies under the guidance of a faculty member. Subject matter varies according to the needs of the students.

Prerequisite: Permission of instructor
Fall, 1-12 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**MAR 553: Fishery Management**
Survey of the basic principles of and techniques for studying the population dynamics of marine fish and shellfish. Discussion of the theoretical basis for management of exploited fishes and shellfish, contrasting management in theory and in practice using local, national, and international examples. Includes lab exercises in the use of computer-based models for fish stock assessment.

Prerequisite: Calculus I or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MAR 554: Aquatic Animal Diseases**
This course is designed to expose students to fundamental and current issues pertaining to host/pathogen interactions in aquatic environment. By the end of the course,
students should have a basic understanding of disease processes in aquatic animals; knowledge of the tools used for disease diagnosis; and an appreciation of disease management tools available today. A particular accent is given to the role of the environment as an important factor in infectious and non-infectious diseases.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 557: Case Study and Project Planning Seminar
This seminar will introduce students to case studies in marine conservation carried out regionally, nationally, and internationally through seminars given by professionals in the field. In addition students will be given direction on how to develop a plan for a case study as well as instruction on how to obtain, analyze, and present data. Students will be required to submit a written project plan for either their Capstone Project or Internship prior to the end of the semester.

Fall, 1 credit, S/U grading

MAR 558: Remote Sensing
Theory and application of remote sensing and digital image analysis to marine research. Students use standard software and PCs for digital filtering, enhancement, and classification of imagery.

Prerequisite: MAR 501, 502, 504, 506, or permission of instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 559: Risk Analysis, Error and Uncertainty
This seminar style course will explore error estimation, uncertainty propagation, risk analysis, model validation, and decision analysis.

Fall, 2 credits, Letter graded (A, A-, B+, etc.)

MAR 560: Ecology of Fishes
Introduction to current research in the ecology of fishes. Topics such as population regulation, migration, reproductive strategies, predator-prey interactions, feeding behavior, competition, life history strategies, and others are discussed.

Prerequisite: Familiarity with concepts of ecology or biological oceanography

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 561: Quantitative Fisheries Ecology
The course covers quantitative models that are currently utilized to assess the status of fish stocks and academic pursuits of understanding single-species and ecosystem dynamics. The course builds on basic ecological models such as the density-independent exponential and density-dependent logistic models and introduces equilibrium and non-equilibrium production models and statistical-catch-at-age techniques. Recruitment and growth models commonly used in fisheries ecology are also covered. Least-squares, non-linear and likelihood methods are methods are utilized in model parameter estimation. Statistical techniques such as bootstrapping and Monte Carlo methods are used to assess uncertainty in models outputs. This course is useful for students that plan academic or management careers in fisheries and wildlife research.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 562: Early Diagenesis of Marine Sediments
The course treats qualitative and quantitative aspects of the early diagenesis of sediments. Topics include diffusion and adsorption of dissolved species; organic matter decomposition and storage; and diageneric processes of clay materials, sulfur compounds, and calcium carbonates. The effects of bioturbation on sediment diagenesis are also discussed. This course is offered as both MAR 562 and GEO 562.

Prerequisite: Permission of instructor

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 563: Early Diagenesis of Marine Sediments II
The basic principles and concepts of diagenetic processes developed in MAR/GEO 562 are used to examine in detail early diagenesis in a range of sedimentary environments. These include terrigenous and biogenic sediments from estuarine, lagoonal, deltaic, open shelf, hemipelagic, oligotrophic deep-sea, and hydrothermal regions.

Prerequisite: Permission of instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 564: Atmospheric Structure and Analysis
Real world applications of basic dynamical principles to develop a physical understanding of various weather phenomena. Topics include the hypsomatric equation, structure and evolution of extratropical cyclones, fronts, hurricanes and convective systems, surface and upper air analysis techniques, radar and satellite interpretation, and introduction to operational products and forecasting.

Prerequisite: 1 year of calculus.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 566: Air Pollution and Its Control
This course provides an overall picture of air pollution caused by gas phase species and airborne particulate matter. The sources of air pollution and their effect on air quality on an urban, regional, and global scale will be addressed. The causes of London type smog and modern photochemical smog are discussed. The health impacts of primary and secondary air pollutants are assessed. The causes and consequences of the stratospheric ozone hole and subsequent policy regulations are discussed. The natural greenhouse effect and our current understanding of global warming are addressed.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 567: Chemical Sensors in Oceanography
An introduction to chemical sensors and their application in oceanography with emphasis on in-situ sensing in coastal environments, discussions of the sensor principles and fabrication, and biogeochemical processes revealed by in-situ measurements.

Spring, 2 credits, Letter graded (A, A-, B+, etc.)

MAR 568: Scientific Communication
This course is designed to provide first-year graduate students with an introduction to the standards and practices of both proposing and presenting results of oceanographic research. Students will develop skills in communicating in both oral and written formats, and have the opportunity to produce a draft thesis proposal.

2 credits, Letter graded (A, A-, B+, etc.)

MAR 569: Statistics With R
Essentials of conducting statistical analyses using software developed by the R Project for Statistical Computing. R is free software that has been developed by contributors around the world and is quickly becoming a standard environment for conducting scientific data analyses. The course will cover the basic language, data management, graphics, and the application of R to a variety of statistical techniques such as ANOVA, regression, MDS and PCA, GLMs and GAMs. The class is intended to explore the capabilities of R and a basic graduate understanding of statistics is required.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 1 times FOR credit.
MAR 570: Modern Methods of Data Analysis in Atmospheric and Ocean Studies - Part II
Sampling and experiment design considerations, time and frequency domain analysis, Fourier methods, related topics in probability and statistics. Course involves some computer work.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

MAR 571: Zooplankton Ecology
The course is designed to acquaint the student with the theoretical problems and applied methodology in ecological studies of marine and freshwater zooplankton. Topics will include taxonomy, anatomy, physiology, life history strategies, population dynamics, and food chain interaction.
Prerequisites: MAR 502 and permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 572: Geophysical Simulation
Basic equations and boundary conditions. Linear and nonlinear instabilities. Finite-difference time integration techniques for problems in geophysical fluid dynamics. Numerical description of global atmospheric and ocean models.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 573: Special Topics-Chemical Oceanography
This course provides an overview of the basic and applied aspects of seabird biology. We examine specific biological adaptations (e.g., morphological and physiological adaptations for diving and flying) in the first third of the course, and review population-level processes and behavioral patterns (e.g., population ecology and migration) in the second part of the course. The last third of the course applies this knowledge of seabird biology and ecology to current conservation issues and management efforts, both within the United States and internationally.
3 credits, Letter graded (A, A-, B+, etc.)

MAR 574: Special Topics: Ocean Dynamics
Introductory dynamical oceanography, framework and applications.
1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAR 575: Special Topics-Geological Oceanography
The course proposes to take several views of the ecology and biogeochemistry of intertidal wetlands to see whether one or more of these views might be useful in reinvigorating interest in the study of wetland function for its own sake. Ecology and plant life history will be studied in addition to geology and wetlands management.
1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAR 576: Special Topics-Biological Oceanography
The course is designed for the discussion of topics of special interest on demand that is not covered in regularly scheduled courses. Examples of possible topics include grazing in benthic environment, coastal upwelling, the nature of marine ecosystems, and marine pollution processes.
Prerequisite: Permission of instructor
Fall, 1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAR 577: Special Topics-Coastal Zone Management
The course is designed for the discussion of topics of special interest on demand that is not covered in regularly scheduled courses. Examples of possible topics include microcomputer information systems, environmental law, coastal pollution, dredge spoil disposal, science and technology in public institutions, and coastal marine policy.
Prerequisite: Permission of instructor
Fall and Spring, 1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAR 578: Bio & Conservation/Seabirds
This course provides an overview of the biology and conservation of seabirds, covering basic and applied aspects of seabird biology. We examine specific biological adaptations (e.g., morphological and physiological adaptations for diving and flying) in the first third of the course, and review population-level processes and behavioral patterns (e.g., population ecology and migration) in the second part of the course. The last third of the course applies this knowledge of seabird biology and ecology to current conservation issues and management efforts, both within the United States and internationally.
Fall, 1 credit, S/U grading
May be repeated for credit.

MAR 580: Seminar
A weekly series of research seminars presented by visiting scientists and members of the staff.
Fall and Spring, S/U grading
May be repeated for credit.

MAR 582: Advanced Atmospheric Dynamics
Application of the concepts of balanced flow and potential vorticity thinking - conservation and inversion - to study wave propagation, baroclinic instability, evolution of cyclones and baroclinic waves, and wave-mean flow interactions.
Prerequisite: MAR 594
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAR 583: Advanced Oceanography
May be repeated for credit.

MAR 584: Applied Marine Ecology Seminar
This course provides an opportunity for advanced graduate students to practice presenting data on their thesis research in areas broadly related to how individuals and communities of marine organisms respond to changes in their environments. Each student will prepare an abstract of the work they plan to present and assign an appropriate review or research paper for the class to read. They will then prepare a formal presentation of their work suitable for a departmental seminar. Faculty and students will provide constructive criticism of the presentation as well as participate in a discussion of the work. May be taken more than once for credit.
Fall, 1 credit, S/U grading
May be repeated for credit.

MAR 585: Coastal Geology Seminar
An assessment of recent developments in coastal geology. Discussion of advances in the application of sedimentology, stratigraphy, and geomorphology to the study of coastal environments. Modern-ancient analogues are emphasized where appropriate.
Prerequisite: Stratigraphy and sedimentary marine geology
Fall, 2 credits, S/U grading
May be repeated for credit.

MAR 586: Introduction to Ecological Modeling
This course will provide students with a familiarity of the major concepts, approaches, and underlying rationale for modeling in the ecological sciences. Topics will include reviews of theoretical and empirical models, the use of models in adaptive management, and how to confront models with data to evaluate alternative hypotheses. Roughly 1/3 of the course will be devoted to the use of models in management, focusing on the problems of fitting models to data and management pitfalls that follow. Course work will consist of readings, in class exercises, and group assignments that involve the construction, analysis, and interpretation of ecological models.

**Prerequisite:** BEE 550, BEE 552; MAT 131 or equivalent; any statistics course.

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**MAR 587: GIS: Display and Analysis of Environmental Data**

Elements of Geographic Information Systems (GIS) with an emphasis on environmental applications, especially those related to marine and coastal systems. The course includes hands-on exercises to familiarize students with GIS capabilities. A project will be required.

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**MAR 588: Molecular Marine Ecology**

DNA analysis offers a new window into the ecology of marine organisms, shedding light on aspects of their biology that are traditionally difficult to study, such as their evolutionary history, population structure, population demographic history and reproductive patterns. In this way, DNA analysis can help us better manage fisheries and conserve endangered marine species. This course is designed to expose graduate students to the burgeoning field of molecular ecology and the application of molecular analyses to fisheries management and conservation. Lectures will be supplemented by a group laboratory project, where students will apply techniques such as DNA extraction, polymerase chain reaction, DNA sequencing and computer based analysis of genetic data to address a contemporary marine conservation or fisheries issue.

**3 credits, Letter graded (A, A-, B+, etc.)**

**MAR 589: Capstone Project in Marine Conservation and Policy**

Students will conduct an in depth capstone study involving independent analysis of available data and produce an original synthesis paper based on a committee-approved, consequential topic in marine conservation. All students will also present their project at the annual Program Symposium.

**Prerequisite:** Permission of Instructor

**Fall, 1-6 credits, S/U grading May be repeated for credit.**

**MAR 590: Research**

Original investigation undertaken with the supervision of the advisor.

**Prerequisite:** Permission of instructor

**Fall and Spring, 1-12 credits, S/U grading May be repeated for credit.**

**MAR 592: Internship in Marine Conservation and Policy**

Students will obtain practical work experience through an internship with local, state or federal agencies or not for profit organizations working in the area of marine conservation and policy. To complete the internship, students will prepare a written report on their activities and present their internship project at the annual Program Symposium.

**Spring, Summer, Fall, 1-6 credits, S/U grading May be repeated for credit.**

**MAR 593: Atmospheric Physics**

Advanced cloud physics, atmospheric convection, and other moist processes.

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**MAR 594: Atmospheric Dynamics**

This course covers atmospheric waves, quasi-geostrophic theory, and atmospheric dynamic instability.

**Spring, 3 credits, Letter graded (A, A-, B+, etc.)**

**MAR 595: Graduate Seminar in Atmospheric Sciences**

Discussion of special research topics centered on monographs, conference proceedings, or journal articles. Topics include climate change, atmospheric chemistry, radiation transfer, and planetary atmospheres. This course is intended primarily for students who have passed the written qualifying examination in atmospheric sciences, although other students may enroll with permission of the faculty seminar leader.

**Fall and Spring, 0-3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.**

**MAR 596: Principles of Atmospheric Chemistry**

The application of photochemistry and reaction kinetics to the atmospheres of the Earth and planets. The composition and structure of various regions of atmospheres, including the troposphere, stratosphere, and ionosphere. Incorporation of chemical rate processes and physical transport into models. Production of airglow and auroral emissions.

**Prerequisite:** Permission of instructor

**Fall, 3 credits, Letter graded (A, A-, B+, etc.)**

**MAR 598: Synoptic and Mesoscale Meteorology**

Course examines the structure and evolution of synoptic and mesoscale systems using observations, modern dynamical analysis, and numerical weather prediction models. Diagnosis of synoptic systems includes applications of quasi-geostrophic theory to baroclinic waves; jet stream and frontal circulations. A survey of the concepts of mesoscale systems includes convective systems, gravity waves, and terrain-coastal circulations. The student will investigate such phenomena in the laboratory as well as individual projects.

**Spring, 4 credits, Letter graded (A, A-, B+, etc.)**

**MAR 599: Atmospheric Boundary Layer Processes**

This course provides the theoretical foundation for a quantitative understanding of transport processes and chemical transformations in the atmospheric boundary layer. Topics covered in this course include the equations of motions for the lower troposphere; the budget of turbulent kinetic energy; turbulent fluxes of momentum, heat and mass; treatment of chemical transformations; and the representation of these processes in numerical models.

**3 credits, Letter graded (A, A-, B+, etc.)**

**MAR 601: Dynamic model with Matlab**

This course is designed to provide basic programming skills with the use of selected Matlab toolboxes to analyze marine and atmospheric science data, to perform challenging simulations, and to explore selected problems in marine and atmospheric and related fields. The course will emphasize functionalities and applications of the matrix manipulations, signal processing, statistical, and mapping toolboxes within the context of marine science problems. The goal is to give the students exposure to tools and programming techniques to enable them to work individually or in a group on a final project relevant to their research interest. Topics will include efficient Matlab programming techniques, simple numerical modeling and learning to build a classifier for recognition and measurement, separating and clustering data, graph and representation and spectral clustering.
2 credits, Letter graded (A, A-, B+, etc.)

MAR 650: Dissertation Research
Original investigation undertaken with the supervision of research committee.
Fall and Spring, 1-9 credits, S/U grading
May be repeated for credit.

MAR 655: Directed Study
Individual studies under the guidance of a faculty member. Subject matter varies according to the needs of the student.
Prerequisite: Permission of instructor
Fall, 1-9 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAR 670: Practicum in Teaching
Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

MAR 699: Dissertation Research on Campus
Research course exclusively for students who have been advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall and Spring, 1-9 credits, S/U grading
May be repeated for credit.

MAR 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MAR 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MAR 800: Summer Research
Summer Research. 0 credits, S/U grading. May be repeated.
S/U grading
May be repeated 1 times FOR credit.

MAR-S

Marine Sciences - Southampton

MAR-S 550: Topics in Marine Sciences
This is used to present special interest courses, including intensive short courses by visiting and adjunct faculty and courses requested by students. Those given in recent years include Nature of Marine Ecosystems, Science and Technology in Public Institutions, Plutonium in the Marine Environment, and Problems in Estuarine Sedimentation.
Fall and Spring, 1-4 credits, Letter graded (A, A-, B+, etc.)
May be repeated.

MAT

Mathematics

MAT 511: Fundamental Concepts of Mathematics
Fundamental Concepts of Mathematics. Brief history of mathematics; sets, functions and logic; constructions of number systems; mathematical induction. The main focus of the course will be on the construction and writing of mathematical proofs.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 512: Algebra for Teachers
Linear algebra, the algebra of polynomials, algebraic properties of the complex numbers, number fields, solutions of equations.
Prerequisite: MAT 511
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 513: Analysis for Teachers I
Topics in differential calculus, its foundations, and its applications. This course is designed for teachers and prospective teachers of advanced placement calculus.
Prerequisite: MAT 511
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 514: Analysis for Teachers II
Topics in calculus, its foundations, and its applications. Emphasis is on integration and on numerical techniques. This course is designed for teachers and prospective teachers of advanced placement calculus. Analysis for Teachers I is not a prerequisite for this course.
Prerequisite: MAT 511
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 515: Geometry for Teachers
A re-examination of elementary geometry using concepts from analysis and algebra.
Prerequisite: MAT 511
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 516: Probability and Statistics for Teachers
A priori and empirical probabilities; conditional probability; mean and standard deviation; random variables; financial distributions; continuous distributions; sampling; estimation; decision making.
Prerequisite: MAT 511
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 517: Calculators and Computers for Teachers
Calculators and Computers for teachers. Graphing calculators, programming, computing and curve sketching; Geometers Sketchpad or other computer based classroom tools; educational use of the world wide web.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 518: Seminar on the Uses of Mathematics
This seminar explores the ways in which secondary school and elementary college mathematics are used in such diverse areas as psychology, sociology, political science, economics, business, engineering, physics, chemistry, biology, and medicine. Primarily for secondary school teachers of mathematics.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 519: Seminar in Mathematics in Teaching and Learning
Seminar format. This course involves deliberative group inquiry - through reading, writing and intensive discussion - into mathematics teaching, learning and mathematics education research; analysis and design of cognitively demanding mathematical tasks; and analysis of students' mathematical thinking, written responses, and common misconceptions in the mathematics classroom. Each student completes an action research project focused on a topic selected with guidance from the instructor.
3 credits, Letter graded (A, A-, B+, etc.)
MAT 520: Geometry for Teachers II
Vector algebra on the plane and in the 3-space; area and volume of geometric figures; analytic geometry. Prerequisite: MAT 511
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

MAT 529: Basic Topology and Geometry (for Masters Program)
A broadly based introduction to topology and geometry, the mathematical theories of shape, form, and rigid structure. Topics include intuitive knot theory, lattices and tiling, non-Euclidean geometry, smooth curves and surfaces in Euclidean 3-space, open sets and continuity, combinatorial and algebraic invariants of spaces, higher dimensional spaces.
There will be a required short paper on the fundamental group of a topological space or some similar topic.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 530: Topology, Geometry I
Basic point set topology; connectedness, compactness, continuity, etc. Metric spaces, function spaces, and topological manifolds. Introduction to algebraic topology; fundamental group and covering space; homology; applications.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 531: Topology, Geometry II
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 534: Algebra I
Groups: normal subgroups, quotient groups, Lagrange's theorem, class formula, finite p-groups and solvable groups. Sylow's theorems, finitely generated abelian groups. Rings and modules: subrings, fields, prime and maximal ideals, quotient rings, ID's, PID's, UFD's, polynomial rings, field of fractions, the Wedderburn theorem, Hilbert basis theorem, finitely generated modules over a PID. Vector spaces: basis, linear maps and matrices, dual spaces, determinants, eigenvalues and vectors, inner products, spectral theorem for normal operators.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 535: Algebra II
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 536: Algebra III
Selections from the following topics: introductory algebraic number theory, introductory algebraic geometry, algebraic groups, cohomology of groups, homological algebra, advanced field theory and Galois theory, central simple algebras, representations of finite and compact groups.
Prerequisite: MAT 535
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 538: Algebra IV
Foundational material and techniques in complex algebraic and differential geometry: Review of basic results in several complex variables: analytic geometry, sheaves and cohomology of sheaves, complex vector bundles, Chern classes, positivity, Kaehler manifolds, projective manifolds, Hodge decomposition for Kaehler manifolds, Kodaira vanishing theorem, Hard Lefschetz Theorem, divisors and line bundles, Bertini's theorem, Lefschetz theorem on (1,1) classes, blowing up, Kodaira's embedding theorem.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 540: Topology in Geometry and Algebra I
Cell complexes, algebraic and geometric definitions of homology, fundamental and higher homotopy groups, Hurewicz theorem, universal coefficient theorem, cup and cap products, Poincare duality, and introduction to spectral sequences.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 541: Topology in Geometry and Algebra II
Cohomology, relations with obstruction and deformation theory, Poincare', Lefschetz, and Alexander dualities, intersection theory, relations to differential forms, monodromy and related topics. Prerequisites: MAT 530, MAT 531
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 542: Complex Analysis I
Elementary functions, holomorphic functions. Cauchy theory, power series, classification of isolated singularities, calculus of residues, open mapping theorem, Riemann mapping theorem.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 543: Complex Analysis II
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 544: Real Analysis I
Ordinary differential equations; Banach and Hilbert spaces; inverse and implicit function theorems; Lebesque measure; general measures and integrals; measurable functions; convergence theorems for integrals.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 545: Complex Geometry
Foundational material and techniques in complex algebraic and differential geometry: Review of basic results in several complex variables: analytic geometry, sheaves and cohomology of sheaves, complex vector bundles, Chern classes, positivity, Kaehler manifolds, projective manifolds, Hodge decomposition for Kaehler manifolds, Kodaira vanishing theorem, Hard Lefschetz Theorem, divisors and line bundles, Bertini's theorem, Lefschetz theorem on (1,1) classes, blowing up, Kodaira's embedding theorem.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 546: Differential Equations
Distributions and the Fourier transform; compact operators, Fredholm theory; pseudodifferential operators; Sobolev spaces; regularity theory for elliptic operators; Hodge theory.
Prerequisite: MAT 544, Corequisite: MAT 550
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 550: Real Analysis II
Representations and decomposition theorems in measure theory; Fubini's theorem; L-p spaces; Fourier series; Laplace, heat and wave equations; open mapping and uniform boundedness theorems for Banach spaces; differentiation of the integral; change of variable of integration.
Prerequisite: MAT 544
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 551: Real Analysis III
Selections from the following topics. Partial differential equations in higher dimensions; Sobolev spaces, calculus of variations, characteristics, Cauchy problem, energy estimates, maximum principles, Harmonic analysis; singular integrals, Hausdorff measure, harmonic measure, Hardy spaces, Functional analysis; spectral theory, distributions, Banach algebras. Prerequisite: MAT 544, 550

MAT 552: Introduction to Lie Groups and Lie Algebras

Prerequisite: MAT 531, MAT 534
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 555: Introduction to Dynamic Systems
Fundamental themes of dynamic systems and applications to other areas. Topics may include the following: Poincare recurrence and Birkhoff Ergodic Theorem, Smale horseshow, and hyperbolicity, Geodesic flow on constant curvature surfaces, One-dimensional dynamics, Julia sets and the Mandelbrot set, Renormalization, rigidity and universality phenomena, Hamiltonian dynamics and integrability, Kolmogorov-Arnold-Moser Theory (overview), Homoclinic bifurcations and New house phenomenon. 3 credits. Offered in Spring. Prerequisites: MAT 530 and MAT 544.

3 credits, Letter graded (A, A-, B+, etc.)

MAT 560: Mathematical Physics I
Aimed at students affiliated with the RTG program, topics include: Classical field theory (Lagrangian and Hamiltonian), electromagnetism, special relativity, statistical mechanics and thermodynamics, quantum mechanics and quantum field theory.

3 credits, Letter graded (A, A-, B+, etc.)

MAT 561: Mathematical Physics II
Aimed at students affiliated with the RTG program, topics include: Classical field theory (Lagrangian and Hamiltonian), electromagnetism, special relativity, statistical mechanics and thermodynamics, quantum mechanics and quantum field theory.

3 credits, Letter graded (A, A-, B+, etc.)

MAT 566: Differential Topology
Vector bundles, transversality, and characteristic classes. Further topics such as imbeddings and immersions, intersection theory, surgery, and foliations.

Prerequisite: MAT 531
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 568: Differential Geometry
Connections, curvature, geodesics, parallelism, and completeness. Riemannian manifolds, geometry of sub-manifolds; method of integral formulas; applications to global extrinsic theorems. Riemannian curvature. Gauss-Bonnet theorem, Hopf-Rinow theorem.

Prerequisite: MAT 531
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 569: Differential Geometry
First and second variation formulas, conjugate points and Jacobi fields, comparison theory.

Prerequisite: MAT 531, MAT 568
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MAT 570: Concepts and Methods of Quantum Mechanics

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 588: First-Year Seminar I
Workshop on basic graduate-level mathematics skills and knowledge. Skills include reading and writing proofs, solving problems, reading mathematics. Topics cover fundamental ideas and theories such as constructions of number systems, interchange of limits, the Euclidean algorithm, and the axiom of choice.

Fall, 3 credits, S/U grading

MAT 598: First-Year Seminar II
Same concept as MAT 588, but covers different materials.

Spring, 3 credits, S/U grading

MAT 590: Problem Seminar
Analyze problems and explore supplementary topics related to the core courses in the Professional M.A. Option. Focus on preparation for the doctoral comprehensive examination.

Fall and Spring, 3 credits, S/U grading
May be repeated for credit.

MAT 598: Teaching Practicum
Seminar and workshop for new teaching assistants.

Fall, 3 credits, S/U grading

MAT 599: M.A. Research
May be repeated for credit.

MAT 602: Topics in Algebra
Typical topics are drawn from group theory, ring theory, representation theory of groups and algebras, fields and commutative algebra, homological algebra.

Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 603: Topics in Algebra
Typical topics are drawn from group theory, ring theory, representation theory of groups and algebras, fields and commutative algebra, homological algebra.

Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 608: Topics in Number Theory
Typical topics are drawn from analytic number theory, algebraic number theory, diophantine equations, and transcendental number theory, with indications of methods from algebra, geometry, analysis, and logic.

Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 609: Topics in Number Theory
Typical topics are drawn from analytic number theory, algebraic number theory, diophantine equations, and transcendental number theory, with indications of methods from algebra, geometry, analysis, and logic.

Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 614: Topics in Algebraic Geometry
Typical topics are drawn from varieties and schemes, algebraic curves, and their arithmetics. Fall
MAT 615: Topics in Algebraic Geometry
Typical topics are drawn from varieties and schemes, algebraic curves, and their arithmetics. Fall
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 620: Topics in Algebraic Topology
Topics of current interest such as foliations, surgery, singularities, group actions on manifolds, and homotopy theory.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 621: Topics in Algebraic Topology
Topics of current interest such as foliations, surgery, singularities, group actions on manifolds, and homotopy theory.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 626: Topics in Complex Analysis
Topics selected from Riemann surfaces, quasiconformal mappings, several complex variables, Fuchsian groups, Kleinian groups, moduli of Riemann surfaces and Kleinian groups, analytic spaces, singularities.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 627: Topics in Complex Analysis
Topics selected from Riemann surfaces, quasiconformal mappings, several complex variables, Fuchsian groups, Kleinian groups, moduli of Riemann surfaces and Kleinian groups, analytic spaces, singularities.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 632: Topics in Differential Equations
Typical topics are hyperbolic or elliptic systems, parabolic equations, spectral theory, finite difference equations, Cauchy-Riemann equations and complex vector fields, equations with constant coefficients, solvability of linear equations, Fourier integral operators, nonlinear equations.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 633: Topics in Differential Equations
Typical topics are hyperbolic or elliptic systems, parabolic equations, spectral theory, finite difference equations, Cauchy-Riemann equations and complex vector fields, equations with constant coefficients, solvability of linear equations, Fourier integral operators, nonlinear equations.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 638: Topics in Real Analysis
Topics selected from functional analysis, harmonic analysis, Banach algebras, operator theory.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 639: Topics in Real Analysis
Topics selected from functional analysis, harmonic analysis, Banach algebras, operator theory.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 641: Topics in Lie Groups Theory
Typical topics are universal enveloping algebras; free, solvable and nilpotent Lie algebras; Lie theory and formal groups; root systems, Dynkin diagrams, classification and representations of complex semisimple Lie algebras; method of orbits; representations of non-compact Lie groups; loop groups.
Prerequisite: MAT 552
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 644: Topics in Differential Geometry
Typical topics will be drawn from areas such as comparison theorems, pinching theorems, Morse theory, characteristic classes, minimal varieties, Hodge theory, spectrum of the Laplacian, and geometry of general relativity.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 645: Topics in Differential Geometry
Typical topics will be drawn from areas such as comparison theorems, pinching theorems, Morse theory, characteristic classes, minimal varieties, Hodge theory, spectrum of the Laplacian, and geometry of general relativity.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 648: Topics in Mathematical Physics
Typical topics are mathematical methods of classical and quantum mechanics; methods of functional integration and its applications; infinite-dimensional Lie algebras, quantum groups and representations; conformal field theories; super-symmetry; topological quantum field theories; gauge theories and geometry in four-dimensions; supergravity and mirror symmetry; strings.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 655: Topics in Dynamical Systems
Typical topics are drawn from holomorphic and low-dimensional dynamics, hyperbolic dynamics, theory of Hamiltonian systems, ergodic theory, and bifurcation theory.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 662: Advanced Topics in Algebra
Prerequisite: Permission of instructor
MAT 662 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 663: Advanced Topics in Algebra
Prerequisite: Permission of instructor
MAT 662 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 666: Advanced Topics in Algebraic Topology
Prerequisite: Permission of instructor
MAT 666 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 667: Advanced Topics in Algebraic Topology
Prerequisite: Permission of instructor
MAT 667 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 670: Advanced Topics in Complex Analysis
Prerequisite: Permission of instructor
MAT 670 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 671: Advanced Topics in Complex Analysis
Prerequisite: Permission of instructor
MAT 671 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 674: Advanced Topics in Differential Equations
Prerequisite: Permission of instructor
MAT 674 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 675: Advanced Topics in Differential Equations
Prerequisite: Permission of instructor
MAT 675 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 678: Advanced Topics in Real Analysis
Prerequisite: Permission of instructor
MAT 678 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 679: Advanced Topics in Real Analysis
Prerequisite: Permission of instructor
MAT 679 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 682: Advanced Topics in Differential Geometry
Prerequisite: Permission of instructor
MAT 682 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 683: Advanced Topics in Differential Geometry
Prerequisite: Permission of instructor
MAT 683 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 685: Advanced Topics in Dynamics
An advanced topic selected from holomorphic and low-dimensional dynamics, hyperbolic dynamics, KAM theory, smooth ergodic theory, geodesic flows, bifurcation theory.
Prerequisite: Permission of instructor
MAT 685 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 686: Advanced Topics in Dynamics
An advanced topic selected from holomorphic and low-dimensional dynamics, hyperbolic dynamics, KAM theory, smooth ergodic theory, geodesic flows, bifurcation theory.
Prerequisite: Permission of instructor
MAT 686 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 687: Advanced Topics in Dynamics
Prerequisite: Permission of instructor
MAT 687 -
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MAT 690: RTG Seminar in Mathematics and Physics I
Intensive learning seminar aimed at first and second year graduate students. The main purpose is to introduce mathematics students to the methods, language and modes of thought in modern physics, and conversely to introduce physics students to the same things in modern mathematics. Student participation is required. Specific topics will change from year to year. 1-6 credits, S/U grading

MAT 691: RTG Seminar in Mathematics and Physics II
Intensive learning seminar aimed at first and second year graduate students. The main purpose is to introduce mathematics students to the methods, language and modes of thought in modern physics, and conversely to introduce physics students to the same things in modern mathematics. Student participation is required. Specific topics will change from year to year. 1-6 credits, S/U grading

MAT 692: Mathematics Seminar
May be repeated for credit.

MAT 693: Mathematics Colloquium
May be repeated for credit.

MAT 698: Independent Study
May be repeated for credit.

MAT 699: Dissertation Research on Campus
Dissertation research under direction of advisor. Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MAT 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MAT 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MAT 800: FULL TIME SUMMER RES
May be repeated for credit.

MBA
Business Administration

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin
MBA 501: Management Economics
The techniques and approaches of microeconomic reasoning are applied to issues of management and policy. The theory of the market and the price system are closely examined to identify areas where neoclassical economics is helpful to the analyst and manager. Decisions regarding firm boundaries, competition, pricing, and entry are examined. Extensive use is made of case studies.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 502: Finance
How firms meet and manage their final objectives. Today's financial environment, the fundamental trade-off between risk and return, the time value of money, and valuing future cash flows are discussed. Financial tools and techniques, which can be used to help firms maximize value by improving decisions related to capital, are explained. Bond and stock valuations are introduced.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 503: Data Analysis and Decision Making
An introduction to statistical techniques useful in the analysis of management problems. We motivate each topic by managerial applications, and we analyze actual data sets using modern statistical software. Topics include probability estimation, hypothesis testing, and regression analysis.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 504: Financial Accounting
Introduction and exploration of basic financial accounting terminology, principles, concepts, and their relevant business applications. This course will include the recording, summarization, and adjustment of financial transactions and the preparation and presentation of the basic financial statements. Other topics will include valuation methods for cash, accounts receivable, inventory and property, plant and equipment. This course is also offered as EMP 502.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 505: Marketing
A survey course covering the foundations of the discipline's foundations (definition, philosophy, and the history of marketing).
3 credits, Letter graded (A, A-, B+, etc.)

MBA 506: Leadership, Team Effectiveness and Communications
This course focuses on business leadership, teamwork and communications. It seeks to answer the following three questions: What do leaders really do? What makes teams effective? How do you create persuasive communications? The course addresses such topics as leading organizational change, managing corporate crises, building motivated teams, and developing strategic communications. It examines these topics with a goal of not only imparting knowledge about these managerial practices but also assisting students to acquire the skills necessary to become business leaders, team builders and articulate communicators. We will seek to bridge theory and managerial practice by using case studies and inviting business executives to the class.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 507: Ethics and Law
This course would link the main ethical problems facing the modern manager with the statutes and regulations that have been enacted to deal with these problems. Emphasis is placed on the moral and ethical responsibilities that relate to investors, employees, customers, and the community. Students will learn the basic vocabularies of business law and of ethics.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 508: Business Planning and Strategic Management
This principles and techniques of strategic management by which an organization sets and implements its long-range direction. This includes the processes of environment scanning, self-assessment of organizational purpose and comparative advantage, and synthesis of organizational mission, plans, and strategic initiatives. Extensive use is made of case studies and in-class exercises.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 509: Continuous Quality Improvement
This course provides students with understanding of concepts of TQM and quality improvement methods to attain world-class performance in business operations. Topics include policy deployment, process improvement methodology, daily work management, quality story methodology, six sigma, poka-yoke, ISO, Deming and Baldrige Awards criteria.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 510: Employee Benefits
This course addresses an area of major social change: new developments in fringe benefit programs available to American workers. Topics include pensions, social security, savings and profit sharing plans, and other benefits in the working and retirement years. It also compares fringe benefits available to the individuals in the private, public, and not-for-profit sectors. Future fringe benefit programs and policies will also be explored. This course is offered as both CES 510 and MBA 510.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 511: Technological Innovations
Innovation drives the modern firm by the interaction of technical invention and managerial entrepreneurship. This course explores the variety of sources of new products, processes, and services, such as inventors, universities, research and development departments in industry, and government labs. In addition, the course explores the variety of ways of bringing new products, processes, and services to market, including startup firms, acquisitions, mergers, and entrepreneurship within the firm. Case studies showing the interaction of invention and entrepreneurship are analyzed. A term project is required in which the student either analyzes the history of invention and entrepreneurship in a major firm or writes a business plan for high technology startup firm.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 512: Business Planning and Strategic Management
This principles and techniques of strategic management by which an organization sets and implements its long-range direction. This includes the processes of environment scanning, self-assessment of organizational purpose and comparative advantage, and synthesis of organizational mission, plans, and strategic initiatives. Extensive use is made of case studies and in-class exercises.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 513: Human Relations in the Workplace
This course focuses on improving the quality of work life for employees, as a value in itself and as an incentive to greater productivity and reduced turnover. Students will explore: the importance of communication-orientation of new employees, formal and informal consultation, quality circles, billboards, news bulletins, etc., and exit interviews; providing opportunities for job enrichment and career development-career planning assistance, practitioner training, cross training, job rotation, job sharing and flextime, enriching each job as the employee progresses; employee assistance programs-financial planning, drug and alcohol rehabilitation, retirement planning, educational assistance, summer jobs for kids, etc.; recreational programs-athletic teams, holiday and seasonal celebrations, community
service participation and contests. All of these activities contribute to developing the joint participation of employees and management which is the hallmark of the well-managed corporation. This course is offered as both CES 511 and MBA 513.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 514: Collective Bargaining and Arbitration in the Public Sector
This course presents an overview of the history, procedures, and problems of public sector labor relations, and comparisons with the private sector. The role of public opinion and politics in public sector bargaining will be explored. Students will role play the negotiation of a public sector contract: preparation of bargaining package, negotiation, mediation, fact-finding, arbitration. They will also prepare, present, and critique a public sector grievance case from its shop origins to its final disposition by arbitration. This course is offered as both CES 514 and MBA 514.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 515: Managing in a Global Economy
Because both the similarities and differences of organizations and management across national boundaries must be a part of the knowledge base of tomorrow's manager, this course examines proprietorships, partnerships, corporations, governmental regulatory agencies, public authorities, voluntary social services, multinational corporations, and strategic alliances, as well as combinations of these organizations, across sectoral and national boundaries.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 517: Information Systems for Management
Information systems and its role in strategic planning and managerial operations in business. The systems approach to the analysis, design, and implementation of information systems. Recent developments in information technology and its impact on existing and future information systems.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 519: Grievance Handling and Arbitration
Grievance and arbitration procedures in a variety of private- and public-sector labor agreements are examined in terms of contract clauses, practical procedures, and problems characteristic of different employment sectors. Dispute settlement between parties themselves is explored, and the final recourse to arbitration is examined in terms of arbitrator selection, case presentation, presentations at hearings, and analysis of awards. Prerequisites: CES 516 or MBA 533 or strong work experience in a position that requires familiarity with labor laws, such as FLSA, FMLA, ERISA, COBRA, and HIPPA.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 520: History of Labor Relations
The course proceeds from the beginnings of labor organization in the guilds and crafts of the early 19th century, to the accelerating pace of change today. The peaking of union strength during World War II and its subsequent decline after Taft-Hartley are discussed, as well as the economic and social reasons for the gradual weakening of organized labor. A discussion of the future of organized labor concludes the course.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 521: Industry Project
Under faculty supervision, groups of students work for clients on management issues in a variety of areas such as health care, MIS, marketing, data analysis, business plans, and the like. The course provides students with the opportunity to apply the analytic skills they have learned in the classroom to actual management problems. Students also gain practical experience in business writing, giving formal presentations, and working in teams. The format for the course is a combination of work in the classroom and "lab" work. The lab work consists of visits with a client, developing a formal proposal, generating a final report, and various other elements of a professional consulting arrangement.

Fall, 6 credits, Letter graded (A, A-, B+, etc.)

MBA 522: Industry Project
Under faculty supervision, groups of students work for clients on management issues in a variety of areas such as health care, MIS, marketing, data analysis, business plans, and the like. The course provides students with the opportunity to apply the analytic skills they have learned in the classroom to actual management problems. Students also gain practical experience in business writing, giving formal presentations, and working in teams. The format for this course is a combination of work in the classroom and "lab" work. The lab work consists of visits with a client, developing a formal proposal, generating a final report and various other elements of a professional consulting arrangement.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 523: Human Resource Management Workshop
This course is designed for human resources practitioners who wish to prepare themselves for higher level executive positions: planning for the personnel function relative to organizational purpose and size of workforce; developing recruiting plans, job classifications, and wage schedules; establishing benefit systems; and training supervisors, systematizing employee supervision, and evaluation methods. Finally, the class will develop such motivational incentives as career development, job enrichment, and employee assistance programs and learn how to devise model affirmative action and employee safety procedures. This course is offered as both CES 523 and MBA 523.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 524: Labor Negotiations Workshop
This is an advanced class in the negotiation of labor agreements in the private and public sectors. Through case studies and presentations students acquire an understanding of the attitudes and strategies of both negotiation parties, evaluation of the economic and political environments, gathering of essential information, determination of bargaining style and strategy, and role playing of negotiations using sample contracts. Guest lecturers critique class performance, offering suggestions for improving negotiation skills. This course is offered as both MBA 524 and CES 524.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 525: Employment Law
This course is designed to give business and HR professionals insight into and practical knowledge of the various legal issues that inform today's employer-employee relationships. Topics will include hiring practices, formation of the employment contract, laws governing the work relationship, investigation protocols and risk-reduction techniques, viewed against a backdrop of emerging employment trends. This course is offered as both CES 525 and MBA 525.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 526: Job Evaluation and Compensation Systems
An advanced course providing students with both theory and specific knowledge of job evaluation and compensation systems, including union issues, comparable worth and legal requirements: preparation of job analysis, descriptions, specifications and evaluations; theory of compensation systems as they relate to job satisfaction and employee morale; development of wage and salary surveys, internal and external equity pay
MBA 527: Women in the Workplace
This course addresses the economic and social struggle of women to achieve workplace equality. It includes an examination of their labor force participation; the remuneration of women; segregated employment patterns; special problems of women in professional, managerial, and scientific disciplines; analysis of the corporate environment and the role of affirmative action in removing formal and informal barriers to progress. It investigates the campaign for comparable worth; alternative definitions of success; women's contribution to the world of work; the glass ceiling and the mommy track; work-family issues; child care; sexual harassment; and women as managers. The course will feature case analysis and guest speakers from different organizations. This course is offered as both CES 517 and MBA 527.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 530: Employee Dispute Resolution and Conflict Management
The methods and procedures for reaching negotiated agreements. Topics include reducing conflict and confrontation between contending parties, analysis of the techniques of win-lose and win-win negotiation, and mediation. Students are expected to participate in a series of workshop activities and simulated cases to reveal how negotiation and mediation are applied to resolving difficulties in business management, labor relations, international and domestic affairs, patient/doctor/hospital relations, and other areas where negotiation and mediation play a significant role in modern life.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 531: New Developments in Human Resource Management
This is an advanced course, designed to examine new developments and professional concerns in human resource management. The course focuses on such topics as productivity in the American workplace; developing union/management cooperation for productivity; methods of training in the workplace; impact of the computer revolution on the personnel field; and specialized personnel needs of the new workforce in a high-tech and service economy.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 532: Foundations of Human Resource Management
This is the mandated course in the human resource sector of the Human Resource Management curriculum. The course explores the basic elements of personnel administration: an overview of human resource functions; recruitment, selection, and placement; job classification and wage and benefit systems; employee supervision, counseling, discipline, and grievance; the legal framework of human resource administration; and approaches specific to union and nonunion environments. This course is offered as both CES 515 and MBA 532.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 533: Survey of Labor and Employee Relations
This is the foundation course in the labor relations sector of the Human Resource Management curriculum. It addresses the historical development of labor unions in the United States, the evolution of the legal framework governing labor relations today, and the major elements of collective bargaining and dispute resolution techniques used in the private and public sectors. This course is offered as both CES 516 and MBA 533.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 534: Contemporary Issues in Employee Relations
This course covers collective bargaining in America: areas of union growth, stability, and decline. Examination of current labor-management agreements in the key areas of wages, productivity, retirement and health plans, employee security, and career advancement will be explored. The chief problems emerging in current negotiations in both the private and public sectors will be examined. This course is offered as both CES 518 and MBA 553.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 537: Training and Development
This course provides an overview of employee training methods, training design, development programs, and evaluation procedures, including cost/benefit analysis. Emphasis is placed on how to perform a needs analysis, how to select the latest training technologies, and how to apply these technologies to maximize adult learning. In addition, development strategies are reviewed-for instance, when to train generalist managers and specialists, how to foster an atmosphere conducive to continuous learning, and how to reward supervisors for supporting their subordinates' development. Students apply these concepts to a specific organization for hands-on learning. In addition, a focus on career planning and development gives students a chance to take interest inventories and self-assessments of abilities and learning style. Students formulate their own career plans and develop action strategies. This course is offered as both MBA 537 and CEX 537.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 538: Organizational Change Management
The aim of this course is to acquaint students with types of organizational change and the roles of human resources managers as change agents. Cases, group exercises, and class discussions are used to examine change methods, employees' reactions to change, facilitation techniques, and evaluation methods. Roles of leaders, managers, employees, and human resources professionals are considered. Targets of change include job designs, interpersonal relationships, and organizational structures. Quality improvement, employee involvement, and professional development are studied as examples of change strategies. Students learn how to help themselves and their co-workers cope. This course is offered as both CEX 538 and MBA 538.

3 credits, Letter graded (A, A-, B+, etc.)

MBA 543: Quantitative Methods in Management
This course is a rapid introduction to the application of modern mathematical concepts and techniques in management science. Algebraic operations, mathematical functions and their graphical representation, and model formulation are reviewed. Topics covered include the following: mathematics of interest, annuity, and mortgage; algebraic and graphic methods of linear programming; PERT, CPM, and other network models; and inventory theory. Simple management-oriented examples are used to introduce mathematical
formulations and extensions to more general problems. The computer laboratory is used to give students experience with PC software packages that solve problems in all course topics. Interpretation of computer outputs is also stressed.

Prerequisite: MAT 123 or equivalent
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 543: Management Science
An introduction to mathematical models useful in the analysis of management problems. We motivate each topic by managerial applications, and we analyze problems using modern software. Topics include forecasting models, linear and integer optimization models, and decision models.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 548: Fundamentals of the Bioscience Industry
A 4-module course set up to provide students with a comprehensive introduction to the complexities of the bioscience business environment.
Prerequisite: Must be either a BME or MBA graduate student (West Campus). All other students must obtain permission from the instructor.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 553: Simulation and Modeling
A comprehensive course in formulation, implementation, and application of simulation models. Topics include data structures, simulation languages, statistical analysis, pseudo-random number generation, and design of simulation experiments. Students apply simulation modeling methods to problems of their own design. This course is offered as CSE 529, AMS 553 and MBA 553.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 557: Introduction to Professional Consulting
The Introduction to Professional Consulting course covers the complete process of business consulting, from developing business proposals and mobilizing consulting teams, to producing deliverables and deploying solutions. The course is designed to provide MBA students with the background and basic skills needed to pursue a career in consulting. The course covers how professional service companies conduct consulting in areas such as strategy consulting, business change, training, organizational development, and IT. Practical concepts, tools, techniques and frameworks are covered that can be used in all forms of consulting and in any area of application. The course emphasizes the competencies needed to become a trusted advisor.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 560: Design and Analysis of Management Information Systems
An overview of information systems and the system development life cycle. Emphasis is on tools and techniques that the programmer or analyst can use to document information systems. Classical and structured tools for describing data flow, date structure, process flow, file design, input and output design, and program specifications will be presented. Object-oriented techniques will be introduced. The course will survey other important skills for the systems analyst such as fact-finding, communications, project management, and cost-benefit analysis.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 561: Expert Systems for Management
An introductory course that provides a basic understanding of the concepts and techniques needed to analyze, design, and manage the knowledge of human experts in organizations. In addition, students will learn the role of the knowledge architect in different industries and the management issues related to the growing integration of computers in the support of decision-making.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 566: Business law
This course provides an understanding of the nature of law and its role in business and surveys some of the regulatory issues faced by businesses. The law of business contracts will be examined in depth. Other topics include property rights, bailments, and agency concepts, business organizations, securities law and regulation, and laws and regulations impacting technology development. This course requires case analysis, problem solving, development of critical thinking skills, and oral and written communication.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 568: Technology Commercialization in the Life Sciences
Commercializing life science technologies requires a significant amount of strategic planning to address the multitude of issues. Our goal is to identify and understand the issues faced by early stage life science companies from technology assessment and financing through successful commercialization. Emphasis will be placed on commercialization strategies implemented by early life companies to mitigate the risks associated with these issues. Topics covered will include competitive analysis, intellectual property, legal structure, technology valuation, equity financing and exit strategies for life science companies.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MBA 570: Entrepreneurship
This course helps the student develop a business plan for his or her own business idea or a plan for an entrepreneur. With the support of visiting practitioners, students take a business idea through all the planning steps. A business plan suitable for presentation to potential investors will be written and presented orally at the end of the class.
3 credits, Letter graded (A, A-, B+, etc.)

MBA 571: Social Entrepreneurship
Students explore the concept of social entrepreneurship including motivation and skills for advocacy, entrepreneurship, and leadership. Topics include forms of social entrepreneurship (private, public, and not-for-profit), venture capital and fund raising, market analysis, marketing, communications, human resources and human relations, including negotiation and conflict resolution methods. Students will explore models of corporate social responsibility, university service to the community, and grass-roots ventures spawned by perceived need and the will to make a difference. Students work in teams to develop a strategic business plan for their own venture and present their proposals to the class.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 572: Business Plan Project I
Students will team with a group from engineering to develop a business plan for the engineers’ senior design project. Business students will create and monitor a project plan and perform market research for the engineering project, provide input to the design phase to maximize market satisfaction and develop a marketing plan. Students will interface with resources outside the University involved in market research.
Prerequisites: G2 standing with GPA of 3.0 or higher, and permission of the instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 573: Business Plan Project II
Building on the marketing plan developed in MBA 572, students will prepare a detailed operations and finance plan. The project
plan developed in the Fall will be used to monitor progress of the team, including both Engineering and Business students' activities. Final project will consist of a full written and oral presentation of the business plan. Students will coordinate efforts with resources outside the University including interface with outside sources of production material.

Prerequisites: G2 standing with GPA of 3.0 or higher, and permission of the instructor.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MBA 574: Project Management**

This course will explore the theory and practice of managing a project. We will examine the various tools that are available to monitor and measure managerial tasks and to define common business processes. Every aspect of business entails the execution of a series of defined tasks and the associated allocation of corporate resources. From developing new products to implementing customer loyalty programs, managers must understand business processes including their associated tasks, inter-relationships and transformations. Project management involves three primary activities: defining manageable tasks, mapping their logical flow, and creating an implementation process. In the course, we will explore ways to manage these functions successfully to increase the probability of achieving desired results. We will use the latest software tools including: MS Project, MS Visio, @Risk Project Simulation, Business Plan Pro 2007, WIP Information System - online and C-Commerce tools such as Instantstream. We will use Blackboard extensively to interact (c-commerce), post grades, assignments, information and notices. Access Blackboard using blackboard.sunysb.edu.

3 credits, Letter graded (A, A-, B+, etc.)

**MBA 581: Socially Responsible Investing**

Introduction to a scope of investments which are socially responsible because of the nature of the business the company conducts, including but not limited to: avoiding investment in companies that produce or sell addictive substances (like alcohol, gambling and tobacco) and seeking out companies engaged in environmental sustainability. The course includes analysis of investments strategies maximizing financial return as well as social good, such as: (i) Negative Screening: excluding securities with potentially social and/or environmental harmful characteristics; (ii) Shareholder activism: activities steering the management towards enhancing the well being of the stockholders, customers, employees, vendors, and communities. (iii) Positive investing: making investments in activities and companies believed to have a positive impact on issues such as social justice and the environment through stock selection, that guarantees sustainability, in environmental and humanitarian sense, and providing a company's long term potential to compete and succeed.

3 credits, Letter graded (A, A-, B+, etc.)

**MBA 582: Capital Markets and Portfolio Theory**

Development of capital markets and portfolio theory in both continuous time and multi-period settings. Utility theory and its application to the determination of optimal consumption and investment policies. Asymptotic growth under conditions of uncertainty. Applications to problems in strategic asset allocation over finite horizons and to problems in public finance. Whenever practical, examples will use real market data. Numerical exercises and projects in a high-level programming environment will also be assigned.

3 credits, Letter graded (A, A-, B+, etc.)

**MBA 583: Bayesian Methods in Finance**

The course explores in depth the fundamentals of the Bayesian

3 credits, Letter graded (A, A-, B+, etc.)

**MBA 584: Risk Management and Risk control in BRIC Countries**

Introduction to the challenges and opportunities in investing in the

3 credits, Letter graded (A, A-, B+, etc.)

**MBA 585: Legal Environment of Business**

Explores competing interests of buyers and sellers, creditors and debtors, suppliers and consumers. Studies Uniform Commercial Code from initiation of a sales contract through financing of transactions, examines the rights of debtors and creditors in bankruptcy, and introduces basic concepts of law, ethics, corporate social responsibility and regulation in the areas of securities, environmental protection, employment, and antitrust.

Prerequisites: MBA 562, MBA 590

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MBA 586: Virtual Communications and Meetings**

Analyzes the growth of and interaction among wireless markets. These markets include devices and services for wide area broadband networks and 802.11b wireless local area networks. Growth factors include business strategies executed by major firms and startups, and roles played by government regulations and community groups in development and delivery of network technology. Student projects for clients or one's own startup investigate wireless strategies in consumer, home, commercial, educational or health care markets.

Prerequisites: MBA 517, MGT 571, MGT580.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MBA 587: Decision Support Systems**

An advanced course focusing on the interrelationships among management information systems, statistics and management science. Both model-driven and date-driven decision support systems will be considered. Students will identify an appropriate business application, select suitable management science and statistical methodologies, build the required information system, and demonstrate how their decision support system addresses the stated management problem.

3 credits, Letter graded (A, A-, B+, etc.)

**MBA 588: Database Management**

Database processing is the foundation upon which all current applications rely and represent the repositories of business intelligence that play a crucial role in the strategic success or failure of a corporation. Even though they vary in size, complexity and organizational scope, there is an underlying common database engine that can be used to manipulate and analyze the stored information. The purpose of this course is to introduce the business professional to the fundamental concepts of database creation, design, application integration, maintenance, management and subsequent analysis.

3 credits, Letter graded (A, A-, B+, etc.)

**MBA 589: Operations Management**

A managerial approach to the concepts, issues and techniques used to convert an organization’s resources into products and services. Topics include strategic decisions for planning, processes, and technologies, operating decisions for planning production to meet demand, and controlling decisions for planning and controlling operations through teamwork and Total Quality Management (TQM). Operational problems in producing goods and services are reviewed. This course is offered as both MBA 589 and EMP 506.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MBA 592: Organizational Behavior**

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin 129
An approach to understanding the behavior of individuals in organizations is developed, with emphasis on implications for effective management. This approach is used to analyze decision problems encountered in managing human resources. Topics include individual and group decision-making skills, recruitment and selection, employee ability, motivation and incentive systems, job satisfaction, performance assessment and management, retention, training, and employee development.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MBA 593: Special Topics in Human Resource Management

An experimental elective course offered on a one-time basis. Courses offered under this course focus on specialized topics in human resource management. Consult department for current topic(s).

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 5 times FOR credit.

MBA 595: Individual Directed Research in Business

Designed to accommodate independent research projects on an individual basis with faculty guidance.

Fall and Spring, 1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MBA 599: Internship Practicum

Designed to accommodate College of Business MBA graduate students working on their internship project requirement while under supervision of an advisor.

Fall, 0-1 credits, S/U grading
May be repeated for credit.

MBA 800: Summer Research

May be repeated for credit.

Molecular and Cellular Biology

MCB 500: Directed Readings in Molecular and Cellular Biology

Directed readings in topics of current interest, under supervision of a faculty sponsor. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MCB 503: Molecular Genetics

Introduces the classical work and current developments in lower and higher genetic systems. Covers gene structure and regulation in prokaryotic and eukaryotic organisms, mutational analysis and mapping, transposable elements, and biological DNA transfer mechanisms. Bacteriophage as well as lower and higher eukaryotic systems are used to illustrate aspects of molecular genetic structure and function. This course is offered as both MCB 503 and HBM 503. Prerequisite: matriculation in graduate program or permission of instructor

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MCB 509: Experimental Molecular & Cellular Biology

An introduction to modern biochemical research techniques. The student spends a half term in the laboratory of each of four different members of the staff selected in consultation with the course director. In each laboratory the student participates in some aspect of the ongoing research pursued by the faculty member. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall and Spring, 1-4 credits, Letter graded (A, A-, B+, etc.)

MCB 510: Experimental Molecular & Cellular Biology

An introduction to modern biochemical research techniques. The student spends a half term in the laboratory of each of four different members of the staff selected in consultation with the course director. In each laboratory the student participates in some aspect of the ongoing research pursued by the faculty member. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall and Spring, 1-4 credits, Letter graded (A, A-, B+, etc.)

MCB 517: Biomembranes

Examines the molecular architecture of membranes; the structure, organization, functions, and assembly of lipids and proteins in biological membranes.

Fall and Spring, 1 credit, S/U grading

May be repeated for credit.

MCB 520: Graduate Biochemistry I

Several topics in modern biochemistry are treated at an advanced level. Topics covered will include protein structure, enzyme kinetics and mechanisms, and enzyme regulation. Prerequisite: undergraduate biochemistry course, matriculation in graduate program or permission of instructor.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MCB 531: Graduate Seminar in Molecular & Cellular Biology

Seminars are given by graduate students on current literature in the fields of biochemistry, molecular biology, cell biology or developmental biology. Prerequisite: matriculation in graduate program or permission of instructor.

I credit, Letter graded (A, A-, B+, etc.)

MCB 532: Graduate Seminar in Molecular & Cellular Biology

Seminars are given by graduate students on current literature in the fields of biochemistry, molecular biology, cell biology or developmental biology. Prerequisite: matriculation in graduate program or permission of instructor.

Spring, 1 credit, Letter graded (A, A-, B+, etc.)

MCB 550: Entering Mentoring

This seminar series is designed for graduate students and postdoctoral researchers of biology who may become science faculty. The goal is to help them become effective mentors through discussions, collective experiences, and novel strategies to improve mentoring skills. This course is comprised of eight one-hour sessions in which topics related to the role and responsibilities of a mentor are discussed. Topics touch on ethical, intellectual, personal, and interpersonal issues that are associated with effective mentoring. Prerequisite: Must be MCB graduate student or permission of instructor. Summer only, 1 credit, S/U grading

I credit, S/U grading

MCB 599: Dissertation Research

Original investigation under the supervision of a member of the staff. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall and Spring, 1-12 credits, S/U grading
May be repeated for credit.

MCB 601: Colloquium in Molecular and Cellular Biology

A weekly series of talks and discussions by visiting scientists covering current research and thinking in various aspects of molecular and cellular biology. Required for all MCB graduate students. Attendance is mandatory. Visitors welcome. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall and Spring, 0-1 credits, S/U grading
May be repeated for credit.

MCB 602: Colloquium in Molecular and Cellular Biology

Stony Brook University Graduate Bulletin: www.stonybrook.edu/gradbulletin
A weekly series of talks and discussions by visiting scientists covering current research and thinking in various aspects of molecular and cellular biology. Required for all MCB graduate students. Attendance is mandatory. Visitors welcome. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Spring, 0-1 credits, S/U grading
May be repeated for credit.

MCB 603: Student Seminar in Molecular and Cellular Biology
Seminars given by MCB graduate students on the progress of their own thesis research. Required of all students every term in which they are registered in Graduate Studies in Molecular Biology and Biochemistry. Attendance is mandatory. Visitors welcome. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall, 1 credit, S/U grading
May be repeated 2 times FOR credit.

MCB 604: Student Seminar in Molecular and Cellular Biology
Seminars given by MCB graduate students on the progress of their own thesis research. Required of all students every term in which they are registered in Graduate Studies in Molecular Biology and Biochemistry. Attendance is mandatory. Visitors welcome. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall, 1 credit, S/U grading
May be repeated 2 times FOR credit.

MCB 656: Cell Biology
Introduction to the structural and functional organization of cells and tissues and to the way structure relates to function. Particular emphasis is placed on nuclear and chromosomal structure, signal transduction, protein translocation, the cytoskeleton and the extracellular matrix. The interaction of cellular structures and components and their regulation is stressed as is the organization and interaction of cells in tissues. The course is comparative and includes examples of cells and tissues from vertebrates, invertebrates, plants, and prokaryotic systems. Prerequisite: matriculation in graduate program or permission of instructor.

Spring, 4 credits, Letter graded (A, A-, B+, etc.)

MCB 657: Principles of Development
This course deals with developing systems at all levels from the morphological to the molecular. Illustrative material from both animal and plant kingdoms is used. Special attention is given to gametogenesis, genetic control of early development, transcriptional and translational control of protein synthesis, the role of cell division and cell movements, and cell-to-cell interactions in defining developing systems. Prerequisite: MCB 656, matriculation in graduate program or permission of instructor.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MCB 699: Dissertation Research on Campus
Prerequisite: Must be advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall and Spring, 1-9 credits, S/U grading
May be repeated for credit.

MCB 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5), matriculation in MCB graduate program or permission of instructor. Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor. Prerequisite: matriculation in MCB graduate program or permission of instructor.

Fall and Spring, 1-9 credits, S/U grading
May be repeated for credit.

MCB 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5) in MCB graduate program or permission of instructor. Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must receive clearance from an International Advisor.

Fall and Spring, 1-9 credits, S/U grading
May be repeated for credit.

MCB 800: Summer Research
Prerequisite: matriculation in MCB graduate program or permission of instructor.

Summer, S/U grading
May be repeated for credit.

MEC

Mechanical Engineering

MEC 500: Modeling and Control of Manufacturing Systems
Introduction to manufacturing system modeling and analysis. Fundamental principles of production systems. Analytical and simulation approach to production system performance analysis, continuous improvement, and design. Topics include mathematical modeling of production systems, production lines with various statistic distribution models of machine reliability, improvement analysis and real-time decision making. Includes both the relevant fundamental concepts and the extensive practical knowledge base on which manufacturing research, development, and design depend. The students are expected to complete a project, in which they will interpret real-life manufacturing plant operation in the light of course principles and suggest improvement solutions.

3 credits, Letter graded (A, A-, B+, etc.)

MEC 501: Convective Heat Transfer and Heat Exchange
Differential and integral formulation. Exact and approximate solutions. Topics include parallel and boundary layer flows, similarity solutions, external and internal flows, laminar and turbulent convection, and forced and free convection.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 502: Conduction and Radiation Heat Transfer
Heat conduction and conservation laws; formulation of conduction equations in differential and integral forms; analytical solution techniques including Laplace transforms and separation of variables; scaling analysis; black body radiation, Kirchoff's law, analysis of heat conduction problems; analysis of radiative exchange between surfaces and radiative transport through absorbing, emitting, and scattering media.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 504: Thermal Analysis and Design of Electronic Systems
Thermal characteristics of electronic components and systems, reliability considerations, design concepts, basic modes of heat transfer and fluid flow. Topics of applied heat transfer: heat exchanger, boiling and condensation, cooling techniques, cooling at various packaging levels, thermal elastic effects, computations for electronic systems.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 505: Modeling and Simulation for Materials Processing and Manufacturing**

Importance of modeling and simulation; interface between computer models and actual processes; microscopic versus macroscopic models; continuum models; thermo-fluid models, chemical transport, magnetic and electrical effects, and stress field; simulation schemes: finite difference versus finite element methods; software development; postprocessing: graphical representation, video animation; case studies; melting/solidification bulk crystal growth; thin film deposition.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 506: Energy Management in Commercial Buildings**

Topics include basic heating, ventilating, and air-conditioning (HVAC) system design and selection for commercial buildings (includes both low-rise and high-rise buildings); selection of central plant components and equipment; calculation of space heating and cooling load; computer techniques for estimating annual energy consumption; design tools for reducing energy consumption; ASHRAE codes; building controls; BACnet.

Prerequisite: B.S. in mechanical engineering or related fields

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 507: Mathematical Methods in Engineering Analysis I**

An introduction to the use of mathematical analysis techniques for the solution of engineering analysis problems and the simulation of engineering systems. Both continuous and discrete methods are covered. Initial and boundary value problems for ordinary and partial differential equations are treated.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 508: Mathematical Methods in Engineering Analysis II**

A continuation of the material covered in MEC 507. Introduction to and application of numerical analysis techniques used in engineering such as finite elements and fast Fourier transforms. Determination of response characteristics of dynamic systems. Combinatoric methods and techniques for optimization of engineering design and systems/process analysis problems.

Prerequisite: MEC 507

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 509: Transport Phenomena**

Introduction to differential and integral formulation of mass, momentum, and energy transport in fluids and solids. Topics include viscosity, laminar flow, turbulent flows, conduction, convection, heat transfer coefficients, radiation, boundary layers, diffusion, and applications to energy technology.

Offered Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 510: Object-Oriented Programming for Scientists and Engineers**

Practical introduction to C++ and object-oriented programming for a first programming course for scientists and engineers. Covers basics of application software development such as problem decomposition, structure charts, object modeling, class diagrams, incremental code building, and testing at a beginner's level. Features the concepts of abstract data types (ADT), encapsulation, inheritance, composition, polymorphism, operator and function overloading besides studying UML (Unified Modeling Language) as a graphical representational design technique. The course follows the evolution of programming ideas from the use of a single function to the use of structural charts and functions to modularize and finally to the use of object-oriented programming.

Prerequisite: B.S. in science or engineering

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 511: Mechanics of Perfect Fluids**

Lagrangian and Eulerian frames. Dynamical equations of momentum and energy transfer. Two-dimensional dynamics of incompressible and barotropic perfect fluids and of the compressible perfect gas. Conformal mapping applied to two-dimensional fluid dynamics. Jets and cavities. Surface waves, internal waves. Perfect shear flows.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 512: Mechanics of Viscous Fluids**

The role of viscosity in the dynamics of fluid flow. The Navier-Stokes equations, low Reynolds number behavior including lubrication theory, percolation through porous media, and flow due to moving bodies. High Reynolds number behavior including steady, unsteady, and detached boundary layers, jets, free shear layers, and wakes. Phenomenological theories of turbulent shear flows are introduced.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 514: Advanced Fluid Mechanics: Introduction to Turbulence**

Introductory concepts and statistical descriptions: kinematics of random velocity fields; equations of motion; experimental techniques: isotropic turbulence, closure problem; transport processes.

Prerequisite: MEC 512

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 515: Emerging Energy Technologies**

Basic physics, chemistry, and engineering of emerging energy technologies, including fuel cells, thermo-electrics, photovoltaics, batteries, hydrogen generation and storage, power electronics, and "smart" grid. Lecture, group reports, and presentation skills will be practiced and evaluated.

Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 516: Energy Technologies Laboratory**

Students work together with instructors to develop solutions to thermal-fluids problems related to heat pumps, photovoltaics, fuel cells, solar thermal, thermo-electric power/cooling, hydrogen productions, hydrogen storage, and wind energy. Lecture, laboratory, group reports, and presentation skills will be practiced and evaluated.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MEC 517: Energy Technologies Laboratory II**

Experiments in the areas of thermoelectric power, fuel cells, photovoltaics, wind turbines, hydrogen storage, hydrogen generation, and power electronics in addition to related project work. The focus is on system efficiencies, system integration, and design for residential markets. Student groups are assigned laboratory projects to build experience applying various energy technologies to solve problems.

Offered in
MEC 520: Energy Technology Thermodynamics
Following a review of engineering thermodynamics principles, the thermodynamics of power generation, heat pumps, electro-chemical systems, chemical reactions and combustion are explored in the context of sustainable energy development lecture, group reports, and presentation skills will be practiced and evaluated.
Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 521: Thermodynamics
This course begins with a review of the fundamental concepts and laws of classical thermodynamics. Then the thermostatic theory of equilibrium states and phase transitions is treated, followed by the thermodynamic theory of processes of simple systems and composite systems, including heat engines. Special topics may include istatistical thermodynamics, irreversible thermodynamics, radiation and photovoltaic energy conversion, biological thermodynamic processes, and other topics of current interest.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 522: Building Energy Dynamics and Technology
Building is treated as a time-dependent energy system, with its interactive components coupled through energy and mass flows under an environment defined in terms of sunlight, ambient air and wind and with its equipment which assist in meeting building-dwellers comfort requirements. Major components discussed are thermal mass (both interior mass and envelope mass) and their thermal capacities, building envelopes and their heat transfer resistances, room air including its circulation and heat exchange with thermal mass, and the transparent part of the envelope the glazing or windows and the solar system passing through it during the day and the heat loss during the night time. Major equipment include lighting, air circulation system, cooling and heating equipment, solar thermal panels and solar PV panels, and other equipment including integrated electric and control units. Of the comfort requirements only temperature-and-humidity and illumination are studied with the objective of creating, through a system-understanding of the building, buildings that in the short run meet these requirements involving minimal use of energy and in the long run are benchmarked against the environmentally regenerative capabilities of wilderness.
Offered in
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 523: Internal Combustion Engines
3 credits, Letter graded (A, A-, B+, etc.)

MEC 524: Computational Methods for Fluid Mechanics and Heat Transfer
Introduction of finite difference, finite volume, and finite element methods for incompressible flows and heat transfer. Topics include explicit and implicit schemes, accuracy, stability and convergence, derived and primitive-variables formulation, orthogonal and non-orthogonal coordinate systems. Selected computer assignments from heat conduction, incompressible flows, forced and free convection.
Prerequisite: MEC 507
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 525: Product Design Concept Development and Optimization
This graduate course will concentrate on the design concept development of the product development cycle, from the creative phase of solution development to preliminary concept evaluation and selection. The course will then cover methods for mathematical modeling, computer simulation and optimization. The concept development component of the course will also cover intellectual property and patent issues. The course will not concentrate on the development of any particular class of products, but the focus will be mainly on mechanical and electromechanical devices and systems. As part of the course, each participant will select an appropriate project to practice the application of the material covered in the course and prepare a final report.
Prerequisites: Undergraduate electrical or mechanical engineering and/or science training.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 526: Modern Power Cycles
First and second law design and analysis of modern power cycles including Rankin Steam Cycles, Brayton Gas Turbine cycles, Combined Cycles, Cogeneration, Central Heat and Power Generation (CHP), Tri-generation and current advances in thermal power systems design and analysis. Cycle efficiency and factors affecting performance and plant efficiency. Thermodynamic analysis of proposed as well as existing thermal energy systems.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

MEC 528: Introduction to Experimental Stress Analysis
The concepts of three-dimensional stress and strain, their transformation laws, and their mutual relationships are discussed in detail. Results from theory of elasticity as pertinent to experimental stress analysis are also presented. Experimental techniques studied include two-dimensional photoelasticity, resistance strain gauge, moire methods, holographic interferometry and speckle photography. The application of different techniques to the measurement of stress and strain in models as well as actual structures is demonstrated. Students form small groups and each group is assigned different laboratory projects to gain experience in various experimental stress analysis methods.
3 credits, Letter graded (A, A-, B+, etc.)

MEC 529: Introduction to Robotics: Theory and Applications
Topics: robot components and mechanatronic aspects of robotics (sensors, actuators, and effectors, system integration); rotation, translation, rigid-body transform; robotics foundations in kinematics and inverse kinematics, dynamics, serial and parallel manipulators and their duality, introduction to mobile robots and LEGO Robotics, control theories, motion planning, trajectory generation, grasping and manipulation, robotic programming language, industrial robotics, manufacturing automation, and societal impacts. Include hands-on projects.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 530: Applied Stress Analysis
Advanced mechanics of solids and structures. Elastic boundary value problems are analyzed with various solution techniques including finite element method. Major topics are stress and strain, FEM formulations, material behaviours, 2D elastic problems, stress function and fracture. Detailed studies of structural components are carried out with FEM with emphasis on optimal mesh design and proper interpretations of computed results.
3 credits, Letter graded (A, A-, B+, etc.)

**MEC 532: Vibration and Control**
Fundamentals of vibrations and control of vibrations of structures and dynamic systems. Topics include one dof systems and responses, multiple dof systems and responses, classical feedback control theory, modern state-space feedback control theory, application of control methodology in structure and systems under vibration and dynamics; introduction of optimal control theory; feedforward control; distributed transducers for active control of vibration.
*Fall, 3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 535: Engineering Stress Analysis**
Provides an overview of stress analysis for practicing engineers and scientists.
*Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 536: Mechanics of Solids**
A unified introduction to the fundamental principles, equations, and notation used in finite deformation of solids, with emphasis on the physical aspects of the subject. Cartesian tensor representation of stress, principal values, finite strain, and deformation. Conservation of mass, momentum, and energy. Formulation of strain–stress relations in elasticity, and compatibility relations. The use of general orthogonal coordinate systems in the equations governing solids. Principles of virtual displacement and virtual work.
*Fall, 3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 539: Introduction to Finite Element Methods**
(formerly Finite Element Methods in Structural Analyses)
Theory of finite element methods and their application to structural analysis problems. Matrix operations, force and displacement methods. Derivation of matrices for bars, beams, shear panels, membranes, plates, and solids. Use of these elements to model actual structural problems. Weighted residual techniques and extension of the finite element method into other areas such as heat flow and fluid flow. Laboratory sessions introduce use of the computer in solving finite element problems. Programs for the solution of force and displacement method problems are configured. A computer project consisting of the solution and evaluation of a structural problem is required.
*Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 540: Mechanics of Engineering Structures**
An introduction to variational principles of mechanics and the development of approximation methods for the solution of structural mechanics problems. Linear and nonlinear theories of beams and thin plates are developed along with their framework for numerical solutions. An introduction of the general theory of structural stability is presented along with its application to the buckling and initial postbuckling behavior of beams and plates.
*3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 541: Elasticity**
*Prerequisite: MEC 536*
*Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 543: Plasticity**
Stress and deformation of solids: yield criteria and flow rules for plasticity deforming solids; the notion of a stable inelastic material; static and dynamic analysis of plastic bodies under mechanical and thermal loading; use of load bounding theorems and the calculation of collapse loads of structures; the theory of the slip-line field.
*Prerequisite: MEC 541*
*Fall, 3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 545: Mechanical Design**
Topics include one dof systems and responses, nonlinear theories of beams and thin plates are developed along with their framework for numerical solutions. An introduction of the general theory of structural stability is presented along with its application to the buckling and initial postbuckling behavior of beams and plates.
*3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 552: Mechanics of Composite Materials**
The course is concerned with the analysis of layered composite materials subject to mechanical loads. Cartesian tensor calculus is used. Homogeneous anisotropic media are studied first. The effect of layering is then analyzed. Applications to plates and shell are studied and analytical methods of solution are given. Numerical analysis of composite solids is also considered using finite difference and finite element methods.
*Prerequisite: MEC 536*
*Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 556: Introduction to Engineering Mechanics of Composites**
Introduction to the engineering mechanics of fiber-reinforced composites. Brief history of the development of fiber composites, their properties, advantages, limitations, and applications. Overview of the different types of composites but with focus on long fiber reinforced composites; particularly, lamina and laminate concepts, characteristics and configurations. Topics covered include: elastic properties of unidirectional lamina, strength of unidirectional lamina, elastic behavior of multidirectional laminates and stress and failure of multidirectional laminates. Design methodologies and considerations for structural composite materials. The students are expected to complete a project, in which they will design a real-life structural part out of composite materials using course principles.
*3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 560: Advanced Control Systems**
Analytical methods applied to the design of multivariable linear control systems. Introduction to linear system theory: linearization, solution of linear matrix differential equations, stability, controllability, observability, transformations to canonical forms. Formulation of control objectives. Deterministic state observer. Full-state feedback control based on pole assignment and linear quadratic optimization theory. Linear systems with stochastic inputs and measurement noise. The response of linear systems to random input; stochastic state estimator (Kalman filter); separation principle of stochastic control and estimation; system robustness.
*Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

**MEC 567: Kinematic Analysis and Synthesis of Mechanisms**
Introduction, mechanism structure, basic concepts of mechanisms, canonical representation of motion. Kinematic analysis, algebraic method, vector-loop method, complex number method, spherical and spatial polygon method, matrix method, dual-number quaternion method, screw coordinate method, line coordinate method, motor algebra method, type synthesis, number
synthesis, coupler curves, curvature theory path generation, finite displacement theory, rigid body guidance, function generation, computer-aided mechanisms analysis and synthesis.

Prerequisite: Permission of instructor

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 575: Introduction to Micro Electro-Mechanical Systems (MEMS)

An introduction to the fundamental knowledge and experience in the design and manufacture of microsystems. Emphasis will be placed on the methodologies for design, fabrication, and packaging of microsystems. An overview on fabrication and manufacturing technologies for producing microsystems will also be covered. Interdisciplinary nature of MEMS will be emphasized via various engineering principles ranging from mechanical and electrical to materials and chemical engineering. Introduction of the working principles of micro actuators, sensors, and transducers.

Prerequisite: Permission of instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 576: Microfluidics and Microscale Heat Transfer

Topics: flow/control of liquids/gases at small length scales; deviation from classical fluid behavior; boundary conditions/scaling laws at small scales; microscopic flow of heat at small length- and time-scales; application to MEMS devices, heat transfer in microelectronics devices, ultra-fast laser processing.

Prerequisite: B.S. in engineering or department approval

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 578: Reliability and Life Prediction of Electromechanical Systems

The modes of failure and the factors that play a role in the failure of mechanical components are presented. Failure modes and failure theories for brittle and ductile materials are introduced; special emphasis will be placed on the fatigue and fracture of materials. Distinctions will be drawn between the behavior of single crystal versus polycrystalline materials, and versus ductile and brittle materials. Reliability issues will be discussed regarding the design of series versus parallel systems.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 579: Optical Measurement

Introduction to optical measurement and its applications to the fields of solid mechanics, design and manufacturing, and thermal and fluid systems. Topics include fundamentals of optics, lasers, and detectors, dimensional and surface metrology, machine vision, measurement of temperature, concentration, and density, and optical techniques for stress analysis and nondestructive testing.

3 credits, Letter graded (A, A-, B+, etc.)

MEC 580: Manufacturing Processes


Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 584: Quality Engineering

MEC 585: Total Quality Management

Concepts of TQM and quality improvement methods to attain world-class performance in business operations. Topics include policy deployment, process improvement methodology, daily work management, quality story methodology, six sigma, poka-yoke, ISO, Deming and Baldrige Awards criteria.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 591: Industrial Project in Opto Electro Mechanical Systems Engineering

A student carries out a detailed design of an industrial project in OEMS engineering. A comprehensive technical report of the project and an oral presentation are required.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 596: Projects in Mechanical Engineering

Conducted jointly by graduate students and one or more members of the faculty.

1-6 credits, Letter graded (A, A-, B+, etc.)

May be repeated 1 times FOR credit.

MEC 597: Graduate Research and Study in Manufacturing

Independent research or project in the area of manufacturing processes or systems.

1-6 credits, Letter graded (A, A-, B+, etc.)

MEC 599: Research

Fall, 1-12 credits, S/U grading

May be repeated for credit.
MEC 630: Special Topics in Fluid Mechanics
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 631: Special Topics in Heat Transfer
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 632: Special Topics in Statistical Mechanics
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 633: Special Topics in Kinematics and Dynamics of Machines
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 634: Advanced Topics in Thermodynamics
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 635: Advanced Topics in Nonlinear Dynamic Systems
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 636: Advanced Topics in Mechanical Vibration
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 637: Special Topics in Precision Engineering
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 638: Advanced Topics in Heat Transfer
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 639: Special Topics in Kinematics and Dynamics of Machines
The subject matter of each special topics course varies from semester to semester, depending on the interests of students and staff. Advanced topics and specialized topics will be discussed, particularly those of current interest.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

MEC 641: Fracture Mechanics
The mechanics of brittle and ductile fracture in engineering materials are studied. Major subjects are linear elastic fracture, elastic-plastic fracture, and fatigue crack analysis. Topics also include stress intensity factor, energy release rate, J-integ.
Prerequisite: MEC 536, Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 651: Advanced Finite Element Analysis
Prerequisites: MEC 541, MEC 539
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 662: Advanced Vibration and Analysis
Principle and techniques of vibration analysis of structures and machines. Includes free and forced vibration responses of linear lumped-parameter, multiple dof systems; model analysis of distributed, continuous systems; non-linear vibration analysis; random vibrations.
3 credits, Letter graded (A, A-, B+, etc.)

MEC 671: Optical Methods for Experimental Stress Analysis
Theory and applications of moire methods (in-plane, shadow, reflection, projection, and refraction moire techniques) for measuring static and dynamic deformation of 2D and 3D models, bending of plates and shells, and temperature distribution or refraction index change in fluids. Other topics: holographic interferometry, laser speckle interferometry, digital speckle photography, and current research activities of the field.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MEC 691: Mechanical Engineering Seminar
This course is designed to expose students to cutting-edge research and development activities in mechanical engineering. Speakers are invited from both on and off campus. Fall and spring. 0 credits, S/U grading. May be repeated.
S/U grading
May be repeated for credit.

MEC 695: Mechanical Engineering Internship
Participation in off-campus engineering practice in private corporations, public agencies, or non-profit institutions. Students will be required to have faculty coordinator as well as a contact in outside organization, to participate with them in regular consultations on the project, and to submit a final report to both. A maximum of 3 credits can be accepted toward the M.S. degree.
Fall, 1 credit, S/U grading
May be repeated 3 times FOR credit.

MEC 696: Special Problems in Mechanical Engineering
Conducted jointly by graduate students and one or more members of the faculty.
1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MEC 697: Practicum in Teaching I
Every TA must register for the course.
Fall, S/U grading
May be repeated for credit.

MEC 698: Practicum in Teaching II
Practicum in teaching under faculty supervision
GRADUATE COURSE DESCRIPTIONS

1-3 credits, S/U grading
May be repeated for credit.

MEC 699: Dissertation Research on
Campus
Prerequisite: Advancement to candidacy (G5).
Major portion of research must take place on
SBU campus, at Cold Spring Harbor, or at the
Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MEC 700: Dissertation Research off
Campus - Domestic
Prerequisite: Must be advanced to candidacy
(G5). Major portion of research will take place
off-campus, but in the United States and/or
U.S. provinces. Please note, Brookhaven
National Labs and the Cold Spring Harbor Lab
are considered on-campus. All international
students must enroll in one of the graduate
student insurance plans and should be advised
by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MEC 701: Dissertation Research off
Campus - International
Prerequisite: Must be advanced to candidacy
(G5). Major portion of research will take place
outside of the United States and/or
U.S. provinces. Domestic students have the
option of the health plan and may also enroll in
MEDEX. International students who are
in their home country are not covered by
mandatory health plan and must contact the
Insurance Office for the insurance charge to
be removed. International students who are
not in their home country are charged for the
mandatory health insurance. If they are to be
covered by another insurance plan they must
file a waiver be second week of classes. The
charge will only be removed if other plan is
deemed comparable.
All international students must received
clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MEC 800: Full Time Summer Research
May be repeated for credit.

MUS

Music

MUS 500: Introduction to Music
Research
An introduction into the scholarly study
of Western music. Topics may include:
bibliographic tools for research; historical,
thematic, and analytical methodologies;
textual scholarship; organology and
iconography; performance practice; aesthetics
and criticism; sociology of music; perception
and cognition; gender and sexuality;
musicology in today’s academia and society.
Survey of the field. Emphasis on recent trends in American musicology.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MUS 501: Compositional Skills of
Tonal Music
An intensive course in chorale harmonization
and counterpoint. (Enrollment limited to 12.
MUS 501 may not be included in the courses
taken in fulfillment of degree requirements.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MUS 502: Proseminar in Tonal
Analysis
The application of various techniques of
analysis to tonal works. Rhythmic, harmonic,
linear, thematic, and other elements of
musical structure are considered. Preparation
equivalent to MUS 501 is assumed.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MUS 503: Music in the 20th and 21st
Centuries
An intensive course in contemporary musical
styles, focusing on historical problems.
Seminar reports and research papers on works
of major significance.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MUS 504: Analysis of Music of the 20th
and 21st Centuries
Detailed analyses of various works that are
representative of the significant compositional
systems of recent music.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

MUS 505: Foundations of Musicianship
An intensive workshop in the skills of sight
singing and dictation of tonal melodies,
rhythm, and diatonic harmony. Repertoire
is drawn from diverse styles and periods.
Qualified students may be exempted from this
course through a placement exam given at the
beginning of the fall semester.
Fall, 2 credits, Letter graded (A, A-, B+, etc.)

MUS 506: Graduate Musicianship
An intensive workshop in the development of
musicianship skills in advanced tonal and
atonal music. The course includes dictation in
a variety of harmonic, melodic, and rhythmic
categories and prepared singing and sight-
singing of complex tonal and atonal melodies
(in bass, alto, tenor, and treble clef). Qualified
students may be exempted from this course
through a placement exam given at the
beginning of the fall semester.
Spring, 2 credits, Letter graded (A, A-, B+, etc.)

MUS 507: Studies in Music History
Concentrated study of the works of a single
composer, or of repertories that represent single
compositional tendencies in Western
music. Recent topics have included Mozart's
operas, Goethe's Faust and the symphonic
tradition, Bach cantatas, virtuosities, Stravinsky,
music and nationalism, and introduction to
popular music studies.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 508: Studies in Composition and
Theory
Study of contemporary or traditional
compositional techniques or styles, including
both analysis and exercises in writing. Not
more than eight credits of MUS 507, 508, and
509 combined may be counted toward the
degree.
Fall or Spring, 1-3 credits, Letter graded (A,
A-, B+, etc.)
May be repeated for credit.

MUS 509: Performance Studies
Study of an instrument or voice as a
supplement to other work in a graduate music
program. This course is designed for students
who require piano study in order to pass
the piano proficiency requirement, and for
students not in a performance degree program
who wish to study voice or an instrument.
Prerequisite: Audition
Fall and Spring, 1-3 credits, Letter graded (A,
A-, B+, etc.)
May be repeated for credit.

MUS 513: Workshop in Instrumentation
and Orchestration
Studies in writing for specific instruments
and ensembles through practical exercises
and examination of the repertory. Faculty and
student performers discuss the capabilities
of their instruments and perform and discuss
exercises written for the class.
Fall or Spring, 3 credits, Letter graded (A,
A-, B+, etc.)
May be repeated for credit.

MUS 514: Audio Engineering
Technical fundamentals of audio engineering
for the serious practitioner, with primary
emphasis on sound reinforcement and
recording arts. The course focuses on
measurement and critical listening, and
investigates the basic operational theory of principal devices and systems.  
Prerequisite: permission of instructor  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MUS 515: The Fundamentals of Electronic Music**  
A short survey of the history and literature of the medium is followed by study of the pertinent background in theoretical acoustics and practical engineering. Students are instructed in the basic techniques of electronic sound production and modification.  
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MUS 516: Electronic Music Workshop**  
Individual short experimental works or specific assignments. Uses of electronic music equipment.  
Prerequisite: MUS 515 or the equivalent  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MUS 517: Introduction to Computer Music**  
A hands-on introduction to the uses of computers in the creation and performance of music. Topics include software synthesis, computer manipulation of natural sound, MIDI and digital tape, and interactive performance. There is a brief survey of the history, literature and repertoire of the field.  
Prerequisite: Music major or permission of the instructor  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MUS 518: Advanced Projects in Computer Music**  
Advanced projects, individual or collaborative, in computer music.  
Prerequisite: MUS 517 and permission of instructor  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

**MUS 519: Composer's Forum**  
Practicum for student composers to learn how to present their music in a professional context.  
1-2 credits, S/U grading  
May be repeated 1 times FOR credit.

**MUS 520: Introduction to Music Research for DMA Students**  
An introduction to research skills for DMA students in their first year of study. Meeting five times per term, the course introduces students to music research databases and searching, proper bibliographic practices, score editions, and other issues relevant to doctoral level research.  
Offered  
Fall, S/U grading

**MUS 523: Advanced Composition**  
Individual projects for graduate students in composition.  
Fall and Spring, 2-6 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

**MUS 534: Opera Studies**  
One of the most resilient and popular genres of the 18th century, opera has seen a remarkable continuity as an institution since its birth in 1600. Performed in the opera house, it has been produced by a fixed set of characters: the impresario, the librettist, the composer, the stage designer, and the director, but also singers, instrumentalists, dancers, and the chorus. Operas have traditionally been written in their entirety and have been revised by freely-invented plots. Operas have often generated political, philosophical, and artistic debates, and provide today's scholars with a unique window into historical, ideological, sociological, and aesthetic issues. The hybrid genre par excellence, opera continues to be a catalyst for creativity in various arts, and in present-day production often features the most advanced media and technologies. This seminar will capitalize on both the continuity and the diversity of the genre, bringing together graduate students in music history, theory, and performance.  
Offered  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

**MUS 535: Lecture-Workshop in the Performance of Baroque Music**  
An examination of problems confronting the performer of music from the period ca. 1600-1750, from both musicological and practical points of view. The basso continuo, its function and realization; phrasing and articulation; ornaments, notated and improvised; period instruments; aspects of notation; bibliography. The course meets in lecture for two hours each week with a third hour devoted to the coaching of a rehearsal or performance of music prepared by members of the class.  
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MUS 536: Area Studies in Ethnomusicology**  
Examination of the music of a selected world area, combining musical analysis with a consideration of historical, social, and performance contexts. Recent topics have included Brazilian music from 1822 to the present; music, politics, and society in Eastern Europe; and a century of Middle Eastern musics. May be repeated for credit.  
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

**MUS 537: Research Methods in Ethnomusicology**  
A practicum covering both the theoretical foundations and practical components of ethnomusicological field research and analysis. Emphasis is on designing and undertaking a small musical ethnography, and on exploring practical, ethical, ontological and epistemological aspects of ethnomusicological research. Weekly readings and a final project.  
3 credits, Letter graded (A, A-, B+, etc.)

**MUS 538: Phenomenological Approaches to Music Analysis**  
Concepts from phenomenological philosophy are used as a basis for the study of music from various periods and cultures, with an emphasis on recent music in the Western classical tradition. Readings include Heidegger, Husserl, and later writings in phenomenology; philosophies of space and time; and music theoretic studies by Clifton, J. Kramer, Lewin, and others.  
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**MUS 539: Proseminar in Ethnomusicology**  
An introduction to the field of ethnomusicology as practiced in Europe and North America over the past century. Theoretical and methodological approaches in ethnomusicology are examined as they relate to major periods in the history of ethnomusicology.  
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**MUS 540: Studies in Cultural Historiography**  
This course is intended to promote the student's knowledge and reflection about the study of the history of the arts as history.  
It is organized on the following topics: origins and philosophical foundations of the modern historical consciousness; the nature of historical knowledge and explanation; historiographic models; and origins, philosophical foundations, and genres of historical musicology.
MUS 541: Topics in the Cross-Cultural Study of Music
Examination of a topic of current interest in the cross-cultural study of music. Readings from various intellectual traditions in the humanities and social sciences provide a context within which to appraise recent research in ethnomusicology, historical musicology, and popular music studies, and to formulate possible directions for future research. Representative topics include music and gender, music and the media, music and power, and performance and performers.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 542: Ethnomusicology and Social Theory
An introduction to major schools of social theory as they may be applied to the analysis of music and related performance forms. Theoretical writings in sociology, anthropology, philosophy, cultural studies and related fields will be paired with case studies that situate musical creation, performance and dissemination within the unfolding of societal processes.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 543: Topics in Medieval Music
Study of a focused area in medieval music, such as the works of Guillaume de Machaut, transmission processes, and the Notre Dame repertory.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 545: Topics in Renaissance Music
Historical, analytical, and critical issues related to Renaissance music. Recent topics have included early 15th-century song repertories, the boundaries of the Renaissance, and the works of Ockeghem. May be repeated if topic is sufficiently different.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 547: Topics in Baroque Music
Historical problems in music of the Baroque era. Recent topics have included German Passion settings, theories of expression and representation, and musical rhetoric.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 548: Topics in 18th-Century Music
Investigation of critical, analytical, and historical issues in 18th-century music, such as the interpretation of sketches and fragments, counterpoint teaching in the 1790s, and the music of Mozart.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 549: Topics in 19th-Century Music
Study of a focused area in 19th-century music. Recent topics have included Italian opera, the unfinished works of Schubert, and genre in Chopin's oeuvre.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 550: Topics in 20th-Century Music
Focused study of selected issues in music of the 20th century. Recent topics have included primitivism and exoticism; quotation, borrowing, and collage; the music of Roger Sessions; and the Second Viennese school.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 551: Topics in 20th-Century Music
Advanced training in preparing and conducting choral works. Students spend a semester in score study, receive individual private instruction, and are expected to participate in the rehearsing of the University Chorus, the University Chorale, and the Chamber Singers. Open only to students enrolled in graduate conducting programs.
Fall and Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated.

MUS 552: Dalcroze Method: Music Pedagogy for Children
A focus on the unique approach of Emile Jaques-Dalcroze, which takes into consideration his approach in light of recent developments in early childhood music education. The idea that students experience music physically before they wrestle with symbols and theoretical abstraction is at the heart of Dalcroze work. The Dalcroze music pedagogy includes: Eurhythmics-developing a sense of rhythm and musical expression through whole-body movement; Solfège-developing a sense of harmony and rhythm through singing games; and Improvisation. This class is designed primarily for music teachers, elementary school classroom teachers and professional musicians. Participants are expected to be able to read and notate simple rhythms and melodies. (formerly: Musical Learning, the Body, and Eurhythmics)
3 credits, Letter graded (A, A-, B+, etc.)

MUS 553: Topics in 20th-Century Music
Advanced training in preparing and conducting choral works. Students spend a semester in score study, receive individual private instruction, and are expected to participate in the rehearsing of the University Chorus, the University Chorale, and the Chamber Singers. Open only to students enrolled in graduate conducting programs.
Fall and Spring, 3-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 554: Topics in 20th-Century Music
Advanced training in preparing and conducting choral works. Students spend a semester in score study, receive individual private instruction, and are expected to participate in the rehearsing of the University Chorus, the University Chorale, and the Chamber Singers. Open only to students enrolled in graduate conducting programs.
Prerequisite: Instructor consent
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

MUS 555: Topics in the Cross-Cultural Study of Music
Advanced training in preparing and conducting choral works. Students spend a semester in score study, receive individual private instruction, and are expected to participate in the rehearsing of the University Chorus, the University Chorale, and the Chamber Singers. Open only to students enrolled in graduate conducting programs.

MUS 556: Stony Brook Symphony Orchestra
Study and performance of orchestral works from the Baroque period to the present.
Fall and Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 557: Topics in Theory
Studies in the writings of music theorists from the Middle Ages through the present day in the context of contemporary repertoires. Recent topics have included modal theory as a model for melodic construction; efforts to adapt modal theory to polyphonic practice; rhythm in theory and practice; theories of tonality from Rameau to Schenker; theoretical approaches to post-tonal and 12-tone music; and theories of timbre and texture.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 558: Topics in Analysis
Intensive analytical study of selected works and exploration of analytical problems. Recent topics have included analysis and performance, melody, Xenakis and Ligeti, Beethoven's late quartets, Berg's Lulu, and the string quartet since 1945.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.
MUS 567: Master Class in Orchestral Repertory
Study of orchestral parts for sections (brass, strings, woodwinds) or for individual instruments. The course emphasizes overall ensemble skills and audition preparation. Different sections directed toward specific groups. See the course listing for offerings in any particular semester. 
Fall and Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 568: Jazz Ensemble
Study and performance of works for jazz ensemble from the early 20th century to the present. 
Fall, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 569: Perspectives on the Performance of Music Since 1945
The course focuses on recent developments on early childhood music education using the unique approach of mile Jacques-Dalcroze, but considers his Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)

MUS 570: Introduction to the History and Performance of the String Bass in Jazz
Study of the historical development of the string bass in jazz and other related improvised musics through a selection of reading and listening projects. Practical assignments will include making transcriptions of classic records and then learning to play them on bass, employing the time-proven method of "copying the masters." 
1-2 credits, Letter graded (A, A-, B+, etc.)

MUS 571: Advanced Instruction in Instrument or Voice
Individual guidance in technique and repertory, with 30 practice hours required each week. Each student is required to perform at least one solo piece per semester, unless excused by the instructor in a written note to the department's graduate program committee. 
Fall and Spring, 1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 572: Improvisation
Practical study of the skills and sources of musical improvisation, including playfulness, emotion, courage, concentration, risk, instrumental and vocal technique, patience and trust. Improvisational skills will not be limited to any single musical style. All students will be required to improvise vocally or instrumentally. 
Fall, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 573: Chamber Music
Chamber ensembles such as the string quartet, wind quintet, solo vocal ensemble, two-piano team, and other special groups meet, each under the direction of a member of the performance faculty, for the study of works from the repertories of the respective groups, with particular attention given to the music of the 20th and 21st centuries. 
Required: Presence at coaching sessions, at least three hours per week of uncoached rehearsal, and at least one performance per semester 
Fall and Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 574: Collaborative Keyboard Performance
Study and performance of the keyboard parts of instrumental and vocal recital repertoire. 
Offered 
Fall and Spring, 1 credit, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

MUS 575: Master Class in Solo Repertory for Instrument or Voice
Performance techniques and problems in works for instrument or voice, drawn from all historical periods. The instructor is a teacher of the specific instrument in each case, except that his or her section may be open to students of certain other instruments with his or her permission. Not offered each semester in every instrument. 
Fall and Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 576: Instrumental Repertoire before 1750
Exploration of instrumental repertoire in the 17th and 18th centuries. 
Fall or Spring, 2 credits, Letter graded (A, A-, B+, etc.)

MUS 577: Master Class in Performance Pedagogy
Guidance and supervision in the teaching of an instrument or voice. 
2 credits, Letter graded (A, A-, B+, etc.)

MUS 578: Harpsichord for Pianists (Beginning)
Fundamentals of harpsichord techniques, touch, and repertoire for students already possessing a keyboard background. 
Fall, 2 credits, Letter graded (A, A-, B+, etc.)

MUS 579: Opera Workshop
Study and performance of scenes and complete operas from the standard and 20th-century repertories. An interdisciplinary approach involving the departments of Music and Theatre Arts. 
Fall and Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 580: Vocal Diction
A thorough study of the rules of pronunciation and International Phonetic Alphabet transcription in a major language of the voice repertory: Italian, French, or German. Special attention to lyric projection of the language as it relates to voice production, listener comprehension, and musical values. Course work includes coaching in appropriate song and operatic literature. The specific language studied rotates from semester to semester. 
Fall and Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

MUS 581: Harpsichord for Pianists (Advanced)
Continuation of MUS 581: Further exploration of techniques and repertoire. 
Prerequisite: Piano major or strong keyboard background. 
Spring, 2 credits, Letter graded (A, A-, B+, etc.)

MUS 582: Harpsichord for Pianists (Advanced)
Continuation of MUS 581: Further exploration of techniques and repertoire. 
Prerequisite: Piano major or strong keyboard background. 
Spring, 2 credits, Letter graded (A, A-, B+, etc.)

MUS 583: Continuo Realization
Practical and theoretical instruction in figured bass realization, based on the study of vocal and instrumental scores from 1600-1750. Required of students in harpsichord. Open, with consent of the instructor, to other qualified students who have some knowledge of figured bass realization. 
Fall or Spring, 2 credits, Letter graded (A, A-, B+, etc.)

MUS 584: Baroque Chamber Ensemble
Study and performance of instrumental and vocal music, 1600-1750. Participants work from scholarly editions and original sources whenever possible and have the possibility of performing on replicas of early instruments. A concert is given at the end of the class term. Acceptance by audition. 
Fall and Spring, 1 credit, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**MUS 585: Early Music Performance Practice**

Study and implementation of Renaissance and Baroque performance practices. Areas include brass ensemble music and lute and guitar repertories.

*Fall and Spring, 2 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 590: Practicum in Professional Skills**

Practical training in activities related to the professional work of a performing musician, including teaching, solo and ensemble performance, conducting, internships and related musical work, both on and off-campus. Required of all full-time students in the M.M. performance program. All off-campus activities in fulfillment of this course must be approved by the Graduate Program Director, who acts as supervisor for this course.

*Fall, 1-3 credits, S/U grading*

May be repeated for credit.

**MUS 591: Practicum in Teaching**

Instruction in the department under the supervision of the faculty. (MUS 591 may not be included in the courses taken in fulfillment of degree requirements.)

*Fall and Spring, 1-3 credits, S/U grading*

May be repeated for credit.

**MUS 592: Seminar on the Teaching of Music**

Discussion of fundamental problems in teaching music. Topics may include the explanation of musical processes; communication to nonprofessionals; and integration of aspects of performance, theory, history, and analysis with one another. Required of all students who teach one of the introductory undergraduate courses in musicianship, theory, or literature; to be taken during the first semester of teaching.

*Fall, 1 credit, S/U grading*

May be repeated for credit.

**MUS 593: Practicum in Performance**

Individual instruction and/or coaching for professional performing experience.

*Fall and Spring, 0-1 credits, S/U grading*

May be repeated for credit.

**MUS 596: Contemporary Chamber Players**

The study and performance of music of the 20th and 21st centuries for ensemble, ranging from duos to larger conducted groups.

Repertoire includes 20th-century classics as well as new works, including compositions written by Stony Brook students. A full schedule of public performances takes place.

Prerequisite: Permission of instructors

*Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 597: Jazz Ensemble**

Study and performance of works for jazz ensemble.

*0-1 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 599: Independent Studies**

Individual studies under the guidance of a faculty member. Each student must submit to the graduate studies committee of the department a written prospectus of the work he or she intends to pursue, with the amount of credit proposed, together with the written endorsement of the prospective instructor. Approval of the graduate studies committee is required; hence this material should be submitted as soon as possible, and in any case within the first two weeks of the semester (or the first week of a summer session).

*0-16 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 615: Seminar in Electronic Music Composition**

Individual compositions of substantial proportions in electronic or concrete music media. The course may be repeated. Open only to qualified students in a music degree program.

Prerequisite: MUS 516 or the equivalent

*Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 623: Directed Study in Composition**

Intended for doctoral students in composition.

*Fall and Spring, 1-12 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 626: Directed Study in Conducting**

Intended for doctoral students in conducting.

*Fall and Spring, 1-12 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 661: Directed Study in Instrumental and Vocal Performance**

Intended for doctoral students in instrumental and vocal performance.

*Fall and Spring, 1-12 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 690: Advanced Practicum in Professional Skills**

Practical training through activities related to the professional work of a performing musician, including teaching, solo and ensemble performance, internships, and related musical work, both on-campus and off-campus. Required for all full-time students in the D.M.A. performance program. All off-campus activities in fulfillment of this course must be approved by the Graduate Program Director, who acts as a supervisor for this course.

*Fall, 1-3 credits, S/U grading*

May be repeated for credit.

**MUS 695: Doctoral Essay Tutorial**

Development of an essay to fulfill requirements in either DMA or PhD programs. Students may enroll in this course only after completing the required graduate seminars or preseminars (see program requirements) with a grade of "B" or better in both the seminar and the essay to be developed.

Prerequisite: MUS 502, 503, 504, 507, 535, 537-555, 557, or 559

*Fall and Spring, 1-2 credits, Letter graded (A, A-, B+, etc.)*

May be repeated for credit.

**MUS 696: Doctoral Colloquium or Lecture-Recital**

Students are required to enroll in MUS 696 in the semester in which the Ph.D. colloquium or the D.M.A. lecture-recital is given. The instructor, chosen in consultation with the directing committee, acts as an advisor or tutor, and signals to the graduate program committee that the colloquium or lecture-recital may be given.

*Fall and Spring, 1 credit, S/U grading*

May be repeated 1 times FOR credit.

**MUS 697: Directed Reading**

Intended for preparation for the preliminary examinations and related requirements.

*Fall and Spring, 1-12 credits, S/U grading*

May be repeated for credit.

**MUS 699: Dissertation Research on Campus**

Intended for work in the area of the dissertation.

Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
MUS 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MUS 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

MUS 800: Summer Research
Students who receive support for summer research must register for this course, which gives them full-time status.
S/U grading
May be repeated for credit.

MUS 850: Summer Teaching
Students who receive support for summer teaching must register for this course, which gives them full-time status.
S/U grading

NET Independent Project
NET 508: OBJ.ORIENTED SYS DEV
NET 509: ADVANCED VLSI DESIGN

PHI Philosophy

PHI 500: Feminist Theories
This course is designed to introduce students to the most recent developments in feminist theory, covering different currents as well as traditions. The seminar may focus on moral and political questions, the intersection between the social and the psychological, or culture and representation as it is negotiated in different cultural media (film, literature, architecture, music, etc.)
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 501: Theories of Race
This course is designed to introduce the student to different currents of analyses of race and racism. It focuses particularly on the relationship between philosophy and the development, legitimacy and legimation of racial categories. The seminar may focus on moral and political philosophy, questions of epistemology or metaphysics, the intersections between the social and the psychological, or culture and representations of raced subjects as they are negotiated in different cultural media (film, literature, architecture, music, etc.)
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 503: Theories of Ethnicity
This course focuses on the category of ethnicity. Using an inter-cultural, comparative and historical approach, it seeks to expose the student to the uses and misuses of this category. The category of ethnicity will also be studied in conjunctions with questions relating to individual identity, national, cultural and civilizational identities. Ethnicity, like Race and Gender, is one of the most fundamental markers of identity. Using interdisciplinary and comparative methods and perspectives, ethnicity's role in the constitutions of identities will be studied.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 504: Intersections of Race, Ethnicity, and Gender
This course, which is analogous to an honors senior seminar, seeks to integrate into a productive dialogue different methods, traditions and perspectives used to analyze Race, Ethnicity, and Gender, while also juxtaposing and comparing the similarities and differences between them. The approach, as in the whole program, will be inderdisciplinary and comparative.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 505: Core Course in Philosophy and the Arts: History of Aesthetic Theory
The basic course will investigate some of the most important and influential theories of art in the West from Plato to the present. Readings and discussions in depth of major figures will make up the content of the course: e.g., Plato, Aristotle, Kant, Hegel, Schopenhauer, Nietzsche, Heidegger, Collingwood, Langer, Merleau-Ponty, Dufrenne. The focus throughout will be on central issues in aesthetics such as imitation, truth, beauty, expression, emotion, and imagination.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 506: Art and Its Problems
A consideration of basic problems in the creation and appreciation of art. What is the creative process? Who is the artist? How is art to be compared with other symbolic forms (e.g. language, science, technology)? What does art offer that philosophy does not, and vice-versa? In what ways does the gender or racial identity of the artist affect the creation of the work? What are the cultural, social, and political dimensions of the art work and its reception?
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 507: Aesthetic System
A concentrated reading of a single major work, with attention both to its detailed structure and to its larger significance. Candidates for such reading include Aristotle's Poetics, Kant's Critique of Judgement, Hegel's Lectures on The Philosophy of Art, Adorno's Aesthetic Theory, Collingwood's Principles of Art, Langer's Feeling and Form, Dewey's Art as Experience, Heidegger's "The Origin of the
Work of Art”, and Danto’s Transfiguration of the Commonplace.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 508: Contemporary Issues in the Arts
With an eye on artworks accessible in the public sphere - museums, galleries, concerts, readings, dance performances, film - philosophical questions will be raised: Why these works now? How do they compare with their predecessors? What do they portend for the future of art? Visits to the sites and performances of such works will be integrated into an ongoing discussion of the issues they raise within the context of aesthetic theory - and what new theories they suggest. This course will be co-scheduled with ITL571, FRN571, and EGL603
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 509: Special Seminar in Aesthetics
This is an advanced seminar in aesthetics that focuses on a single question that arises in the philosophy of art. This question may be approached through the writings of a single author, or else by consulting texts of several thinkers (including practicing artists as well as philosophers). Examples of such questions would be: What is the place of form in art? How does emotion figure into the creation or appreciation of art? To be taught on the main campus by a regular faculty member. Ideally, this course would be taken during the second year of master's degree work at Stony Brook Manhattan.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 510: Ancient Philosophy
An in-depth reading of few fundamental texts of classical antiquity that conceptualize mind/soul as object of rational investigation. These ancient theories contain within themselves all the principal elements of later philosophies of mind. This course aims at making these elements explicit through the study of the following: Anaxagoras, selected fragments on ‘mind’; Plato, Republic (selection) and Phaedo; Aristotle, De Anima (Peri Psyche); Marcus Aurelius, The Meditations; Lucretius, On the Nature of Things.
3 credits, Letter graded (A, A-, B+, etc.)

PHI 511: Modern Philosophy
This is an advanced course that investigates pivotal connections between seventeenth and eighteenth-century theories of knowledge, metaphysics, aesthetics, and ethics. It surveys key developments in these areas of philosophic inquiry during the sixteenth and seventeenth centuries. It also involves careful explicative work on texts written by major thinkers of the period, e.g., Descartes, Locke, Leibniz, Spinoza, Malebranch, Shaftesbury, Hutcheson, Hume, Rousseau, and Kant.
3 credits, Letter graded (A, A-, B+, etc.)

PHI 520: Advanced Studies in Philosophy
Investigations into specialty areas led and directed by accomplished philosophers in the discipline involved. Instructor consent required. No more than six credits of PHI 520 may count towards the fulfillment of degree requirements in the MA program.
Offered:
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHI 521: Contemporary Moral Issues
This examination of the radical nature of traditional moral theory in its contemporary applications will look at the ideas of Mill, Kant, and Aristotle as variations on traditional Judeo-Christian moral theory. Students will write short papers on contemporary moral issues as these are portrayed in short fiction.
3 credits, Letter graded (A, A-, B+, etc.)

PHI 535: Political Philosophy
This course will take up classics of political philosophy and discuss contemporary social life and ideologies in the light of the theoretical frameworks they have achieved. Readings and assignments will be drawn from such exemplary works as Plato’s Republic, Aristotle’s Politics, Machiavelli’s The Prince, Hobbes’s Leviathan, Locke’s Second Treatise of Government, and Marx’s Communist Manifesto.
3 credits, Letter graded (A, A-, B+, etc.)

PHI 553: Philosophy of Education
The purpose of the course is to develop curricula which not only bridge educational gaps but which also develop within all students a sense of civil responsibility toward community issues and problems. This course critically examines such issues of ethnicity and race, family systems, affirmative action, and multiculturalism through the vehicle of Asian American studies.
3 credits, Letter graded (A, A-, B+, etc.)

PHI 555: Perspectives on the Person
The focus of this course will be the question of how the results of current research are related to our understanding of human development and whether they require us to revise our understanding of what a person is. Readings from classic philosophical texts, such as Plato, Locke, Kant, and from contemporary research in philosophy, psychology and other relevant sciences will be used. Offered as both CEI 587 and PHI 555
3 credits, Letter graded (A, A-, B+, etc.)

PHI 562: Concepts and Methods in Evolutionary Biology
The course aims at achieving two related objectives: first, to provide graduate students in Ecology & Evolution and other biology departments, as well as Philosophy, with a basic understanding of the varied methods (both experimental and statistical) that make up the body of evolutionary quantitative biology. The focus will be in particular on quantitative genetics and its interface with more modern approaches, including QTL mapping, bioinformatics and the various "omics" (genomics, proteomics, etc.). Second, students will become familiar with the fundamental concepts of philosophy of science particularly as they relate to the conceptual analysis of the ideas that shape modern evolutionary and ecological theory. In this respect, the focus will be both on philosophical concepts such as falsificationism, induction, deduction, hypothesis testing and the nature of evidence, as well as on the meaning of key ideas in evolutionary ecology, like natural selection, genetic drift, and constraints.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHI 571: American Philosophy: Philosophical Foundations of American Politics
Readings from Emerson, C.S. Peirce, G.H. Mead, W. James, G. Santayana, J. Dewey, J.H. Randall, and J. Buchler will give the student a grasp of the classic American tradition in philosophy and the plural strands that go to make it up, such as: the turn from idealism to semioticism, neo-realism and critical realism, pragmatism and pragmatism, the historical interest and the social interest, individualism and voluntarism, and the centrality of art and science in human affairs.
3 credits, Letter graded (A, A-, B+, etc.)

PHI 572: ORIENTAL PHILOSOPHY

PHI 575: Philosophy of Religion
Several aspects of the Judeo-Christian tradition raise philosophical questions worthy of further reflection and consideration. The first is the relation of religious faith to other sorts of knowledge and commitment: is religious belief more like belief in scientific experts or...
more like belief in one's spouse? A second is what sort of God is worth believing in and whether we can talk intelligibly about the deity. The third is whether and how any God worth believing in could be compatible with the obvious ills of our world.

3 credits, Letter graded (A, A-, B+, etc.)

**PHI 576: ETHICS AND VALUES**

**PHI 582: Philosophy of Art**
The purpose of this course is to encourage students to explore and enrich their aesthetic experience through reading, analyzing, discussing, and writing about various theories put forth by philosophers in the western tradition. Among topics to be considered are representation, expression, form, the aesthetic attitude, beauty, taste, criticism and interpretation of art, and the relation of art to other areas of experience. The course does not assume previous familiarity with philosophy or art; however, it does assume an intellectual commitment to the examination of difficult ideas. This course is offered as both CEI 573 and PHI 582.

3 credits, Letter graded (A, A-, B+, etc.)

**PHI 587: DIRECTED READINGS**

**PHI 588: DIRECTED RESEARCH**

**PHI 590: DIRECTED READINGS**

**PHI 595: DIRECTED RESEARCH**

**PHI 599: Master's Thesis Research**

*May be repeated 2 times FOR credit.*

**PHI 600: Ancient Philosophy**

**PHI 601: Medieval and/or Renaissance Philosophy**

**PHI 602: Modern Philosophy**

**PHI 603: 19th-Century Philosophy**

**PHI 604: Special Topics in the History of Philosophy**

*May be repeated for credit.*

**PHI 610: Philosophy and the Arts**

**PHI 611: Philosophy and Literature**

**PHI 612: Philosophy and Psychology**

**PHI 613: Philosophy and Politics**

**PHI 614: Philosophy and Linguistics**

**PHI 615: Philosophy and Feminism**

Co-scheduled with WST 611.

3 credits, Letter graded (A, A-, B+, etc.)

**PHI 616: Philosophy and Technology**

Co-scheduled with WST 611.

3 credits, Letter graded (A, A-, B+, etc.)

**PHI 617: Philosophy and Environmental Studies**

**PHI 618: Philosophy and the Sciences**

**PHI 619: Special Topics in Interface Studies**

*May be repeated for credit.*

**PHI 620: Advanced Problems in Philosophy**

Delivery: Variable and repetitive credit

3 credits, Letter graded (A, A-, B+, etc.)

*May be repeated for credit.*

**PHI 621: Independent Study**

*May be repeated for credit.*

**PHI 622: Supervised Teaching**

**PHI 623: Teaching Practicum**

**PHI 624: New York Consortium Study**

This course designation should be used by students who enroll in seminars at participating universities of the New York Consortium of Graduate Schools. No more than six credits of consortium study (and none for first-year students at Stony Brook) may count toward the fulfillment of requirements in the doctoral program.

*Prerequisite: Completion of first year in doctoral program (Philosophy)*

Fall, 1-4 credits, Letter graded (A, A-, B+, etc.)

**PHI 625: Prospectus Seminar**

This seminar is taken by all doctoral students in the Spring semester of their third year. The primary goal is to have each write a dissertation proposal.

*Spring, 3 credits, S/U grading*

**PHI 630: Seminar in Continental Philosophy**

**PHI 631: Seminar in Analytic Philosophy**

**PHI 632: Seminar in Comparative Philosophy**

**PHI 633: American Pragmatism and Naturalism**

**PHI 634: Eastern Philosophy**

**PHI 635: Philosophy of Science and Logic**

**PHI 636: Metaphysics**

**PHI 637: Epistemology**

A study of selected conceptions of the nature, structure and content of knowledge, as found in classical and contemporary theories of knowledge.

3 credits, Letter graded (A, A-, B+, etc.)

**PHI 638: Philosophical Psychology**

**PHI 639: Social and Political Philosophy**

**PHI 640: Ethics**

**PHI 641: Aesthetics**

**PHI 642: Philosophy of Religion**

**PHI 643: Semiotics**

**PHI 644: Special Topics in Contemporary Philosophy**

*May be repeated for credit.*

**PHI 699: Dissertation Research on Campus**

Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.

*Fall, 1-9 credits, S/U grading*

*May be repeated for credit.*

**PHI 700: Dissertation Research off Campus - Domestic**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/ or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate
PHY 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must receive clearance from an International Advisor.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

PHI 800: Full Time Summer Research
0 credits, S/U grading
S/U grading
May be repeated for credit.

PHY

Physics

PHY 501: Classical Mechanics
Analytical classical mechanics including Lagrangian and Hamiltonian formulations and the Hamilton-Jacoby theory. Variational principles, symmetries and conservative laws. Selected advanced problems such as parametric and nonlinear oscillations, planetary motion, classical theory of scattering, rigid body rotation, and deterministic chaos. Basic notions of elasticity theory and fluid dynamics.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 503: Methods of Mathematical Physics I
A selection of mathematical techniques useful for physicists. Topics are selected from: linear algebra, complex variables, differential equations, asymptotic analysis, special functions, boundary value problems, integral transforms, perturbation theory as applied to linear and nonlinear systems. This course should be taken by entering graduate students seeking enrichment in these areas.

PHY 505: Classical Electrodynamics
Electrostatics and Magnetostatics in vacuum and medium; Green's functions; Maxwell's equations and gauge invariance; Electromagnetic wave propagation; Radiation, scattering, interference, and diffraction; Special relativity; Radiation by relativistic charges; Additional topics as time permits. Three lecture hours plus two recitation hours per week.

Fall, 0-3 credits, Letter graded (A, A-, B+, etc.)

PHY 506: Methods of Mathematical Physics II
A continuation of PHY 503. Topics include partial differential equations, symplectic maps, etc. There is a discussion of the basic theorems, as well as methods used to derive perturbation solutions for differential equations and maps using the method of normal forms.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 510: Introduction to Nonlinear Dynamics
This course concentrates on developing the tools used to analyze models of dynamical systems associated with physical phenomena, such as coupled electrical mechanical, chemical and biological oscillators, amplitude equations, symplectic maps, etc. There is a discussion of the basic theorems, as well as numerical analysis of data, presentation of results in written, graphic, and oral form, and meaningful comparison of experiments and theory are part of the course. Working alone or with, at most, one partner, each student must do one experiment from each of four different groups.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHY 511: Quantum Mechanics I
First course in a two-part sequence. Topics include basic quantum physics and mathematical apparatus; application to one dimensional examples and simple systems. Symmetries, angular momentum, and spin. Additional topics as time permits.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 512: Quantum Mechanics II
Second course in a two-part sequence, covering variational principles, perturbation theory, relativistic quantum mechanics, quantization of the radiation field, many-body systems. Application to atoms, solids, nuclei and elementary particles, as time permits.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 514: Current Research Instruments
In a series of distinct units, various members of the experimental research faculty describe the nature of their work, explain the major principles of their laboratory instruments, discuss how these instrument systems function, and conduct tours of their laboratories showing the apparatus in action. The student becomes familiar with most of the experimental research instrumentation in the department.

3 credits, S/U grading

PHY 515: Methods of Experimental Research I
An experimental course required for all graduate students. The goal of the course is to provide firsthand experience with the nature of experimental work. For students oriented toward theory, the course gives a background for reading and evaluating experimental papers. The course is based on classic measurements in nuclear, particle, atomic, condensed matter physics, and astronomy. Students can gain experience in handling cryogenic liquids, vacuum systems, lasers, pulse counting and coincidence methods, resonance measurements, and electronic instrumentation, such as lock-in amplifiers, particle detectors, coincidence counters, computer control, etc. Numerical analysis of data, presentation of results in written, graphic, and oral form, and meaningful comparison of experiments and theory are part of the course. Working alone or with, at most, one partner, each student must do one experiment from each of four different groups.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PHY 517: Laboratory Course in Astronomical Techniques
A course designed to introduce the theory, design, and operation of modern astronomical instrumentation and to familiarize the student with the use of telescopes. Current astronomical techniques will be discussed with emphasis on methods of observational measurements and reduction of data. Emphasis is given on optical techniques appropriate for wavelengths shorter than one micron. Extensive laboratory and observing exercises may be expected.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 518: Applications of Synchrotron Radiation
An introduction to the principles of synchrotron radiation is followed by a series of lectures given by graduate faculty and guest lecturers with expertise in using synchrotron radiation research in physics, chemistry, materials science, biology and medicine. Most of these presentations are followed by hands-on experience with synchrotron instrumentation at Brookhaven National Laboratory. Access to user facilities, including safety requirements, preparation of user proposals, user training and other issues, and also covered.

Spring, 1-3 credits, S/U grading
PHY 521: Stars
A study of the atmospheres, interiors, and evolution of stars. The contact between theory and observations is emphasized. Stellar atmospheres in hydrostatic and radiative equilibrium described. Models for the calculation of stellar spectra are discussed. Stellar winds are studied. Next, theoretical studies of stellar interiors and evolution, including equations of state, energy transport, and nuclear energy generation, are developed. Structures of main sequence, red giant, pre-main sequence, and white dwarves are studied and compared to observations. The evolution of single stars up to supernovae and the peculiar evolution of close binary systems are also studied.
Fall, 0-3 credits, Letter graded (A, A-, B+, etc.)

PHY 522: Interstellar Medium
A study of the interstellar medium with emphasis on physical processes. Topics include kinetic theory, equation of transfer, spectral lines, non-thermal emission, ionization effects of dust, and formation and spectroscopy of molecular clouds. The components of the interstellar medium and the interactions between them are discussed in detail, as well as the process of star formation.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 523: Galaxies
A basic course on observational and theoretical aspects of the content, morphology, kinematics, and dynamics of galaxies. Topics include the size, shape, and location of the sun in the Milky Way; stellar populations; the disk and spheroidal components; galactic rotation; distance determination in the Milky Way and to external galaxies; galaxy classification and the Hubble Law. Theoretical topics center on stellar dynamics, including potential theory; stellar orbits; and spiral structure. The course also includes a brief introduction to cosmology.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 524: Cosmology
A basic course on cosmology: Hubble expansion, Friedmann universes, age of the universe, microwave background radiation, big-bang nucleosynthesis, inflation, growth of gravitational instabilities and galaxy formation, correlation functions, local density and velocity perturbations, and dark matter. 
Prerequisite: PHY 523 or permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 534: Radio Astronomy
Topics covered include continuum and spectral-line radio astronomy. Within the Milky Way Galaxy topics include the interstellar medium, the physics and kinematics of molecular clouds, star formation in giant molecular clouds, chemistry of molecular clouds, galactic structure, spiral structure, and pulsars. Extragalactic topics include radio galaxies and jets, radio loud quasars, molecular and atomic gas in galaxies, luminous infrared galaxies, the missing mass problem in spiral galaxies, and cosmic microwave background radiation. Radio astronomy measurement techniques for single telescopes and aperture synthesis techniques are also covered, although the emphasis is on scientific results.
Fall or Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 536: The Physics of Free Electron Lasers
The purpose of this course is to introduce the students to the physics of Free Electron Lasers and Synchrotron Radiation. This course is suitable for graduate students who want to learn more about Free Electron Lasers and Synchrotron Radiation physics.
Offered Summer, 1-2 credits, Letter graded (A, A-, B+, etc.)

PHY 540: Statistical Mechanics
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 541: Advanced Statistical Mechanics
Topics are selected from cluster expansions, elementary theory of quantum fluids, phase transitions, transfer matrix, Ising and ferroelectric models, polymers and membranes, disordered systems, and fluctuation and nonequilibrium phenomena.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 542: Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab
This course is an introduction to the underlying principles and uses of the nearly 14,000 particle accelerators that are used worldwide in medicine, industry, and scientific research. The course is suitable for senior undergraduate and entry-level graduate students in physics and engineering or students from other fields with a particular interest in accelerator-based science.
Offered Winter, 1-2 credits, Letter graded (A, A-, B+, etc.)

PHY 543: Superconducting RF for High-Energy Accelerators
This graduate level course covers application of superconducting radio frequency (SRF) technology to contemporary high-energy accelerators: storage rings, pulsed and CW linacs, including energy recovery linacs (ERLs). The course will address physics and engineering aspects of using SRF in accelerators. It will cover beam-cavity interactions issues specific to superconducting cavities, a systems approach to designing SRF systems and engineering of superconducting cavity cryomodules. The course is intended for graduate students pursuing accelerator physics and graduate engineers and physicists who want to familiarize themselves with superconducting RF systems.
Offered Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 551: Nuclear Physics I
Nucleon structure, conservation laws and the static quark model; nuclear force and the two nucleon system; bulk properties of nuclear matter; charge distribution, spin, isospin, mass, alpha decay, nuclear fission; electromagnetic and weak interaction; collective motion; microscopic models of the nucleus; nuclear matter under extreme conditions, high rotational states, heavy ion physics at RHIC, nuclear astrophysics.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 552: Nuclear Physics II
Nucleon-nucleon scattering and effective range approximation; the nucleon-nucleon interaction calculated from meson exchange; effective forces between nucleons in nuclei and nuclear matter; the renormalization group approach to these interactions; Fermi-liquid theory of the nuclear many-body problem; thermodynamics of hadrons at
PHY 554: Fundamentals of Accelerator Physics

History of accelerators, basic principles including centre of mass energy, luminosity, accelerating gradient; Characteristics of modern colliders: RHIC, LEP, LHC, b-factories; Transverse motion, principles of beam cooling, Strong focusing, simple lattices; Circulating beams, synchrotron radiation; Longitudinal dynamics; Non-linearities and resonances; Radio Frequency cavities, superconductivity in accelerators; Applications of accelerators: light sources, medical uses, Future Accelerators: eRHIC, ILC, neutrino factories, muon collider, laser plasma acceleration.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 555: Solid-State Physics I

This course concentrates on the basic notions of solid state physics, treated mostly within the single-particle approximation. Main topics include: crystal lattices and symmetries, reciprocal lattice and state counting, phonons, electron energy band theory, bonding and cohesion (semi-quantitatively), electron dynamics and electron transport in metals and semiconductors, screening, optical properties of solids, and an introduction to superconductivity and magnetism.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 556: Solid-State Physics II

The course focuses on the many-particle aspects of solid state physics addressing classical topics such as superconductivity and the transport properties of disordered conductors, as well as more modern subjects including the fractional quantum Hall effect, dissipative quantum mechanics, and problems of mesoscopic physics. Both phenomenological and theoretical descriptions are discussed.

Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 557: Elementary Particle Physics

Introduction to elementary particle physics. Symmetries and invariance in particle physics. The properties of particles in terms of quarks and leptons and their interactions. An introduction to the electroweak and for strong interactions. Interactions at high energies. Interactions between particles and matter, experiments in particle and experimental results. Survey of particle accelerators. Fall or Spring, 0-3 credits, Letter graded (A, A-, B+, etc.)

PHY 558: Physical Biology

Topics of this course include but are not limited to: Time and space in cells; Structural basis of biology; Molecular solvation and lattice models; Chemical potential; Electrostatics, potentials, dipoles, electrochemical potentials[Poison-Boltzmann and Born models; Acids, bases and salts; Intermolecular potentials and force fields; Phase transitions; Lattice and Ising models; Adsorption; Binding polynomials; Binding cooperativity; Semigarrn ensemble, molecular machines; Molecular motors, energy conversion and transduction; Polymer theory; Flory-Huggins; Random flights; Elasticity; Helix-coil theory; Collapse transitions; Protein folding equilibria; Protein folding kinetics; Sequence space; Protein evolution; Protein plasticity and biological mechanics of proteins; Biophysics of the cell; Proteome stabilities, aggregation, kinetics.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 559: Biological Dynamics and Networks

Topics of this course include but are not limited to: Physical kinetics; Diffusion/Smoluchowski; Random flights; Waiting times; Poisson; Brownian ratchets; Chemical kinetics; Transition states; Stability, bifurcations, pattern development; Noise in cells: intrinsic and Extrinsic; Feedback; Biological Oscillators; Recurrence, period doubling, chaos; Networks; Topologies; Degree distribution, betweenness; Models of nets: Erdos-Renyi, scale-free, social, Watts-Strogatz, agents; Robustness, highly-optimized tolerance, bowties, epidemics; Biological networks: Protein-protein nets, regulatory and metabolic nets; Known biological circuits and their behaviors; How networks evolve: Preferential attachment, rewiring; Power laws; Fluxed through networks; Information and communication, entropy; Metabolic flux analysis; Artificial and Natural selection for traits; Darwinian evolution; Population dynamics.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 561: Biology for Physical Scientists

Topics of this course include but are not restricted to: Overview of living things; Six kingdoms, animal phyla. Physiology and organs; Chemistry of life; Noncovalent interactions; Hydrogen bonds; Solvation; Biochemistry: reactions, catalysis, ATP amino acids, nucleic acids, lipids; Cell structures: Nucleus, mitochondria, chromosomes, membranes; Basic paradigm: DNA makes RNA makes protein; How cell machines and circuits work; Cell cycle; The processes of evolution; Genetics and heredity; Diseases: how biological systems fail; How drugs are discovered; Tight-binding inhibitors; Antibodies; Current research: Cell division and cancer, genomics, bioinformatics, high throughput sequencing, systems and synthetic biology.

Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 562: Lasers and Modern Optics

Introduction to the theory of lasers including resonance conditions, normal modes, optical cavities and elementary quantum mechanics. Description of types of lasers, methods of control, limitations of power, precision, wavelength, etc. Applications to research and industry. Throughout the course, there will be many problems that involve writing computer programs to solve simple differential equations and model different aspects of laser operation. Not for satisfying physics Ph.D. breadth course requirements.

Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 564: Advanced Accelerator Physics

Types and Components of Accelerators, Relativistic Mechanics and EM for Accelerators, Accelerator Hamiltonian and N-dimensional phase space, Poincare diagrams, Lie algebras and symplectic maps and matrices; exact parameterization of linear motion in accelerators; matrix functions, Sylvester's formula; non-linear effects, Collective instabilities & Landau Damping, Radiation damping and Excitation, natural Emittance; Spin motion in accelerators.

1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 565: Quantum Electronics I: Atomic Physics

Quantum electronics is a synthesis of quantum physics and electrical engineering, and is introduced in two independent semesters. A description of simple atoms and molecules and their interaction with radiation includes atoms in strong and/or weak external fields, two-photon spectroscopy, superradiance, Rydberg states, lasers and laser spec-troscopy, coherent transients, etc.
PHY 566: Quantum Electronics II: Quantum Optics
Quantum electronics is a synthesis of quantum physics and electrical engineering, and is introduced in two independent semesters. This course focuses on the quantum properties of light. The quantized electromagnetic field and its correlations are used to understand nonclassical states from various sources such as two-level atoms and nonlinear systems interacting with radiation fields.
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 570: Introductory Physics Revisited for Teachers
This seminar allows students to explore the fine points of topics normally covered in high school physics. Not for PhD credit.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 571: Electromagnetic Theory for Teachers
The course reviews vector calculus and develops Maxwell's equations relating electric and magnetic fields to their sources. Applications for time-independent fields are developed for solving boundary value problems and the interactions of fields in bulk matter. An oral presentation of a relevant topic suitable for a high-school class is required. Not for PhD credit.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 573: Mechanics for Teachers
The Newtonian formulation of classical mechanics is reviewed and applied to more advanced problems than those considered in introductory physics. The Lagrangian and Hamiltonian methods are then derived from the Newtonian treatment and applied to various problems. An oral presentation of a relevant topic suitable for a high-school class is required. Not for PhD credit.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 576: Thermodynamics and Statistical Mechanics for Teachers
This course consists of two parts. Those relations among the properties of systems at thermal equilibrium that are independent of a detailed microscopic understanding are developed by use of the first and second laws of thermodynamics. The concepts of temperature, internal energy and entropy are analyzed. The thermodynamic potentials are introduced. Applications to a wide variety of systems are made. The second portion of the course, beginning with the kinetic theory of gases, develops elementary statistical mechanics, relates entropy and probability, and treats simple examples in classical and quantum statistics. An oral presentation of a relevant topic suitable for a high-school class is required. Not for PhD credit.
Fall or Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 577: Physical and Mathematical Foundations of Quantum Mechanics for Teachers
In addition to the requirements for the undergraduate course PHY 307, students taking this course must prepare and present a talk on quantum physics suitable for a general (non-physics) adult audience. This course cannot be taken for credit toward the PhD degrees in Physics. Approval of the Program Director is required for taking this course for credit toward a Master Degree.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 578: Quantum Physics for Teachers
The concepts, historical development and mathematical methods of quantum mechanics. Topics include Schrodinger's equation in time-dependent and time-independent forms, and one- and three-dimensional solutions, including the treatment of angular momentum and spin. Applications to simple systems, especially the hydrogen atom, are stressed. An oral presentation of a relevant topic suitable for a high-school class is required. Not for PhD credit.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 579: Special Topics for Teachers
Topics of current interest to high school teachers are discussed in order to bring the teachers up to date on the latest developments in various areas of research. Examples could include the standard model of particle physics, nanofabrication techniques, atomic force microscopy, etc. Not for PhD credit.
Fall and Spring, 0-1 credits, Letter graded (A, A-, B+, etc.)

PHY 580: Special Research Projects
Research under the direction of a faculty member. Not open to Ph.D. candidates.
Fall and Spring, 1-18 credits, Letter graded (A, A-, B+, etc.)

PHY 582: Optics Rotation
Optical science students experience three to eight week periods in each of several appropriate research groups. At the end of each period a report is required that describes the topics studied or project done. May not be taken for credit more than two semesters.
Fall and Spring, 0-2 credits, Letter graded (A, A-, B+, etc.)

PHY 584: Rotation in Physical Biology
A two-semester course in which students spend at least 8 weeks in each of three different laboratories actively participating in the research of faculty associated with the Laufer Center. At least one of the rotations must be in experimental physical biology. Participants will give a research talk at the end of each eight week period.
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 585: Special Study
Reading course in selected topics.
Fall and Spring, 1-18 credits, Letter graded (A, A-, B+, etc.)

PHY 586: Special Research Projects
Research under the direction of a faculty member. Not open to Ph.D. candidates.
Fall and Spring, 1-18 credits, Letter graded (A, A-, B+, etc.)

PHY 588: Graduate Seminar II
This seminar provides students with an opportunity to present scientific talks, review literature, and engage in discussions with faculty, postdoctoral fellows, and other graduate students. Talks are to be on topics in various fields of physics. 
Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 595: Master's Degree Thesis Research
Independent research for Master's degree students. Open only to those approved by individual faculty for thesis work.
Fall and Spring, 1-18 credits, Letter graded (A, A-, B+, etc.)

PHY 597: Advanced Topics in Quantum Mechanics
This course covers advanced topics in quantum mechanics, including quantum field theory, quantum information, and quantum computing. 
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PHY 598: Graduate Seminar I
This seminar provides graduate students with an opportunity to present scientific talks on topics in various fields of physics. 
Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)

PHY 599: Graduate Seminar II
This seminar provides graduate students with an opportunity to present scientific talks on topics in various fields of physics. 
Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
Special research topics centered on monographs, conference proceedings, or journal articles. Topics include elementary particles, nuclear physics, galactic and extragalactic astronomy, and cosmology and accelerator physics. Required for all first-year graduate students.

**PHY 600: Practicum in Teaching**
This course provides hands-on experience in teaching. Activities may include classroom teaching, preparation and supervision of laboratory experiments, exams, homework assignments, and projects.

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**PHY 610: Quantum Field Theory I**
Quantization of relativistic fields: Lorentz and gauge symmetries, relativistic spin, the S-matrix and scattering; the standard model; perturbation theory, renormalization and effective field theories; path integrals and relations to condensed matter physics.

**PHY 611: Quantum Field Theory II**
Quantization of relativistic fields: Lorentz and gauge symmetries, relativistic spin, the S-matrix and scattering; the standard model; perturbation theory, renormalization and effective field theories; path integrals and relations to condensed matter physics.

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**PHY 621: Advanced Quantum Field Theory**
Proofs of renormalizability and unitarity on non-Abelian gauge theories using modern methods of Becchi-Rouet-Storey-Tyutin (BRST) symmetry; descent equations for anomalies; classical instantons and their quantum corrections, including integration over zero modes; background field methods, other topics if time permits. PHY 610/611 or equivalent is prerequisite.

**PHY 622: String Theory I**
This course is intended for graduate students who have familiarity with gauge & quantum field theory. Topics will be selected from: Free bosonic & spinning strings and heterotic & Green-Schwarz superstrings; conformal field theory; tree-level and one-loop amplitudes; partition functions; spacetime supersymmetry and supergravity; compactification & duality; winding & Kaluza-Klein modes; 11-dimensional supergravity; branes in supergravity; D-branes in string theory; T-duality; M-theory; complex geometry and Calabi-Yau manifolds; string field theory; other advanced topics if time permits. PHY 610/611 or equivalent is prerequisite.

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**PHY 623: String Theory II**
This course is intended for graduate students who have familiarity with gauge & quantum field theory. Topics will be selected from: Free bosonic & spinning strings and heterotic & Green-Schwarz superstrings; conformal field theory; tree-level and one-loop amplitudes; partition functions; spacetime supersymmetry and supergravity; compactification & duality; winding & Kaluza-Klein modes; 11-dimensional supergravity; branes in supergravity; D-branes in string theory; T-duality; M-theory; complex geometry and Calabi-Yau manifolds; string field theory; other advanced topics if time permits. PHY 610/611 or equivalent is prerequisite.

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**PHY 621: Advanced Quantum Field Theory**
Presentation of preliminary research results and current research problems by students and faculty. Required every semester of all astronomy graduate students.

**PHY 655: Journal Club in Physical Biology**
Presentation of preliminary research results and current research problems by students and faculty. Required every semester for all graduate students in Physical Biology.

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**PHY 666: Cool Stars**
A weekly seminar concentrating on observational and theoretical studies of cool stars and related objects. Emphasis is on ongoing research and recent results in this area. Speakers include faculty, students, and visitors. Topics anticipated in the near future include results from the Hubble Space Telescope and ROSAT. Students registering for one credit will be expected to present at least one seminar.

**PHY 668: Seminar in Astronomy**
A weekly series of research seminars presented by visiting scientists as well as by the faculty. Required every semester of all astronomy graduate students.

**PHY 669: Nuclear Astrophysics Seminar**
A weekly seminar concentrating on topics in nuclear astrophysics, including dynamics of supernova collapse, structure and evolution of neutron stars, equation of state, the role of neutrinos in nucleosynthesis, etc.

**PHY 670: Seminar in Theoretical Physics**
A weekly seminar on advanced theoretical concepts. The discussion starts with a graduate student presentation and it is conducted under the guidance of a faculty supervisor.

**PHY 672: Seminar in Elementary Particle Physics**
A weekly seminar on advanced theoretical concepts. The discussion starts with a graduate student presentation and it is conducted under the guidance of a faculty supervisor.

**PHY 673: Seminar in Cosmology**
This seminar discusses current topics in cosmology. Each semester consists of a formal talk followed by an informal discussion of active areas of cosmology research.
PHY 674: Seminar in Nuclear Physics  
Fall and Spring, 0-1 credits, S/U grading  
May be repeated 1 times FOR credit.

PHY 676: Seminar in Solid-State Physics  
Fall and Spring, 0-1 credits, S/U grading

PHY 678: Atomic, Molecular and Optical Physics Seminar  
Fall and Spring, 0-1 credits, S/U grading

PHY 680: Special Topics in Theoretical Physics  
Fall and Spring  
1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 681: Special Topics in Statistical Mechanics  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 682: Special Topics in Solid-State Physics  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 683: Special Topics in Astronomy  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 684: Special Topics in Nuclear Physics  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 685: Special Topics in Mathematical Physics  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 686: Special Topics in Elementary Particles  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 687: Topics in Biological Physics  
The "Topics" courses in the 680 sequence do not have specific description, since the subject matter within the broadly defined topic may change from one semester to the next.  
1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 688: Special Topics in Astrophysics  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 690: Special Topics in Atomic and Optical Physics  
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)  
May be repeated for credit.

PHY 698: Colloquium  
Fall and Spring, 0-1 credits, S/U grading  
May be repeated for credit.

PHY 699: Dissertation Research on Campus  
Independent research for Ph.D. degree candidates. Open only to students who have advanced to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.  
Fall, 1-9 credits, S/U grading  
May be repeated for credit.

PHY 700: Dissertation Research off Campus - Domestic  
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.  
Fall, 1-9 credits, S/U grading  
May be repeated for credit.

PHY 701: Dissertation Research off Campus - International  
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.  
All international students must received clearance from an International Advisor.  
Fall, 1-9 credits, S/U grading  
May be repeated for credit.

POL 501: Introduction to Statistics for Public Policy  
This course acquaints student with statistics. It begins with the basics of applied statistical analysis, including probability and hypothesis testing, and builds to simple regression analysis. Requires use of computer packages.  
Prerequisites: Some elementary mathematics/statistics background helpful  
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

POL 502: Intermediate Statistics for Public Policy  
This course utilizes multivariate regression analysis and explores violations of the linear model. Requires use of computer.  
Prerequisite: POL 501 or equivalent  
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 504: Research Design  
This course will cover a variety of research methods that can be used to study attitudes and opinions: Experimental methods (in laboratory and field settings), quasi-experimental designs, surveys and questionnaires, and methods for studying various psychological characteristics of attitudes such as reaction time and lexical decision tasks.  
Offered  
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 509: Public Budgeting and Finance  
This course develops the rationale for public taxation and spending programs. It examines the role of public finance in the economy, and explores the use of program and functional budgets, capital and operating budgets, intergovernmental expenditures, etc. Focuses on state and local governments.  
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
POL 510: Personnel Systems for Public Policy
This course examines the development of civil service and other bureaucratic personnel systems in American government. It focuses on the knowledge that managers must have to utilize human resources appropriately in the constrained public sector environment. Focuses mainly on state and local government.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 530: Topics in Public Affairs
Specially organized seminars are offered on topics of particular importance to students of public affairs. These courses are led by distinguished experts in those policy areas.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 531: Topics in Public Affairs: Planning
This course addresses the planning process as a decision-making tool in the implementation of public policy in housing, land-use, transportation, and environmental management. The course also investigates intergovernmental relations and the impact of citizen participation on policy changes.
Offered in
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 534: Intergovernmental Relations and Policy Delivery
The examination of the formulation, implementation, and impact of intergovernmental policy are the core concepts to be covered in this course. Several policies are examined in-depth, including grant-in-aid programs, General Revenue Sharing, housing and community development, and employment programs. The historical, economic, and political foundations of intergovernmental policy delivery systems are examined.
3 credits, Letter graded (A, A-, B+, etc.)

POL 535: Public Policy Analysis and Evaluation
This course concentrates on the strategies and methods of public policy analysis and evaluation. Students debate the merits of proposed solutions to various policy issues and discover the political constraints on the policy making process. Skills stressed in the course include cost-benefit analysis, program evaluation, and basic microeconomics.
3 credits, Letter graded (A, A-, B+, etc.)

POL 536: Public Management and Organizational Behavior
This course examines how public sector organizations work and how managers can operate in the public sector environment. A range of theoretical perspectives, including sociological, economic, and institutional, will be employed as real public organizations are examined and analyzed. Public agencies will also be compared to their private sector counterparts, and the nature of organizational efficiency will be explored.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 537: Administrative Law for Policy Analysts
This course examines the role of administrative law in the formulation, implementation and evaluation of public policy. The role of legislation such as the Administrative Procedures Act is explored. Actual cases are analyzed, as well as the broader set of precedents that have emerged in federal, state, and local administrative law proceedings.
3 credits, Letter graded (A, A-, B+, etc.)

POL 538: The Politics of Local Economic Development
This course examines the process of local economic development with an emphasis on the interaction of political and economic factors. It explores the extent to which local (as compared to state and federal) officials can influence business location decisions, the specific strategies often utilized, and the way they have changed over time. It also considers the winners and losers from the “economic development game” with a focus on New York and Long Island.
3 credits, Letter graded (A, A-, B+, etc.)

POL 539: The Politics of Local Government
This course examines the process of local government with an emphasis on the interaction of political and economic factors. It explores the extent to which local (as compared to state and federal) officials can influence business location decisions, the specific strategies often utilized, and the way they have changed over time. It also considers the winners and losers from the “economic development game” with a focus on New York and Long Island.
3 credits, Letter graded (A, A-, B+, etc.)

POL 540: Data Applications in Public Policy
This course studies the strategic use of data to support public policy proposal design and implementation. With a focus on U.S. domestic policy, the class will gain proficiency in the application of data to identify policy problems, determine causative factors, develop and implement persuasive policy proposals, and evaluate the policy effectiveness.
Prerequisite: POL 501
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 541: Survey Research for Public Policy
This course studies the techniques of survey research and their application in the development of public policies. Topics include survey design, survey population sampling, use of survey data to frame policy choices and attitudes towards existing policies.
Prerequisite: POL 501
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 542: Regional Planning
This course addresses the planning process as a decision-making tool in the implementation of public policy in housing, land-use, transportation, and environmental management. The course also investigates intergovernmental relations and the impact of citizen participation on policy changes.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

POL 543: Environmental Politics and Policy
Federal environmental policies, such as the National Environmental Policy Act, the Coastal Zone Management Act, and the Federal Pure Waters Management Act are examined in this course. The policies, politics and administrative activities of federal, state, and local levels are considered. Finally, the interaction of the public sector, the private sector, and citizen groups in the implementation of environmental policy is discussed. This course is offered as both CES 553 and POL 543.
3 credits, Letter graded (A, A-, B+, etc.)

POL 544: Human Behavior as Rational Action
Rational behavior means choosing among possible actions those that are most efficient in meeting one's goals. Whether people do so is one of the oldest unresolved disputes in philosophy and the social sciences. We will trace the main positions in this dispute as they have evolved in philosophy, psychology, economics, anthropology and sociology. Even if individuals do act rationally, can we assume that the large scale social patterns that result are necessarily effective? Readings will consider the topic abstractly, but also in the concrete settings of small intimate groups, formal organizations, and primitive and modern economic, social and political systems in both stable and revolutionary situations.
3 credits, Letter graded (A, A-, B+, etc.)

POL 553: Foundations: Comparative, International
Survey and evaluation of the major theoretical approaches, issues, and problems in comparative political analysis. The course examines such areas as political development, empirical democratic theory, or
political socialization, along with a detailed examination of one or more selected non-American political systems.

3 credits, Letter graded (A, A-, B+, etc.)

POL 560: American Democracy: Its Critics and Defenders

This course will examine the central components of American democratic government. Critics and defenders of the over 200 year-old Constitution (Congress, President, Supreme Court) will be discussed, as will arguments surrounding the role of political parties, pressure groups, and the bureaucracy. Most readings will be from contemporary authors and reference sources. This course is offered as both CEI 560 and POL 560.

3 credits, Letter graded (A, A-, B+, etc.)

POL 561: Dynamics of Public Opinion

This course provides an overview of the literature on public opinion. The course will start by considering the micro-foundations of opinions and the psychology of opinion holding. How much do people know about politics and other aspects of the social world? What are the consequences of differences in knowledge and attitude strength? Building from there, we will discuss the structure of attitudes and opinions, specifically, the nature of political ideology. A number of determinants of opinions will be discussed including values and personality. Finally, the course will examine the dynamics of attitudes and opinions and their relationship to government policy and larger social trends. Offered

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 562: Passionate Politics: Mobilization, Interest Groups, and Social Movements

This course discusses political mobilization: the factors that motivate public involvement and the consequences that high levels of public engagement have on elections and the development of public policy. The course begins with several high profile examples of citizen engagement that have had noticeable impact on American politics. This first section also includes a discussion of the various ways in which Americans can be mobilized from involvement in election campaigns to the distribution of political information via social networks. The course then shifts focus to cover the psychology of political mobilization in detail, including the importance of group memberships and identities, emotions, and values. An entire unit of the course is devoted to psychology of group membership in which the mobilizing power of identities and the role of politically motivating emotions are discussed at length. Finally the last section of the course is devoted to specific examples of political mobilization in the U.S. including the environment/green movement, issue groups such as the right-to-life movement, racial politics, and highly polarized partisan politics. Overall, the course is designed to illuminate the psychology of political mobilization and apply these principles to contemporary American politics. Offered

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 563: Thinking and Emotion in Public Opinion

This course reviews recent research in cognitive, social, and political psychology on the interplay between cognition and emotion in explaining social and political behavior. Traditionally, political science has viewed thinking as a conscious cognitive process of intentional deliberation. Emotions and other feelings have been ignored or seen as interfering with rational thought. Moreover, until recently there has been almost no consideration of what psychologists call implicit or unconscious thought processes in understanding public opinion. Psychologists and communications researchers now understand that implicit events and processes (e.g., symbol or music cues in political advertising) can have profound effects on how citizens evaluate political candidates, groups, and issues. We will examine the traditional approach to political cognition and consider how this recent research may alter our understanding of the formation of public opinion. Offered

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 564: Social Influences

In studying public opinion, people often focus on the arguments, information, and overt attempts to persuade. In doing so, we neglect the impact of the social environment in which an individual is situated. Friends, family, and aspects of the broader social environment all deeply influence the attitudes people hold, the tenacity with which they hold them, and the political behaviors they engage in. Rather than focusing on direct persuasion, this course emphasizes the effect social context can have upon people's opinions even without overt argumentation or even information exchange. Students will learn about the influence of 1) other individuals (e.g. socialization, social network influence), 2) social roles (e.g. power, obedience) 3) societal influence (e.g. normative influence, conformity, deviance & rejection), and 4) influence from other environmental sources (e.g. priming). Offered

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 565: Persuasion and Propaganda

Politics at its core is about persuasion. It is about argumentation and debate, and about bringing citizens to a particular way of thinking about an issue, candidacy, or event. Given its centrality in the political process, understanding the dynamics of political persuasion should be a high priority for the discipline. In a more theoretical vein, the concept of "attitude" is among the most indispensable in the social sciences. This course is intended to provide a survey of contemporary theory and research on attitude formation and change. It is not intended to be a general course on the mass media, but rather is concerned only with mass media research as it pertains to individual-level political attitude processes. The course is divided into the following three sections: (1) A consideration of basic concepts (e.g., what is an "attitude"), methodological challenge, and recent developments (e.g., the distinction between implicit and explicit attitudes); (2) An overview of major psychological theories of persuasion that attempt to answer Harold Lasswell's classic question: Who says what, in which channel, to whom, and with what effect? (3) An examination of the major agents of political persuasion - the mass media, political elites, social context, and interpersonal processes. Offered

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 566: The Psychology of Voting

The course examines the key motivations, attitudes, perceptions, and beliefs that guide voters in the process of making up their minds in choosing candidates in elections, including the decision to turn out at all in elections. The list of topics includes party identification (acquisition, genetic basis, development over the life cycle, and historic change); opinions about policy issues and the conceptualization of politics in ideological terms; the impact of valence issues (the economy and national security); perceptions of candidates (personal as well as political qualities); group influence on individual decisions, particularly racial attitudes; and the impact of the campaign (media ads, debates etc.) on vote choices. Offered

Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
POL 567: Culture, Values, and Public Opinion
This course investigates the evolution of values, cleavages, political space, and issues in cross-national perspective (with particular focus on the advanced industrialized countries of the US, Europe, Israel, Japan, and Australia). We begin our study with the analysis of traditional socio-economic cleavages in determining issue positions, and the end of ideology theses propounded by comparative political scientists, such as Daniel Bell and Francois Fukuyama, and elaborated by scholars of the behavioral revolution such as Inglehart, Dalton, and Franklin. We then explore the strengths and weaknesses of paradigm shifts to values, buttressed by public opinion data. Bringing in cultural and neo-institutional explanations of political behavior and change, the course weeds individual level analysis and group behavior theories with rigorous empirical testing. We will look at cross-national and longitudinal data sets to examine the evolving political space stemming from new politics, identity politics, immigration, and new security threats in a global era. Finally, the course will conclude by looking at how different levels of analyses (individual, group, and institutions) contribute to explain contentious politics, boundary-making (us and them), and the politics of difference across cultures.
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POL 568: Master’s Thesis
This course entails a student thesis paper under supervision of a faculty member on a research project related to methods used to study the dynamics of public opinion.
6 credits,

POL 569: Internship in MA in Political Science
The internship for the Political Science M.A. is designed to provide first-hand experience with the major research methods used to study the dynamics of public opinion. The student is expected to work in the organization and prepare a daily journal of activities, as well as paper at the conclusion of the course, apply program knowledge to the internship activities. Permission of Program Director is required.
6 credits,

POL 595: Internship Public Policy
Prerequisite: Permission of GPD
3-6 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

POL 596: Directed Policy Research
Student works under supervision of faculty member on research project related to public policy.
1-6 credits, Letter graded (A, A-, B+, etc.)

POL 597: Master’s Paper in Public Policy
This course is primarily for students already employed in related field. In lieu of internship, student writes a Master’s Paper which goes beyond their normal employment duties to apply theory and methods to a particular policy issue.
6 credits, Letter graded (A, A-, B+, etc.)

POL 598: Thesis Registration
May be repeated for credit.

POL 599: Internship in Public Policy
This course is an applied internship in a public, not-for-profit, or private sector organization that deals with public policy. The student works in the organization and prepares a daily journal of activities, as well as a paper at the conclusion of the course, applying program knowledge to the internship activities.
3-6 credits, S/U grading
May be repeated for credit.

POL 600: Research Project
A two-semester introduction to research for first-year students. The course introduces issues of research design through lectures and presentations of current research by faculty members. Each student designs his or her own research paper under the guidance of a faculty member familiar with his or her area of interest. Final papers are due in the beginning of May.
3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

POL 601: Foundations: Public Policy and Political Economy
A systematic introduction to the principles of political economy. Develops a microeconomic model and approach to public policy analysis. A major part of the course is devoted to student projects that analyze the political economy of a governmental policy.
3 credits, Letter graded (A, A-, B+, etc.)

POL 602: Applied Data Analysis I
The application of statistical and mathematical models to the analysis of political data: regression analysis.
3 credits, Letter graded (A, A-, B+, etc.)

POL 604: Applied Data Analysis III
The application of statistical methods to the analysis of political data. The emphasis is on diagnosing and dealing with violations of assumptions of statistical models. Topics covered include advanced regression, models for discrete dependent variables, systems of equations, and selection bias.
3 credits, Letter graded (A, A-, B+, etc.)

POL 605: Foundations: American Politics
A review of the basic political science literature on American politics, with emphasis on American political institutions.
3 credits, Letter graded (A, A-, B+, etc.)

POL 606: Time Series Analysis
This seminar will consider statistical models for political processes observed over time. The major topics will include cointegration, time varying parameter models and duration models.
3 credits, Letter graded (A, A-, B+, etc.)

POL 607: Social Survey in Contemporary Society
This course on political socialization focuses on continuity and change in political attitudes and behavior across the life span. Topics include the stability of political attitudes—contrasting the greater durability of political partisanship and basic values with the relative instability of issue positions; the social psychology of attitude change, which lends some insight into the conditions under which attitudes are most likely to change; the importance of political period or era as a determinant of political attitudes and behavior; and the existence and coherence of distinct political generations. Some attention is also given to the political changes that accompany old age, including changes in attitude and behavior linked to growing dependency on the Social Security and Medicare systems.
3 credits, Letter graded (A, A-, B+, etc.)

POL 608: Foundations: Political Psychology, Behavior
A review and analysis of the political behavior literature, including such topics as attitude formation and change, belief systems, political socialization, demographic and small group influences on political beliefs and conduct, political leadership, electoral behavior, elite vs.
mass politics, decision making, personality and politics, political conformity, and protest.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 609: Advanced Research Design**

A practical application of topics in the philosophy of science to research design. Students prepare their dissertation proposal as a part of this course.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 610: Foundations II: Experimental Design and Methods**

An overview of experimental research with an emphasis on experimental design, data analysis, and interpretation. Students develop the ability to critically evaluate experimental research. Students also participate in the development, implementation, and analysis of a laboratory experiment.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 611: Game Theory for Political Science**

Introduction to formal models of strategic behavior in static, dynamic, and repeated games. Technical emphasis is formulation and solution of games of complete and incomplete information; a variety of equilibrium concepts will be introduced. Substantive applications include spatial models of candidate behavior in elections; agenda control and bargaining in legislatures; lobbying by interest groups; common pool resource problems; and cooperation between rivals.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 614: American Judiciary**

A seminar on judicial process and behavior. Emphasis is placed on the Supreme Court, but trial courts and other appellate courts are examined as well. Topics include constitutional interpretation and both legal and extra-legal models of decision making. Students should possess basic methodological skills.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 615: Legislative Process**

A seminar on the legislative process, focusing on current research on the United States Congress.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 616: Political Parties and Groups**

A seminar on parties, campaigns, and elections in the United States. Topics covered include party organization and leadership, nomination and general election campaigns, and the role of parties in government.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 617: Electoral Behavior**

Models of voting choices; key attitudes such as party identification, issue orientations, and ideology; the impact of group affiliations, economic conditions; campaign strategies of candidates; congressional vs. presidential elections; historical change, e.g., party realignments.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 618: American Political Ideology**

This course examines American political ideology as it is reflected in public opinion, political debate, and public policy. The goal is to understand the underlying bases of conflict and consensus in American politics and the ways in which they influence and constrain debate over public policy. The course traces the development of political conflict in the United States and examines the basis of contemporary political debate.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 620: Government Regulation of Business**

An examination of the scope of government regulation of business in the United States today—regulation at both the federal and state levels and by both economic and social agencies. The course compares market vs. regulatory policies as well as possible explanations for why some regulatory agencies change over time. Finally, the course considers proposed reforms, such as clearer legislative standards, curbs on "revolving door" practices, greater citizen participation in agency proceedings, and deregulation.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 621: Theories of Policy Making**

An introduction to theories of policy making, especially policy formulation, stressing reading and thinking about classics and acquiring skills necessary for theorizing, including mathematical modeling and formal theory. Laboratories focus on improving special skills (e.g., optimization) and theorizing about particular policy areas (e.g., pork barrel politics).

3 credits, Letter graded (A, A-, B+, etc.)

**POL 622: Bureaucracy and the Policy Process**

An examination of bureaucracy as part of the policy-making process. This course reviews theoretical explanations for the bureaucracy as a political institution and implications of its rapid growth since the New Deal. It also looks inside bureaucratic organizations, examining factors that influence the exercise of discretion and policy implementation.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 629: Experimental Game Theory**

Surveys experimental tests of formal models derived from political economy and game theory, and applies behavioral and social-psychological theories to explain deviations from equilibrium behavior. The methodologies of psychological and economic experiments are contrasted and explored. Substantive applications include social trust, bargaining power, agenda control, committee decision making, common pool resource problems, and political persuasion.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 630: Behavioral Decision Theory**

Emphasizes psychological theories of judgment and choice and prediction of the errors that individual decision makers are likely to make. These ideas are applied to a variety of political contexts.

3 credits, Letter graded (A, A-, B+, etc.)

**POL 664: Advanced Institutions**

**POL 670: Advanced Topics: Political Economy I**

An intensive examination of major substantive and methodological concerns involved in the study of political economy.
POL 671: Advanced Topics: Political Economy II
Reading and research in the area of political economy.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 673: Advanced Topics: American Politics I
A seminar in American institutions and processes, focusing on current research in such areas as Congress, the Supreme Court, the presidency, political parties, or bureaucracy.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 674: Advanced Topics: American Politics II
A continuation of POL 673.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 675: Advanced Topics: Comparative Politics I
Readings and research papers on topics in comparative politics. Particular attention is given to concepts and methods identified with the field.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 676: Advanced Topics: Methods I
A course reviewing the literature and methodology of specific areas of political science research. The course relates directly to research applications and provide students with an opportunity to apply advanced research tools to selected substantive problems.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 678: Political Decision Making
Review of the literature and methods related to a topic or problem in contemporary political science, voting behavior, issue formation, interest groups, political economy, or personality.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 679: Advanced Topics: Political Psychology/Behavior I
Reading and research in the area of political psychology and behavior.
3 credits, Letter graded (A, A-, B+, etc.)

POL 680: Directed Study
Individual studies under the guidance of a faculty member. Subject matter varies according to the needs of the student.
1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

POL 681: Directed Study
Individual studies under the guidance of a faculty member. Subject matter varies according to the needs of the student.
1-9 credits, S/U grading
May be repeated for credit.

POL 690: Research Colloquium
Students participate in weekly departmental colloquia where they serve as discussants of research reports presented by individual faculty members or outside investigators reporting on current research.
3 credits, Letter graded (A, A-, B+, etc.)

POL 691: Research Practicum I
A course actively involving students in an ongoing research project under the direction of a principal investigator. Students participate in all stages of the research project and are required to prepare a research report on one aspect of the project.
3 credits, S/U grading

POL 692: Research Practicum II
A continuation of POL 691. Students actively participate in either a second research project, where they will again prepare a research report, or continue their participation in the same project, where they are then assigned a subset of data for analysis or carry out a specific research aim of the project.
3 credits, S/U grading
May be repeated for credit.

POL 693: Practicum in Teaching

POL 699: Dissertation Research on Campus
Dissertation research under direction of advisor.
Prerequisite: Advancement to candidacy (G5); permission of graduate program director.
Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

POL 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

POL 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

POR 500: Reading Portuguese
Systematic instruction in the fundamentals of reading comprehension and in specialized subject-oriented vocabulary.
Prerequisite: Permission of instructor
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

POR 511: Portuguese for Spanish Speaker
A one semester accelerated course in Brazilian Portuguese for students with a native of near-native command of Spanish. This course uses Spanish as a base for study of Portuguese grammar, vocabulary and pronunciation. By the end of the semester students will be prepared to read advanced materials and will have acquired a basic proficiency in speaking, writing and comprehension of standard Brazilian Portuguese. A grade of B- or above will satisfy the graduate language proficiency...
requirement in Portuguese for the MA or PhD.
Department consent is required for enrollment.
3 credits, Letter graded (A, A-, B+, etc.)

**POR 575: Luso-Brazilian Readings**
Major literary works from 19th- and 20th-century Portugal and Brazil, especially narratives.
Prerequisite: Reading proficiency in Portuguese and permission of instructor
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**PSY**

**Psychology**

**PSY 501: Analysis of Variance and Experimental Design**
The design and analysis of factorial experiments having a single dependent variable. Topics include between- and within-subjects designs, mixed-factor designs, comparisons. Emphasis on applications in psychological research. Required of all Ph.D. students in psychology. Prerequisite: Undergraduate statistics, Co-requisite: PSY 503
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**PSY 502: Correlation and Regression**
Correlation, regression, multiple correlation, partial correlation, and introductions to some of the following topics: factor analysis, mediational analysis, structural equation modeling, relation of regression to analysis of variance, analysis of covariance, discriminant function analysis, and multivariate analysis of variance. Required of all Ph.D. students in psychology. Spring
3 credits, Letter graded (A, A-, B+, etc.)

**PSY 504: First-Year Lectures**
Presentation and discussion of current research progress and interests. Required of all first-year Ph.D. students. Fall and Spring S/U grading

**PSY 505: Structural Equation Modeling and Advanced Multivariate Methods**
Thorough coverage of structural equation modeling and brief coverage of other specialized techniques used in data analysis in psychology, such as multi-level modeling and cluster analysis (topics for brief coverage vary from year to year). The course emphasizes hands-on work with real data sets, using standard statistical software packages.

**PSY 506: Psychometric Methods**
This course surveys traditional and evolving views on item design, reliability, and validity, reviews statistical methods related to test construction, and applies this material to the design and evaluation of observational, rating, and self-report methods in domains of interest to psychologists. The course also examines the impact of test characteristics on data analysis and the role of test design in theory construction.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**PSY 508: Introduction to Computer Applications in Statistics**
Computer protocol and introduction to statistical packages and necessary utility programs. Fall and Spring
0-1 credits, S/U grading

**PSY 510: History of Psychology**
Intensive reading in the history of psychology from original sources. Emphasis is on class discussion and relation to modern problems.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**PSY 511: Learning**
A consideration of the basic principles of learning. Analysis of the leading theories of learning as well as areas of controversy and dispute.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**PSY 513: Theories of Attention**
This course covers some of the major theoretical perspectives that have shaped the attention literature, starting with historical distinctions of early versus late selection and ending with more contemporary mathematical, neurophysiological, and neuorcomputational theories. Specific questions will include: “What is attention?” (is it a unitary thing or a grab-bag of assorted processes), “How does it work,” and “What paradigms have researchers used to study attention?” (dichotic listening, priming, search, etc.).
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**PSY 518: Memory**
Review of theory and phenomena related to human memory. Topics include representation of schemas and categories, encoding, forgetting, implicit learning, and memory for procedures. Several recent models of long-term memory representation are discussed and compared.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**PSY 520: Psycholinguistics**
The psychology of language, including the mental lexicon, sentence processing, pragmatics, discourse, production and comprehension of utterances in conversation, language and thought, first-language acquisition, and computational approaches.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**PSY 524: Cognitive Development**
This course presents the developmental perspective as applied to human cognition. Topics include (1) characteristics and constraints on cognitive abilities in infancy, childhood, and adolescence, (2) mechanisms of developmental change, and (3) links between cognitive development and selected applied topics.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**PSY 533: Principles Applicable to Clinical Psychology: Historical/ Systemic Perspectives**
A critical review of how principles of general psychology apply to clinical psychology. The course material will be discussed within the context of the history of ideas and major systems of thought as they relate to conceptualization, assessment, and intervention.
Prerequisite: Psychology doctoral student.
PSY 544: Emotion & Cognition
This course focuses on fundamental questions regarding the interaction between emotion and cognition, and how such this interaction can be measured. Key topics will include: differentiating emotions from other affective states, understanding the roles of discrete emotions, the role of the consciousness in emotional experience, and whether emotions can be controlled; additionally, the course will address emotion-cognition interactions in the domains of memory, attention, perception and reasoning/decision-making. We will also address developmental changes and cross-cultural differences in emotion and cognition. The goal of the course is to be able to develop a translational research proposal rooted in basic research on emotion and cognition.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 545: Psychopathology: Conceptual models and internalizing disorders
Theory and research on abnormal behavior in children, adolescents, and adults. A lifespan development approach is taken, with a focus on classification, conceptualizations and models of psychological disorders, and the phenomenology, epidemiology, course, etiology, pathogenesis, psychopathology, and pathophysiology of internalizing disorders such as mood and anxiety disorders.
Fall, 2 credits, Letter graded (A, A-, B+, etc.)

PSY 546: Measurement and Scaling
An historical introduction to the measurement of psychological variables and survey of contemporary scaling methods with an emphasis on psychophysical scaling and experimental applications.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 549: Prejudice and Discrimination
This course will provide an overview of theoretical perspectives, research methods, empirical findings, and practical applications of psychological research on prejudice, stigma, and intergroup relations. Critical thinking about theorizing and research in this area will be emphasized during class discussions and through a course project. Students are admitted with permission by instructor.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 552: Social and Personality Development
A survey of milestones and processes of social development in infancy and childhood. Relevance to understanding adult personality and social relationships is emphasized.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 555: Social Psychology
An introduction to social psychology, a field of study examining how people feel about, think about, and influence others. Topics include attitudes, motivation, social judgements, and interpersonal behaviors. Coursework focuses on identifying basic principles that transcend particular content domains.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 556: Stress and Coping
In this course, we examine current issues, challenges, and questions in two related areas of psychology: stress and coping. We will cover classical approaches in addition to recent empirical research and theoretical development. Students are not expected to have prior familiarity with the topic areas. We will begin by reviewing definitions and major theoretical orientations. In subsequent weeks we will concentrate on issues relevant to stress, coping, and related topics such as social support, across a broad range of circumstances, rather than focusing on specific stressful contexts such as chronic illness or bereavement. For example, we will examine ways to define successful and maladaptive coping. We will also consider whether social support is better conceptualized as a commodity or as an individual perception. We will compare contradictory evidence about the benefits of perceived control, and we will
discuss problems of generalizing research findings to different ethnic, cultural, and other groups.

Offered:
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 558: Theories of Social Psychology: Health Applications
This course provides an overview of the ways in which social psychological theories and perspectives can be used to understand thoughts and behavior relevant to health and illness. It covers social influence, social comparison, pluralistic ignorance, social support, cognitive dissonance, message framing, and fear communication. The course also covers links between personality characteristics and health and how broader social and cultural environment affects health and illness.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 559: Psychology of Women's Health
This course covers a variety of psychologically-important topics in women's health based on current research findings. We address psychological contributors to and consequences of women's health and illness, focusing on diseases that affect women differently or disproportionately than men (including coronary heart disease, cancer, AIDS, and autoimmune diseases), women's reproductive health (including menstruation, contraception, pregnancy, infertility, and menopause), health behaviors (including substance abuse, exercise, and eating), and other topics such as violence against women, women's mental health, and women as health care providers and health researchers.

Co-scheduled with WST 559.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 560: Cognitive Neuroscience
Cognitive neuroscience is an interdisciplinary field, at the interface of systems neuroscience, computational neuroscience, and cognitive psychology. In this course, we examine the current theories and empirical research findings on the neural basis of cognition. We will cover anatomical, neurophysiological and pharmacological correlates of behavioral functions such as perception, attention, motivation, learning, memory, cognitive control, and communication. We will evaluate the strengths and weaknesses of various approaches used to study the neural substrates of higher-order cognition.

3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 1 times FOR credit.

PSY 561: Cognitive and Behavioral Neuroscience I
This course introduces students to neural elements responsible for processing information supporting sensation, perception, cognition and movement. Starting with the philosophy of the mind and the history of neuroscience, the course proceeds with an introduction of cells, neural signaling, transmitters and receptors. How these elemental units are integrated to support emergent properties, such as object recognition, is illustrated. Conversely, examples of complex behavioral impairments resulting from dysfunction in elemental units illustrated. The course proceed to cover neural metabolism, and its relation to disorders of memory and motor dysfunction. Last, stress and its role in neuropsychological disorders is discussed.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 562: Cognitive and Behavioral Neuroscience II
Cognitive and Behavioral Neuroscience illustrates how cellular circuits support function. Classic experiments demonstrating function fro the use of electrophysiological data, lesions and transmitter manipulations are discussed. Students interested in understanding how individual neurons and neural circuits and integrated regional systems directly support specific behaviors will find this course of interest. A textbook is used for the readings.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 563: Neuropsychological Assessment
Classroom discussions of issues in neuropsychological assessment and design of assessment batteries are combined with practical experience in the assessment of clinical populations. Each student is assigned to a supervisor to learn assessment techniques for research and/or clinical practice.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 564: Neuropsychopharmacology
This course covers the mechanisms of transmitters and related drug action in the nervous system. In addition to exploring transmitter/receptor relationships, the course covers the sequence of events initiated by this action. Through understanding of these processes, the course then links drug action to nervous system outcomes such as movement, cognition, pain and mood.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 565: Functional Neuroanatomy
Just as a function can be derived from the structure of everyday objects, so too can function be derived from the study of brain architecture and neural connectivity. Accordingly, this course takes a structural approach to the understanding of the nervous system and behavior. To complement a disciplinary focus on cognition, affect and emotions, this course will emphasize the connectivity of higher order brain regions. Students will first be introduced to the global organization of the nervous system and a general framework for information processing. Then sensory and motor pathways will be discussed in more detail. The course will end with topics such as the neurocircuitry of addiction, emotion, and memory.

Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 581: Cognitive and Behavioral Neuroscience Colloquium I
Colloquium presentations on current research problems by advanced students, staff, and visiting scientists. This sequence is required of all students in the Biopsychology Program.

Fall, 0-3 credits, S/U grading
May be repeated for credit.

PSY 582: Cognitive and Behavioral Neuroscience Colloquium II
Colloquium presentations on current research problems by advanced students, staff, and visiting scientists. This sequence is required of all students in the Biopsychology program.

Spring, 0-3 credits, S/U grading
May be repeated for credit.

PSY 583: Cognitive Science Colloquium I
Seminars on current research problems directed by students, staff, and invited scientists. Required of all Experimental/Cognitive students.

Fall, 0-3 credits, S/U grading
May be repeated for credit.

PSY 584: Cognitive Science Colloquium II
Seminars on current research problems directed by students, staff, and invited scientists. Required of all Experimental/Cognitive students.

Spring, 0-3 credits, S/U grading
May be repeated for credit.
PSY 585: Social and Health Psychology Colloquium I
Colloquium presentations on current research problems by advanced students, staff and visiting scientists. This sequence is required of all students in the Social and Health Psychology Program. Offered
Fall, 0-3 credits, S/U grading
May be repeated for credit.

PSY 586: Social and Health Psychology Colloquium II
Colloquium presentation on current research problems by advanced students, staff, and visiting scientists. This sequence is required of all students in the Social and Health Psychology Program.
Offered
Spring, 0-3 credits, S/U grading
May be repeated for credit.

PSY 594: Psychology of Gender
This class examines how gender affects and is affected by behavior, thoughts, and emotions. We investigate gender differences and similarities across the lifespan and consider various perspectives on the study of gender, including psychobiology, social cognitive theory, social role theory, and cross-cultural research.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 595: Human Development
An examination of the biological and psychological development of children and adolescents and its relationship to teaching and curriculum development for diverse learners. The course will focus on special education programs, childhood and adolescent psychiatric disorders, and societal issues.
Offered:
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

PSY 596: Psychopathology: Externalizing & Psychotic Disorders
Theory and research of abnormal behavior in children, adolescents, and adults. A lifespan development approach is taken, with a focus on the phenomenology, epidemiology, course, etiology, pathogenesis, psychopathology, and pathophysiology of externalizing disorders (e.g., conduct, disorder, personality disorders, substance use disorders) and psychotic disorders.
Prerequisite: Must be Psychology Graduate Student
Spring, 2 credits, Letter graded (A, A-, B+, etc.)

Self-report and projective measures of personality and psychopathology; targeted assessments and measures; intellectual and cognitive assessment; assessment of children and parents; ethics and cultural diversity.
Spring, 2 credits, Letter graded (A, A-, B+, etc.)

PSY 603: Ethics and Professional Issues
Ethics and professional issues. Required of all first-year clinical students. Prerequisite: Clinical psychology doctoral student
Spring, 2 credits, S/U grading

PSY 604: Intervention Practicum
Exposure of the application of clinical intervention procedures.
Prerequisite: PSY 537 or PSY 538, Must be Psychology Graduate Student
Fall, 2 credits, S/U grading

PSY 605: Advanced Clinical Practicum
Exposure to the application of advanced intervention procedures.
Prerequisite: PSY 604 and Clinical psychology doctoral student
Fall and Spring, 2 credits, S/U grading

PSY 606: Supervised Practice
Clinical Psychology faculty meet with students as a group with follow-up individual recitation sessions to cover topics such as assessment and treatment conceptualization of specific cases that students are seeing in Psychological Center. In addition, methods of providing documentation of change in individual cases are discussed as well as means of obtaining corroborating evidence to support self-reported information. Students present case material to the group and receive peer and faculty feedback about case conceptualization and treatment.
Prerequisite: Clinical psychology doctoral student
Fall, 3 credits, S/U grading
May be repeated for credit.

PSY 606: Clinical Psychology Internship
Qualified clinical students carry out supervised clinical responsibilities in settings approved by the faculty.
Prerequisite: Clinical psychology doctoral student
Fall and Spring, 1 credit, S/U grading
May be repeated 1 times FOR credit.

PSY 608: Clinical Psychology Internship
Qualified clinical students carry out supervised clinical responsibilities in settings approved by the faculty.
Prerequisite: Clinical psychology doctoral student
Fall and Spring, 1 credit, S/U grading
May be repeated 1 times FOR credit.

PSY 609: Dissertation Research on Campus
May be repeated for credit.

PSY 610: Seminars in Selected Topics
Topics selected on the basis of the needs of the graduate program and research interests of the staff.
Prerequisite: Permission of instructor
Fall, 0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PSY 620: Seminars in Selected Topics
Topics selected on the basis of the needs of the graduate program and research interests of the staff.
Prerequisite: Permission of instructor
Spring, 0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PSY 621: Seminar in Teaching Methods
Theory and pragmatics of good college teaching. Topics include lecturing, use of discussion, types of evaluation of students and teachers, factors affecting undergraduate learning, ethics, student-faculty relations, course administration, and audio-visual devices.
Prerequisites: Matriculated psychology graduate student; permission of instructor
Fall or Spring, 0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PSY 622: Seminar in Teaching Methods
Theory and pragmatics of good college teaching. Topics include lecturing, use of discussion, types of evaluation of students and teachers, factors affecting undergraduate learning, ethics, student-faculty relations, course administration, and audio-visual devices.
Prerequisites: Matriculated psychology graduate student; permission of instructor
Fall or Spring, 0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PSY 628: Seminar in Teaching Methods
Theory and pragmatics of good college teaching. Topics include lecturing, use of discussion, types of evaluation of students and teachers, factors affecting undergraduate learning, ethics, student-faculty relations, course administration, and audio-visual devices.
Prerequisites: Matriculated psychology graduate student; permission of instructor
Fall or Spring, 0-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

PSY 699: Dissertation Research on Campus
May be repeated for credit.
Dissertation research under direction of advisor.

Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

**PSY 700: Dissertation Research off Campus - Domestic**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

**PSY 701: Dissertation Research off Campus - International**

Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must received clearance from an International Advisor.

Fall, 1-9 credits, S/U grading
May be repeated for credit.

**PSY 800: Full Time Summer Research**

0 credits, S/ grading
S/U grading
May be repeated for credit.

**PSY 820: Summer Teaching-CED**

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**RUS**

**Russian Language and Literature**

**RUS 500: Reading Russian**

Intensive introductory Russian for graduate students in other programs. Practice in reading and translation; Russian prose; use of dictionaries and reference materials; as much attention as possible to special problems of various disciplines.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 504: Introduction to Cultural History**

Russian cultural history focusing on recurrent values and ideas. Topics explored include issues of cultural identity, responses to the West and Asia (in such movements as Slavophilism, pan-Slavism, and Eurasian theory), gender, and ethnicity.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 508: Russian Authors**

A seminar in selected Russian authors, focusing on one or two of the following: Pushkin, Gogol, Dostoevsky, Turgenev, Tolstoy. May be repeated.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 509: Dostoevsky and the West**

Dostoevsky’s major texts viewed in cross-cultural perspective with particular emphasis on literary and philosophical traditions common to Russia and Europe.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 511: Studies in Literary Genres**

A course in Russian syntax and advanced grammar from various theoretical frameworks.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 513: 19th-Century Russian Literature**

A seminar on 19th-century Russian literature. The course deals with prose, poetry, and drama in the context of literary movements and traditions.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 514: 20th-Century Russian Literature**

A seminar in turn-of-the-century, Soviet post revolutionary, and emigre Russian literature. The course deals with prose, poetry, and drama in the context of literary movements and traditions.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 520: Russian Syntax**

A course in Russian syntax and advanced grammar from various theoretical frameworks.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 590: Language Acquisition I**

Elementary Russian I intended for graduate students from other programs.

1-4 credits, Letter graded (A, A-, B+, etc.)

**RUS 591: Language Acquisition II**

Elementary Russian II intended for graduate students from other programs.

1-4 credits, Letter graded (A, A-, B+, etc.)

**RUS 592: Language Acquisition III**

Intermediate and Advanced Russian intended for graduate students from other programs. The requirements for the course will include a graduate-level component to be determined by the instructor. May be repeated for credit.

1-6 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

**RUS 595: Practicum in Teaching**

Fall and Spring, 1-3 credits, S/U grading
May be repeated for credit.

**RUS 599: Thesis Research**

RUS 599 Thesis Research. One to six credits.
S/U grading. May be repeated for credit.

1-6 credits,
May be repeated 6 times FOR credit.

**RUS 601: Studies in Cultural Genres**

Exploations in different forms of Russian cultural representation offered by written texts, the arts, architecture, and popular media such as puppet theatres, the bard tradition, and cinema. Interaction among aesthetic genres will be explored with particular emphasis on the roles of literature in the other arts. Fall 3 credits, Letter graded (A, A-, B+, etc.)

**RUS 602: Literature and Theatre**

The relationship of literature and theatre with specific examples taken from Russian cultural history. The stage adaptations of Stanislavsky, Meyerhold, and contemporary directors will be studied as forms of aesthetic conjunction and as responses to the social-ideological context.

Spring
3 credits, Letter graded (A, A-, B+, etc.)

**RUS 603: Seminar in Cultural Theory**

Studies in cultural theory with particular reference to the works of formalism, structuralism, the Tartu school of semiotics, and Bakhtinian theory. Fall
3 credits, Letter graded (A, A-, B+, etc.)
SCI

Science Teacher Preparation

SCI 510: Introduction to Science Teaching
This course introduces the pre-service teacher to the requisite skills, culture, and demands of the profession. The pre-service teacher learns to design curriculum, write lesson plans, orchestrate classroom activity, probe student thinking and assess student progress within the context of a pedagogy that promotes an inquiry approach to learning. This course requires one-half day per week of clinical practice with follow-up seminar in the campus Discover Lab, out-of-class meetings with classmates, and periodic visits to local public schools.
3 credits, Letter graded (A, A-, B+, etc.)

SCI 520: Science Instructional Strategies and Techniques
In this course, the pre-service teacher builds on the pedagogical foundations set in SCI 510 and prepares for student teaching in the following semester. Greater leadership in Discover Lab programs and teaching assignments in local public schools is expected. Greater emphasis is placed on the integration of theory and practice, extension of scientific inquiry for diverse learners and assessment of student progress within the context of teaching. This course demands an inquiry into the nature of science and the nature of knowing. It requires one-half day per week of clinical practice with follow-up seminars, out-of-class meetings with classmates, and micro-teaching assignments in selected public schools. Prerequisite: SCI 510; entrance interview with the Science Education Committee; 3.0 cumulative graduate GPA; matriculation in degree (MAT, MS, Ph.D or MA/LS) program; permission Science Education program 631.632.7075 Remark:
3 credits, Letter graded (A, A-, B+, etc.)

SCI 530: Applied Research in Educational Settings
This course offers the pre-service teacher the opportunity to conduct a place of original research that will inform future practice. With guidance from the PEP faculty and/or affiliated departmental faculty, pre-service teachers will formulate a question, design a protocol, collect data and analyze within research traditions appropriate to the question.
3 credits, Letter graded (A, A-, B+, etc.)

SCI 540: Clinical Experience and Action Research
Within this course, students will engage in weekly clinical practice experiences in campus teaching labs, outreach programs or regional schools. In addition, students will design, implement, and present an action research project. This course is intended to be taken as a two-semester co-requisite of SCI 510 and SCI 520.
3 credits, Letter graded (A, A-, B+, etc.)

SCI 549: Science Field Experience I
This course requires teacher candidates to complete 50 hours of supervised field experience at various sites and with diverse learners, including: high needs schools, students with disabilities or special needs, English language learners, and diverse age groups. The field experience will involve: observing instruction by sponsoring teacher and other teachers using a structured observation protocol, assisting sponsoring teacher with class activities, tutoring students, planning curriculum and negotiating curriculum with students, assessing student knowledge, and preparing written assignments for the methods courses on the basis of the above activities.
1 credit, S/U grading

SCI 550: Science Field Experience II
This course requires teacher candidates to complete 50 hours of supervised field experience at various sites and with diverse learners, including: high needs schools, students with disabilities or special needs, English language learners, and diverse age groups. The field experience will involve: observing instruction by sponsoring teacher and other teachers using a structured observation protocol, assisting sponsoring teacher with class activities, tutoring students, planning curriculum and negotiating curriculum with students, assessing student knowledge, and preparing written assignments for the methods courses on the basis of the above activities. Prerequisite: Matriculation in Science Education Program, SCI 549; SCI 510
1 credit, S/U grading

SCI 551: Supervised Student Teaching High School Grades 10-12: Science
Prospective science teachers will participate in a supervised student teaching experience in selected Long Island secondary schools, grades 10-12. The student teacher reports to the school to which he/she is assigned each full school day. Frequent consultation with the supervising teacher helps the student interpret and evaluate the teaching experience. Applications must be filed in the semester preceding student teaching.
3 credits, S/U grading

SCI 552: Supervised Student Teaching Middle School Grades 7-9: Science
Prospective science teachers will participate in a supervised student teaching experience in selected Long Island secondary schools, grades 7-9. The student teacher reports to the school to which he/she is assigned each full school day. Frequent consultation with the supervising teacher helps the student interpret and evaluate the teaching experience. Applications must be filed in the semester preceding student teaching. Prerequisite: SCI 510, 520, 541, 542 CEE 505 and CEE 565; matriculation in degree (MAT, MS, Ph.D or MA/LS) program, 3.0 cumulative GPA; submission of portfolio and interview with and permission of Science Education Committee 631.632.7075
3 credits, S/U grading

SCI 554: Supervised Teaching of Science Seminar
This seminar, which will focus on problems encountered by student teachers and public school teachers at the secondary level, will include study and analysis of science teaching issues, including classroom management, school culture, and social issues affecting the schools and student performance. Prerequisite: SCI 510, 520, 541, 542 CEE 505 and CEE 565; submission of portfolio and interview with and permission of Science Education Committee 631.632.7059; matriculation in degree (MAT, MS, Ph.D or MA/LS) program; completion of any content area deficiencies
3 credits, Letter graded (A, A-, B+, etc.)

SLV

Slavic Languages and Literature

SLV 501: Special Topics in Slavic Literature
Special topics in Slavic literature investigating an author, period, genre, or theoretical issue. Designed to provide a forum for advanced research in critical methodology.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

SLV 502: Problems of Literary Translation
The course addresses theoretical and practical problems of translation from the Slavic languages. Published translations of literary texts as well as translations prepared by participants of the seminar will be compared and analyzed.
**SOC 502: Multivariate Regression Techniques**

This course provides an in-depth overview of regression analysis, primarily focused on OLS modeling. Topics include: inferences in regression analysis, dummy variables, interaction terms, and diagnostics and remedial measures. The course concludes with an introduction to other regression techniques such as logistic and probability modeling.

3 credits, Letter graded (A, A-, B+, etc.)

**SOC 504: Logic and Practice of Sociology**

This course provides an introduction to the logic of empirical research in sociology. It takes a broad overview of both quantitative and qualitative methods: inductive and deductive reasoning; and the process of theory construction and testing, with an emphasis on research design and the logic of causal analysis. A knowledge of advanced statistics is not assumed. Topics covered include survey research, participant observation and field methods, the comparative method, experimental and quasi-experimental design, content analysis, and the logic of multivariate analysis.

3 credits, Letter graded (A, A-, B+, etc.)

**SOC 505: Classical Sociological Theory**

A review of the intellectual development of the discipline, its epistemological foundations, and classical theoretical statements.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**SOC 506: Contemporary Sociological Theory**

A review of the current major theoretical orientations and newly developing theoretical perspectives.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**SOC 509: The Practice of Ethnography**

This course has four major objectives: (1) to become familiar with contemporary ethnographies; (2) to acquaint students with the methodological literature on qualitative sociology; (3) to consider theoretical and epistemological issues in qualitative research; and (4) to put some data production techniques (observant participation, in-depth interviews, and life stories) into practice.

This course is co-scheduled with WST 610.

May be repeated for credit.

**SOC 510: Historical Methods in Sociology**

Major approaches, philosophical problems of, and methods used in historical sociology. Topics covered include causal analysis, macrosociological comparisons, case-oriented versus variable-oriented approaches, ideal types, comparative typologies, narrative, and issues of significance and objectivity. Special attention is given to the problem of concept formation.

3 credits, Letter graded (A, A-, B+, etc.)

**SOC 512: Global Sociology, Identities and Organizations in Global Perspective**

This course examines how increasing global integration impacts human societies. It reviews the broad trends that foster globalization in the economic, political, cultural, and social spheres, as well as the consequences global change has had on how individuals and communities identify themselves and how they organize for collective goals. Core issues on the global agenda such as conflict, environment, technological and economic development, demographic change, gender, and human rights will be addressed; research methods for the study of global society will be introduced.

3 credits, Letter graded (A, A-, B+, etc.)

**SOC 514: Advanced Topics in Global Sociology**

This course provides an advanced treatment of major topics and debates in the increasingly globalized social sciences. The course is based on research activities of the faculty and students. Topics may include global inequality; globalization and gender; sociology of human rights; war and revolution; transnational social movements; comparative political economy; globalization and immigration; globalization and work; issues in global culture.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 2 times FOR credit.

**SLV 517: Comparative Slavic Linguistics**

An investigation of the major West, East, and South Slavic languages with particular attention to their historical development. The course includes comparative and contrastive studies in the areas of phonology, morphology, and syntax.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**SLV 578: Directed Independent Studies**

May be repeated for credit.

**SLV 579: Directed Independent Studies II**

Spring

May be repeated for credit.

**SLV 580: Special Topic in Slavic Languages I**

The study of the phonology, morphology, and syntax of a Slavic language other than Russian, e.g., Polish, Czech, Ukrainian, Serbo-Croatian, or Bulgarian. May be repeated if different language studied.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

**SLV 581: Special Topic in Slavic Languages II**

A continuation of the study of a Slavic language other than Russian. May be repeated if different language is studied.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated for credit.

**SOC 516: Social Inequality**

This course provides an advanced treatment of major topics and debates in the increasingly globalized social sciences. The course is based on research activities of the faculty and students. Topics may include social inequality; globalization and gender; sociology of human rights; war and revolution; transnational social movements; comparative political economy; globalization and immigration; globalization and work; issues in global culture.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

May be repeated 2 times FOR credit.

**SOC 510: Historical Methods in Sociology**

Major approaches, philosophical problems of, and methods used in historical sociology. Topics covered include causal analysis, macrosociological comparisons, case-oriented versus variable-oriented approaches, ideal types, comparative typologies, narrative, and issues of significance and objectivity. Special attention is given to the problem of concept formation.

3 credits, Letter graded (A, A-, B+, etc.)
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

SOC 518: Sociology of Gender
This course will familiarize students with the field through a broad survey. Topics include theoretical debates about construction of gender identity, conceptual and empirical issues in the study if gender dynamics and empirical studies of the ways gender is constituted by social institutions such as family, education, workplace, and media.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

SOC 519: Advanced Topics in Gender Studies
This course will continue the discussion of the graduate seminar on Sociology of Gender, by examining theoretical debates or controversies, examining specific gender identities, examining the gender of a specific institution (i.e., labor, law), or the gender dynamics of social interaction (in for example, romantic relationships or sexuality).
Co-scheduled with WST 602.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

SOC 521: Social Psychology
An analysis of the three major domains of social psychology: (1) symbolic interactionism with a focus on the topic of identity; (2) psychological social psychology with a focus on the topics of personal perception and attitudes; and (3) social structure and personality with a focus on the topics of norms, roles, and socialization.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

SOC 523: Sociology of Education
Relationships between education and other institutions. Internal dynamics of the school and the classroom.
3 credits, Letter graded (A, A-, B+, etc.)

SOC 531: Economic Sociology
This course covers the fundamental principles of economic sociology and looks carefully at the main areas of research in the resurgence that began in the 1970's. The course covers classic texts and considers key areas that have animated the field in the recent era. Subjects would include the rise of the large corporation, ownership and control debate (including the overlapping issues of corporate interlocks and finance capital), the issue of markets and transactions costs, the development of the embeddedness perspective, labor markets and the nature and extent of globalization.

SOC 532: Organizations
This course will review classic and current research in the area of organizations. It will cover internal dynamics of organizations, beginning with classic Weberian theory, and continue by reviewing contemporary approaches to human relations theory. It will address key debates about the dynamics of management-worker relations, and it will scrutinize the debate of corporate control. Also it will survey the literature on interorganizational relations and dynamics, such as interlock research to new institutionalism.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

SOC 536: Sociology of Education
The relations between social structure, social change, and the development of major art forms.
3 credits, Letter graded (A, A-, B+, etc.)

SOC 537: Sociology of the Arts
This course will provide students with the skills necessary to write grant proposals for both government and private agencies. The main requirement will be to prepare a proposal suitable for submission to a particular agency that funds the kind of research the student plans to do.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

SOC 566: Funding and Grant Writing in Sociology
This course will provide students with the skills necessary to write grant proposals for both government and private agencies. The main requirement will be to prepare a proposal suitable for submission to a particular agency that funds the kind of research the student plans to do.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

SOC 568: Dissertation Seminar
Under the direction of the seminar leader, students help one another (1) prepare for the Preliminary Specialty Field Exam (which includes putting together a reading list) and (2) work on a dissertation proposal and its defense. The details of selecting a dissertation committee and writing a dissertation are also explored.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

SOC 590: Independent Study
Intensive reading, under supervision of one or more instructors, of material not covered in the formal curriculum.
1-12 credits, S/U grading
May be repeated for credit.

SOC 591: Special Seminars
Topics to be arranged. The seminar is built around actual research activities of students and faculty. The following topics have been covered: Cultural Theory; Sociology of Technology; Micro-sociology; Advanced Topics in Marxist Theory; Sociology of Emotions; Historical Methods; Ethnic Relations; Biosociology; Comparative

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Stratification; Max Weber; Sociology of the Future; Science of Sociology and Everyday Life; The Study of the World's Advanced Societies; Methods of Behavioral Observation; Social Structure; Sociology of the Family; Cognitive Sociology; Sociology of Work; Transnational Social Movements; Economic Sociology; War and Revolution; Sociology of Gender; Sociology of Culture; Development of Capitalism; Film as a Sociological Research Tool; Funding and Grant Writing; The Three Faces of Social Psychology; A Structural Approach to Organizational Behavior; Professionals and Professionalism; Sociology of Modernity; Globalization and Immigration; Research Support in Sociology; Sociology of Sexual Behavior; Global Sociology; Gender and the Law; Poverty and Homelessness.

3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

SOC 595: Special Seminars
Topics to be arranged. The seminar is built around actual research activities of students and faculty. The following topics have been covered: Cultural Theory; Sociology of Technology; Micro-sociology; Advanced Topics in Marxist Theory; Sociology of Emotions; Historical Methods; Ethnic Relations; Biosociology; Comparative Stratification; Max Weber; Sociology of the Future; Science of Sociology and Everyday Life; The Study of the World's Advanced Societies; Methods of Behavioral Observation; Social Structure; Sociology of the Family; Cognitive Sociology; Sociology of Work; Transnational Social Movements; Economic Sociology; War and Revolution; Sociology of Gender; Sociology of Culture; Development of Capitalism; Film as a Sociological Research Tool; Funding and Grant Writing; The Three Faces of Social Psychology; A Structural Approach to Organizational Behavior; Professionals and Professionalism; Sociology of Modernity; Globalization and Immigration; Research Support in Sociology; Sociology of Sexual Behavior; Global Sociology; Gender and the Law; Poverty and Homelessness.

3 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

SOC 598: Research
Execution of a research project under the supervision of one or more faculty members.
1-12 credits, S/U grading
May be repeated for credit.

SOC 603: Advanced Topics in Quantitative Analysis
Mathematical and statistical methods in the analysis of quantitative data.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

SOC 604: Advanced Topics in Qualitative Analysis
The use of personal documents, official records, field observations, and interviews.
3 credits, Letter graded (A, A-, B+, etc.)

SOC 691: Practicum for Teaching and Graduate Assistants
Individualized supervision of initial (first two semesters) teaching assistance. Discussion, examination construction, student consultation, and grading. Register for section of supervising instructor.
3 credits, S/U grading

SOC 692: Practicum in the Teaching of Sociology
The exploration of teaching goals, processes, and outcomes. Practice lectures are videotaped and discussed; classroom visits; planning, outlining, selection of course material; writing of syllabus for Introductory Sociology section to be taught as part of SOC 693 in following semester.
3 credits, Letter graded (A, A-, B+, etc.)

SOC 693: Practicum for Graduate Teaching Assistants
Supervised teaching of a section of Sociology 105 using the outlines, materials, and techniques developed in SOC 692. Includes weekly meetings of all persons registered for SOC 693 and observation of classes by both faculty and fellow graduate students.
3 credits, Letter graded (A, A-, B+, etc.)

SOC 699: Dissertation Research on Campus
Dissertation research under direction of advisor.
Prerequisite: Advancement to candidacy (G5). Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

SOC 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

SOC 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver by second week of classes. The charge will only be removed if other plan is deemed comparable.

All international students must receive clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

SOC 800: SUMMER RESEARCH
May be repeated for credit.

SPN

Hispanic Languages and Literature

SPN 500: Reading Spanish
Through an intensive study of language structures and idiomatic usage, with extensive practice in written translation of literary and scholarly texts, candidates for advanced degrees are able to obtain the proficiency level of the graduate Spanish reading requirement. Several programs grant exemption from further examination for successful completion of this course (not for M.A. or Ph.D. candidates in Spanish).
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

SPN 501: Historical Linguistics
General processes of language change, as exemplified by the development of the Romance languages, with particular reference to Spanish.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

SPN 502: Methods in Linguistics Research

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Methods for elicitation and collection of linguistic data and their analysis. Relation between theory and research design, and between qualitative and quantitative analysis. Introduction to commonly used tests of statistical significance, and to reasoning and argumentation from limited data.

Prerequisite: Permission of instructor
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 503: Spanish Linguistics**

Major issues related to the general structure of the Spanish language (phonetics, phonology, morphosyntax, semantics, etc.)

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 504: Contrastive Analysis: Spanish and English**

Topics vary, and may include linguistic interference and its basis and manifestations, in-depth discussion of specific syntactic/semantic areas with reference to possible Spanish/English interference, major phonological differences between Spanish and English and consequent learning difficulties, and nonlinguistic factors that may affect learning in different groups in different situations.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 505: Hispanic Dialectology and Sociolinguistics**

Major theoretical issues involved in analysis of geographical and social variation and with the principal methods used in its investigation, as applied to varieties of Spanish, Portuguese, Catalan, and Galician.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 506: Bilingualism**

This course aims to provide an introduction to the study on the phenomenon of bilingualism, both at the individual and at the societal level. We will discuss the nature of bilingual competence, theories of the representation/storage of bilingual knowledge, the acquisition/learning of multiple languages. Finally, we will examine social attitudes towards bilingualism and the consequences of language contact, and bilingual education policies and their effects.

3 credits, Letter graded (A, A-, B+, etc.)

**SPN 507: Phonetics and Phonology of Spanish**

This course introduces the phonetics and phonology of Spanish. Through the course, the students will be able to learn about the basic phonological (supra-)segmental units that form the sound system of the Spanish language as well as their acoustic and articulatory properties.

Offered
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**SPN 508: Spanish Morphology**

Morphology is the study of the word and its internal structure. In this course we will study the generalization contained inside words of Spanish. The student will be introduced to the general concepts current in modern morphological theories. Some of the more specific topics will be how new words are created and derived.

Offered in
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**SPN 509: Hispanic Culture**

An introduction to the essential aspects of Peninsular and, or Latin American cultures and civilizations, designed to provide incoming graduate students with sufficient background to undertake the advanced study of Hispanic languages and literature.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 510: Hispanic Culture**

An introduction to the essential aspects of Peninsular and, or Latin American cultures and civilizations, designed to provide incoming graduate students with sufficient background to undertake the advanced study of Hispanic languages and literature.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 511: Spanish as Second Language Acquisition**

The purpose of this course is to provide a framework on how language development in bilingual individuals is different from that of monolinguals, how people learn their first language (L1) and how they learn their second language (L2) and the relationship between the two languages. We will try to reach the theoretical questions about the presence of a second language in the same mind as a first language and how this pre-existing language affects the L2 user's mind. Finally, we will understand at the differences and similarities that have been proposed between L1 and L2 acquisition. Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**SPN 512: Spanish Grammar**

The student will be introduced to important concepts in the study of grammar and syntax of Spanish in view of modern linguistics theories about our language facility. This course also will describe the grammar of Spanish spoken in Spain and Latin America.

Offered in
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**SPN 513: Spanish as Second Language Acquisition**

The purpose of this course is to provide a framework on how language development in bilingual individuals is different from that of monolinguals, how people learn their first language (L1) and how they learn their second language (L2) and the relationship between the two languages. We will try to reach the theoretical questions about the presence of a second language in the same mind as a first language and how this pre-existing language affects the L2 user's mind. Finally, we will understand at the differences and similarities that have been proposed between L1 and L2 acquisition. Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**SPN 514: Spanish Grammar**

The student will be introduced to important concepts in the study of grammar and syntax of Spanish in view of modern linguistics theories about our language facility. This course also will describe the grammar of Spanish spoken in Spain and Latin America.

Offered in
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**SPN 515: Spanish Composition and Stylistics**

Theory and practice of problems in composition and translation with revision of difficult points in advanced Spanish grammar. Classroom analysis and discussion. Required for Doctor of Arts (DLS) students; also useful for M.A. and Ph.D. students.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

**SPN 516: Advanced Topics in the Phonetics and Phonology of Spanish**

This course explores advanced topics in the studies of the phonetics and phonology of Spanish. The course is intended to be a seminar thus it assumes attending it already have a working knowledge of acoustic phonetics and Spanish phonology. The topic of the seminar may change from one semester to the other.

Offered in
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 517: Golden Age Literature**

Major literary works within the Renaissance and/or baroque periods are read and analyzed in depth, and their interrelation with the cultural context is discussed.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 518: Interdisciplinary Approaches to Hispanic Studies**

The critical analysis of selected themes in Spanish and/or Latin American culture and society as represented across different discourses and disciplines including literary and cultural studies, film and media, documentary and historical sources.

Offered in
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 519: Studies in Modern Spanish Literature**

Major literary works of the 19th and 20th centuries will be read and analyzed in depth in relation to their broader cultural and historical content.

Offered in
Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 551: Early Latin American Literature and Culture**
An introduction to the analysis of major works and concepts of the colonial period and their relevance for contemporary debates in Latin American literary and cultural studies. 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 573: Studies in Modern Latin American Literature**
Major literary works of the 19th and 20th centuries will be read and analyzed in depth in relation to their broader cultural and historical context. Offered in Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 582: The Hispanic Tradition in the United States**
A general historical analysis of the influence of Hispanic culture in the United States as a consequence of the continuous interaction between Spanish- and English-speaking people. Special attention is given to cultural manifestation in a bicultural setting. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 585: Caribbean Literature**
A course devoted to major writers and works of the Caribbean area. Readings will be analyzed in relation to cultural contexts. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 588: Directed Master's Research**
For work toward the M.A. thesis or preparation for the M.A. comprehensive examination only. This course is mainly intended for students who are not continuing toward the Ph.D. Prerequisite: Permission of graduate program director, M.A. thesis director, and, or director of the M.A. comprehensive examination committee. Fall and Spring, 1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 595: Directed Independent Individual Studies**
For M.A. and Ph.D. candidates only. Requires a written proposal signed by the faculty member involved and the approval of the graduate program director and the departmental chairperson. No more than a total of nine credits may be applied toward a Spanish graduate degree or combination of degrees. Prerequisite: Permissions mentioned above Fall and Spring, 1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 599: Thesis Preparation**
For M.A. and Ph.D. candidates only. Individual Studies SPN 595: Directed Independent may be repeated for credit. A-, B+, etc.)
committee.

of the M.A. comprehensive examination director, M.A. thesis director, and, or director of the Ph.D. students. Advanced D.A. and M.A. students are accepted. A required course for Ph.D. students. Advanced D.A. and M.A. students are accepted. A required course for Ph.D. students. Advanced D.A. and M.A. students are accepted. A required course for Ph.D. students. Advanced D.A. and M.A. students are accepted. A required course for Ph.D. students. A general historical analysis of the influence of Hispanic culture in the United States as a consequence of the continuous interaction between Spanish- and English-speaking people. Special attention is given to cultural manifestation in a bicultural setting. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 589: Spanish-American Modernism**
A course devoted to major authors and literary works of the modernist period (1880-1916) in Spanish America. Readings are analyzed and discussed. A required course for Ph.D. students. Advanced D.A. and M.A. students are accepted. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 609: Literary Theory**
A study of the most outstanding methods of analysis and literary research, and a survey of major works pertaining to the study of literature. A required course for students in the Spanish Ph.D. program. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 610: Colonial Spanish-American Literature**
Major literary works of the medieval period will be read and discussed in depth, and their interrelation with the cultural context explored. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 612: Topics Seminar**
A seminar course designed primarily for doctoral students. The topic will be chosen by the professor from any of the major areas of Hispanic literature and linguistics required of all Ph.D. students. Ph.D. students must take from two to four of these seminars depending on their previous preparation. Prerequisite: Admission to the Spanish Ph.D. program or permission of instructor Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 613: Medieval Literature**
Major literary works of the medieval period will be read and discussed in depth, and their interrelation with the cultural context analyzed. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 628: Cervantes**
Miguel de Cervantes' works are read, analyzed, and discussed in depth. A required course for Ph.D. students. Advanced D.A. and M.A. students are accepted. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 641: 19th-Century Spanish Literature until the Generation of 1898**
Until the Generation of 1898 Major literary works of the period are read and analyzed in depth, and their interrelation with the cultural context is discussed. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 643: 20th-Century Spanish Literature**
Major literary works of the period will be read, analyzed, and discussed in depth, and their interrelation with the cultural context will be discussed. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 652: Colonial Spanish-American Literature**
Major authors and literary works of the period. Readings will be analyzed and discussed in depth, and their interrelation with the cultural context will be discussed. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 659: Spanish-American Modernism**
A course devoted to major authors and literary works of the modernist period (1880-1916) in Spanish America. Readings are analyzed and discussed. A required course for Ph.D. students. Advanced D.A. and M.A. students are accepted. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 662: 19th-Century Spanish-American Literature**
Major authors and literary works of the period. Readings will be analyzed and discussed in depth, and their interrelation with the cultural context will be discussed. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 669: Spanish-American Modernism**
A course devoted to major authors and literary works of the modernist period (1880-1916) in Spanish America. Readings are analyzed and discussed. A required course for Ph.D. students. Advanced D.A. and M.A. students are accepted. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 671: 20th-Century Spanish-American Literature**
A course devoted to major authors and literary works of the period. Readings will be analyzed and discussed in depth, and their interrelation with the cultural context discussed. 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**SPN 681: Directed Readings**
For students who have completed all doctoral requirements and wish to dedicate themselves...
to full-or part-time preparation for the comprehensive examination.
Prerequisite: Coursework toward the Ph.D. must be completed; permission of the dissertation director, graduate studies director, or department chairperson
Fall and Spring, 1-9 credits, S/U grading
May be repeated for credit.

SPN 691: Practicum in the Teaching of Spanish Language
Prerequisite: Permission of instructor, department chairperson, or graduate program director
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

SPN 693: Practicum in the Teaching of Spanish Language
This course is to be taken in conjunction with the student's teaching assignment. Each week's discussion centers on problems of applied linguistics or grammar. Discussion will also be focused on methodology (audio-lingual method, pattern drills, language laboratory, and preparation of examinations).
Fall and Spring, 3 credits, S/U grading
May be repeated for credit.

SPN 699: Dissertation Research on Campus
For students who have already passed the Ph.D. comprehensive examination and need to devote their time to preparation of their dissertation.
Prerequisites: Ph.D. comprehensive examination completed and advanced to candidacy (G5); permission of the dissertation director, graduate program director, or department chairperson. Major portion of research must take place on SBU campus, at Cold Spring Harbor, or at the Brookhaven National Lab.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

SPN 700: Dissertation Research off Campus - Domestic
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place off-campus, but in the United States and/or U.S. provinces. Please note, Brookhaven National Labs and the Cold Spring Harbor Lab are considered on-campus. All international students must enroll in one of the graduate student insurance plans and should be advised by an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

SPN 701: Dissertation Research off Campus - International
Prerequisite: Must be advanced to candidacy (G5). Major portion of research will take place outside of the United States and/or U.S. provinces. Domestic students have the option of the health plan and may also enroll in MEDEX. International students who are in their home country are not covered by mandatory health plan and must contact the Insurance Office for the insurance charge to be removed. International students who are not in their home country are charged for the mandatory health insurance. If they are to be covered by another insurance plan they must file a waiver be second week of classes. The charge will only be removed if other plan is deemed comparable.
All international students must received clearance from an International Advisor.
Fall, 1-9 credits, S/U grading
May be repeated for credit.

SPN 800: Summer Research
May be repeated for credit.

TAF

Theatre

TAF 500: Introduction to Graduate Theatre
This seminar course will introduce graduate theatre students in all tracks to each other, to graduate faculty across disciplines, and will encourage new collaborations and projects for development during the students' graduate careers. Theatre students will meet to discuss the role of each artist, with emphasis on the changing nature of collaboration and the expanding art form in today's theatre profession. Readings, written assignments and collaborative projects are required.
3 credits, Letter graded (A, B, C, etc.),
Prerequisite: Permission of the Instructor, Southampton and Manhattan, Semesters offered:
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

TAF 505: Dramaturgy I: Production Dramaturgy
An introduction to production dramaturgy in which students explore the types of research and concept development necessary to prepare already produced scripts for performance. Research tools and methods, investigations of cultural and social history, critical writing, and issues in adaptation and translation are discussed. Means of facilitating communication within a production team and between actors, designers, and directors are examined. Other topics include season planning, promotion and publicity, educational outreach materials, preparation of protocols, post-play discussion, and other audience development techniques.
Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

TAF 506: Dramaturgy II: Literary Management
Examining the roles of the literary manager in the contemporary theatre, this course explores the process of new play development and the preparation of a new play for production. The ability to read and write sensitively about new plays, reading new plays and preparing sophisticated play reports, how to talk to playwrights about their plays, and how to facilitate discussions with directors and actors as they encounter a play for the first time are issues examined in this course. New plays from a variety of venues, including professional theatres in New York City, are read and discussed, and the process of developing new plays from staged readings through public performances are studied.
Prerequisite: Permission of instructor
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

TAF 507: Dramaturgy of Process: New Play Development Workshop
This course for advanced students of Dramaturgy allows them to apply practical theatre skills to the development of new work. Students will assist in the workshop production of a new play. This will explore NPD process as it exists in the American Regional Theatre, and learn the practical skills of running a play-reading series, commissioning new plays, communicating with playwrights, casting and marketing. 3 credits, ABCF Grading
3 credits, Letter graded (A, A-, B+, etc.)

TAF 510: Western Theatre History
Theatre forms in the Western tradition, from ancient to modern. This course is centered on a particular critical or theoretic problem or theme. It may be repeated as an independent study with the permission of the instructor.
3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

TAF 510: Western Theatre History
Theatre forms in the Western tradition, from ancient to modern. This course is centered on a particular critical or theoretic problem or theme. It may be repeated as an independent study with the permission of the instructor.
TAF 511: Far Eastern Theatre and Drama
Course surveys the traditional theatre of three Far Eastern (China, Korea, and Japan) as related to: its history, dramatic literature (Yuan drama and Beijing Opera of China; Pong san Korean Masked Dance-Drama; a Noh play cycle, Kabuki, and Joruri Puppet Theatre of Japan), point of departure will be: the Eastern world view (namely Shemanism, Confucianism, Daoism, and Buddhism) and theatre; the concept of the actor's body and mind as a microcosmic presentation of a macrocosmic universe; his performance as an act of becoming one with the macrocosm; and the total nature of all performing arts elements harmoniously operating together in creating beauty on stage.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

TAF 520: Western Dramatic Literature
Course surveys forms of Western drama, with particular reference to theatrical performance. Focus is placed on key periods and themes such as gender issues, political violence, death and dying, love, etc. May be repeated once.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

TAF 521: South and Southeast Asian Theatre and Drama
Surveying the traditional and modern theatre of South and Southeastern Asian (India, Sri Lanka, Thailand, Indonesia, Tibet, Nepal, and Bhutan) as related to: it's mythic origins, history, dramatic literature, aesthetic theory, ritual functions, conventions of productions and actor training. The point of departure will be cosmology, especially that of Hinduism, and world view of the people.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

TAF 523: Theatre in New York
A workshop seminar on contemporary, alternative performance forms and mainstream theatre. Emphasis on the development of critical perspectives and the writing skills needed to articulate them through seminar discussions and writing workshops relevant to performances seen on trips to theatres in New York and the region.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

TAF 525: Topics in Theatre and Drama
Intensive studies of selected forms of theatre and drama from various countries and periods, designed to supplement rather than repeat areas of study already undertaken in the curriculum. May be repeated.

Prerequisite: Permission of instructor
Fall or Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

TAF 530: Directed Reading in Theatre and Drama
Students read and evaluate the literature on a topic of special academic interest under the supervision of a faculty member. May be repeated. Prerequisite: Permission of instructor
Fall and Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

TAF 535: Theories of Theatre
Theories of the theatre, from the ancient to the contemporary, are read critically to develop a complex and varied conception of the philosophical basis underlying approaches to the theatre. Theorists read might include Aristotle, Plato, Diderot, Rousseau, Nietzsche, Artaud, Brecht, Stanislavski, Grotowski, Barba, Mnouchkine, Suzuki, and Zeami.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

TAF 550: Teaching Seminar
Supervised student teaching of undergraduate courses accompanied by a seminar in methods and strategies of teaching theatre arts at the University level. An independent teaching project, in which the student works with a particular faculty member, may be substituted.

Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

TAF 570: Directing Theory and Practice
Course surveys the art and craft of the Director, with focus on contemporary practices of directing and approaches to pedagogy. Students will write papers and develop projects in conjunction with advanced reading and instruction.

3 credits, Letter graded (A, A-, B+, etc.)

TAF 575: Adaptation Workshop
This course is an intense examination of a playwright or group of plays with the object of preparing a new adaptation or stage version. The course will study a text or group of texts, important criticism, notable or significant translation and/or adaptations, stage productions and/or film versions. Students will submit an outline or rough draft of their new version at the end of the course.

Offered in
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

TAF 576: Theatre Workshop
The workshops at Southampton Arts are intensive classes in various aspects of the craft of theatre and film, including playwriting, screenwriting, directing, acting, solo performance, interdisciplinary collaboration (devising), and digital filmmaking, together with lectures, readings, seminars, and panels featuring nationally distinguished artists. These workshops encourage participation by visiting students, new theatre and film artists, established artists, and teachers who will be admitted by application and may receive academic credit upon request. Graduate students may take any Theatre Workshop sponsored by the MFA program for academic credit. Study may occur in Southampton, Manhattan, or abroad. A submission of a workshop application, and permission of instructor are required. May be repeated for credit.

1-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated 1 times FOR credit.

TAF 590: M.A. Thesis
Independent study and research for M.A. students, on special topics, theoretical or cultural issues, or problems. Development of material for research paper.

1-3 credits, S/U grading
May be repeated for credit.

TAF 591: Independent Project
Special project allowing advanced individual work in an area of theatre study or practice. Must be scheduled by arrangement with
TAF 635: Theories of Performance
This course examines different theories of performance as they relate to theatre and everyday life. Students explore ways of thinking about the performing body and different modes of cultural expression. There is a performing component to the course in addition to a final paper.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

TAF 638: Directing I - Principles of Directing
This course will focus on the analytical, organizational and creative processes necessary to be a director. Topics include: the role of the director and the collaborative process; the history of directing; script analysis and interpretation/concept; stage, space and composition; visual interpretation and working with designers; casting and working with actors; working with dramaturges; and rehearsal and technical process.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

TAF 639: Directing II - Advanced Directing
This course will build upon the work covered in Directing I and will focus on advanced problems in Directing, including advanced scene work, period styles, alternative forms, and the challenges of contemporary drama and or alternative performance. Prerequisite: THR638 Offered

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

TAF 640: Theatre Design Workshop
Advanced assignments in theatre design. May include design work on departmental productions. May be repeated once.

Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

TAF 650: Playwriting Workshop
Students write and discuss original plays, evaluate their work, study techniques of composition and formal organization, and develop strategies for audience communication. Advanced students may study techniques for revision and the development of material for performance. Some plays may be selected for department production.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)

TAF 651: Playwriting Workshop II
With the instructor of record, the student will develop a plan for addressing problems or the boundaries of approaches to creative work specific to his or her needs for continued development as a playwright. As deemed appropriate by the instructor, the student will work on a full length or one-act play or scenes.

Offered in
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

TAF 660: Acting Workshop
Intensive advanced study in a particular acting technique, such as Kutiyyam, Suzuki, musical theatre, Brecht, etc. Offered in conjunction with departmental productions. May be repeated.

Prerequisite: Permission of instructor
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

TAF 670: Directing Workshop
Advanced training in directing, which may involve concentrated scene work, formal experiments in performance, work on period styles and problems, or preparation of performances for public showing. May be repeated once.

Prerequisite: Permission of Instructor
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

TAF 680: Dramaturgy Workshop
Students serve as dramaturgs for the production of a play, providing research support, studying editorial and interpretive techniques, attending rehearsals, and developing program materials for the audience. Prerequisite: Admission to graduate program
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

THR 500: Introduction to Graduate Study in Dramaturgy
This course surveys the field of theatre scholarship, introducing students to research tools, research methods, critical writing, and scholarly values. Discussions include reference to basic texts in dramatic literature and representative research problems.

Prerequisite: Permission of instructor
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

THR 506: Dramaturgy II: Literary Management
Examining the roles of the literary manager in the contemporary theatre, this course explores the process of new play development and the preparation of a new play for production. The ability to read and write sensitively about new plays, reading new plays and preparing sophisticated play reports, how to talk to playwrights about their plays, and how to facilitate discussions with directors and actors as they encounter a play for the first time.

TAF 690: Professional Internship
A full-term internship at a professional theatre. Students should submit an internship description in the first month of work, then a journal or evaluation of their work experience.

Prerequisite: Permission of graduate studies director
Spring, 3 credits, S/U grading

TAF 691: M.F.A. Project
The project is to be undertaken at a professional theatre or as part of the mainstage production season at Stony Brook University. Students submit a proposal for a project in which they have a major responsibility as an assistant dramaturg on a production or an equivalent position. All proposals for projects outside of the university must be submitted in writing to the faculty supervisor and graduate program director for approval.

Fall, 3 credits, Letter graded (A, A-, B+, etc.)
THR 507: Dramaturgy of Process: New Play Development Workshop
This course for advanced students of Dramaturgy allows them to apply practical theatre skills to the development of new work. Students will assist in the workshop production of a new play. This will explore NPD process as it exists in the American Regional Theatre, and learn the practical skills of running a play-reading series, commissioning new plays, communicating with playwrights, casting and marketing.
3 credits, Letter graded (A, A-, B+, etc.)

THR 510: Western Theatre History
Theatre forms in the Western tradition, from ancient to modern. This course is centered on a particular critical or theoretic problem or theme. It may be repeated as an independent study with the permission of the instructor.
3 credits, Letter graded (A, A-, B+, etc.)

THR 511: Far Eastern Theatre and Drama
Course surveys the traditional theatre of three Far Eastern (China, Korea, and Japan) as related to: its history, dramatic literature (Yuan drama and Beijing Opera of China; Pongsan Korean Masked Dance-Drama; a Noh play cycle, Kabuki, and Joruri Puppet Theatre of Japan), point of departure will be: the Eastern world view (namely Shemanism, Confucianism, Daoism, and Buddhism) and theatre; the concept of the actor's body and mind as a microcosmic presentation of a macrocosmic universe; his performance as an act of becoming one with the macrocosm; and the total nature of all performing arts elements harmoniously operating together in creating beauty on stage.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

THR 520: Western Dramatic Literature
Course surveys forms of Western drama, with particular reference to theatrical performance. Focus is placed on key periods and themes such as gender issues, political violence, death and dying, love, etc. May be repeated once.

THR 521: South and Southeast Asian Theatre and Drama
Surveying the traditional and modern theatre of South and Southeast Asian (India, Sri Lanka, Thailand, Indonesia, Tibet, Nepal, and Bhutan) as related to: its mythic origins, history, dramatic literature, aesthetic theory, ritual functions, conventions of productions and actor training. The point of departure will be cosmology, especially that of Hinduism, and world view of the people.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated 2 times FOR credit.

THR 523: Theatre in New York
A workshop seminar on contemporary, alternative performance forms and mainstream theatre. Emphasis on the development of critical perspectives and the writing skills needed to articulate them through seminar discussions and writing workshops relevant to performances seen on trips to theatres in New York and the region.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

THR 525: Topics in Theatre and Drama
Intensive studies of selected forms of theatre and drama from various countries and periods, designed to supplement rather than repeat areas of study already undertaken in the curriculum. May be repeated.
Prerequisite: Permission of instructor
Fall or Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

THR 530: Directed Reading in Theatre and Drama
Students read and evaluate the literature on a topic of special academic interest under the supervision of a faculty member. May be repeated. 
Prerequisite: Permission of instructor
Fall or Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

THR 535: Theories of Theatre
Theories of the theatre, from the ancient to the contemporary, are read critically to develop a complex and varied conception of the philosophical basis underlying approaches to the theatre. Theorists read might include Aristotle, Plato, Diderot, Rousseau, Nietzsche, Artaud, Brecht, Stanislavski, Grotowski, Barba, Mnouchkine, Suzuki, and Zeami.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

THR 540: Design Theory and Practice
Course surveys principal design areas, providing information about aesthetic theory and methods of stage design. Students address design problems and analyze a topic in design theory in conjunction with readings and instruction.
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

THR 550: Teaching Seminar
Supervised student teaching of undergraduate courses accompanied by a seminar in methods and strategies of teaching theatre arts at the University level. An independent teaching project, in which the student works with a particular faculty member, may be substituted.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

THR 560: Acting Theory and Practice
Course surveys the field of acting-his history, formal principles, primary techniques, and contemporary practice. Students develop course papers and, or projects in conjunction with advanced readings and instruction.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

THR 570: Directing Theory and Practice
Course surveys the art and craft of the Director, with focus on contemporary practices of directing and approaches to pedagogy. Students will write papers and develop projects in conjunction with advanced reading and instruction.
3 credits, Letter graded (A, A-, B+, etc.)

THR 575: Adaptation Workshop
This course is an intense examination of a playwright or group of plays with the object of preparing a new adaptation or stage version. The course will study a text or group of texts, important criticism, notable or significant translation and/or adaptations, stage productions and/or film versions. Students will submit an outline or rough draft of their new version at the end of the course. 
Offered in Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

THR 589: M.F.A. Thesis
Independent study and research for M.F.A. Dramaturgy students, on practical or theoretical topics related to the field of dramaturgy. Development of materials for this research paper may be related to the students...
M.F.A. Project or other dramaturgical pursuits. 3 credits, S/U grading. May be repeated for credit.

THR 590: M.A. Thesis
Independent study and research for M.A. students, on special topics, theoretical or cultural issues, or problems. Development of material for research paper. 1-3 credits, S/U grading. May be repeated for credit.

THR 591: Independent Project
Special project allowing advanced individual work in an area of theatre study or practice. Must be scheduled by arrangement with instructor. Should result in an advanced paper or project report. May be repeated. 1-3 credits, Letter graded (A, A-, B+, etc.). May be repeated for credit.

THR 625: Theory and Criticism
Study of major issues in dramatic theory and criticism and in performance theory. May be repeated for up to six credits with instructor's permission. Spring, 3 credits, Letter graded (A, A-, B+, etc.). May be repeated 2 times FOR credit.

THR 630: Dramaturgy Colloquium
Through interaction with theatre professionals, students develop independent projects around topics of common concern to the profession, and develop strategies for implementing alternate plans for improving and developing theatre. May be repeated. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.). May be repeated for credit.

THR 635: Theories of Performance
This course examines different theories of performance as they relate to theatre and everyday life. Students explore ways of thinking about the performing body and different modes of cultural expression. There is a performing component to the course in addition to a final paper. 3 credits, Letter graded (A, A-, B+, etc.). May be repeated 2 times FOR credit.

THR 636: Topics in Performance Studies
The history and theories of performance are explored. Seminars may focus on the performing body, performance and political change, avant-garde performance, performing and cognitive science, virtual performance, performance and identity. Depending on the topic, there may be a performance component and/or computer based projects. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.). May be repeated for credit.

THR 638: Directing I - Principles of Directing
This course will focus on the analytical, organizational and creative processes necessary to be a director. Topics include: the role of the director and the collaborative process; the history of directing; script analysis and interpretation/ concept; stage, space and composition; visual interpretation and working with designers; casting and working with actors; working with dramaturges; and rehearsal and technical process. Offered Fall, 3 credits, Letter graded (A, A-, B+, etc.).

THR 639: Directing II - Advanced Directing
This course will build upon the work covered in Directing I and will focus on advanced problems in Directing, including advanced scene work, period styles, alternative forms, and the challenges of contemporary drama and or alternative performance. Prerequisite: THR638 Offered Spring, 3 credits, Letter graded (A, A-, B+, etc.).

THR 640: Theatre Design Workshop
Advanced assignments in theatre design. May include design work on departmental productions. May be repeated once. Prerequisite: Permission of instructor Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.). May be repeated once.

THR 650: Playwrighting Workshop
Students write and discuss original plays, evaluate their work, study techniques of composition and formal organization, and develop strategies for audience communication. Advanced students may study techniques for revision and the development of material for performance. Some plays may be selected for department production. Fall, 3 credits, Letter graded (A, A-, B+, etc.).

THR 651: Playwriting Workshop II
With the instructor of record, the student will develop a plan for addressing problems or the boundaries of approaches to creative work specific to his or her needs for continued development as a playwright. As deemed appropriate by the instructor, the student will work on a full length or one-act play or scenes. Offered in Fall, 3 credits, S/U grading. May be repeated for credit.

THR 660: Acting Workshop
Intensive advanced study in a particular acting technique, such as Kutiyattam, Suzuki, musical theatre, Brecht, etc. Offered in conjunction with departmental productions. May be repeated. Prerequisite: Permission of instructor Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.). May be repeated for credit.

THR 670: Directing Workshop
Advanced training in directing, which may involve concentrated scene work, formal experiments in performance, work on period styles and problems, or preparation of performances for public showing. May be repeated once. Prerequisite: Permission of Instructor Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.). May be repeated 2 times FOR credit.

THR 680: Dramaturgy Workshop
Students serve as dramaturgs for the production of a play, providing research support, studying editorial and interpretive techniques, attending rehearsals, and developing program materials for the audience. Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.). May be repeated for credit.

THR 690: Professional Internship
A full-term internship at a professional theatre. Students should submit an internship description in the first month of work, then a journal or evaluation of their work experience. Prerequisite: Permission of graduate studies director Spring, 3 credits, S/U grading.

THR 691: M.F.A. Project
The project is to be undertaken at a professional theatre or as part of the mainstage production season at Stony Brook University. Students submit a proposal for a project in which they have a major responsibility as an assistant dramaturg on a production or an equivalent position. All proposals for projects outside of the university must be submitted in writing to the faculty supervisor and graduate program director for approval. Fall, 3 credits, Letter graded (A, A-, B+, etc.).

THR 692: M.F.A. Thesis
Independent study and research for M.F.A. students, on special topics, theoretical or
only imparting knowledge about these managerial practices but also assisting students to acquire the skills necessary to become business leaders, team builders and articulate communicators. We will seek to bridge theory and managerial practice by using case studies and inviting business executives to the class. The readings for the course come largely from Harvard Business Review articles and case studies on these topics.

Spring, 1.5 credits, Letter graded (A, A-, B+, etc.)

**TMP 544: Organizational Behavior**

An approach to understanding the behavior of individuals in organizations is developed with emphasis on implications for effective management. This approach is used to analyze decision problems encountered in managing human resources. Topics include individual and group decision-making skills, recruitment and selection, employee ability, motivation and incentive systems, job satisfaction, performance assessment and management, retention, training, and employee development.

Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)

**TMP 545: Basic Financial Accounting**

Introduction to financial accounting which includes the accounting cycle, analysis and preparation of financial statements, cash flow analysis, corporate accounting, investment in stocks, and international transactions.

Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)

**TMP 546: Managerial Accounting for High Technology Organizations**

Development and presentation of accounting information for managerial decision making in a global technological environment. Topics include budgeting, forecasting, profit analysis and planning, performance evaluation, transfer pricing, capital budgeting, performance measurement, and cost control. Special emphasis will be given to accounting issues pertinent to high technology companies, such as valuation of intangible assets. Summer

1.5 credits, Letter graded (A, A-, B+, etc.)

**TMP 547: Industry Project**

The class provides students with the opportunity to apply the analytic skills they have learned in the classroom to actual management problems. The class will visit various American businesses to learn about the operation, marketing, and financing of the business. Students will be divided into working groups and each group will examine problems in the businesses based on discussions with the managers of various companies visited. Students will recommend solutions to the problems presented by the management. Each group will write a report and make a presentation of their project.

Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)

**TMP 548: Ethics, Corporate Governance and Control Systems**

This course explores the values that govern corporate behavior. Topics include understanding ethical behavior, corporate ethics programs, employees' responsibilities, and codes of conduct and governance. Sarbanes-Oxley (SOX) is examined as watershed legislation that has implications for U.S. companies and non-U.S.-based, multinational companies doing business in the U.S. Examples of similar legislation in the EU and elsewhere are covered. Related topics are corporate social responsibility (CSR) (with cases and examples from U.S. and abroad), ways to promote employee engagement, human resource management risk assessment, and human resource information systems. The course also covers mechanisms for developed a positive organizations culture and engaged workforce. This includes review of employee relations programs, developing and learning a high performing team, and developing a continuous learning organizational culture. Case discussions and exercises (e.g., developing a code of conduct) provide hands-on learning experiences.

Spring, 1.5 credits, Letter graded (A, A-, B+, etc.)

**TMP 549: Negotiation Strategy**

This course is designed to equip students with the basic theories and skills of negotiation. Accordingly, it consists of several parts. The first part is the introduction to the newly development approaches to negotiation; how you can improve your negotiation skills and outcomes. Also some commonly encountered negotiation tactics will be introduced, not to make you victims of those tactics. The second is simulation; students will engage in several negotiation simulations with other students under specific negotiation mandates and the outcomes will be reviewed. The last is a brief introduction to the game theory with an emphasis on the cooperative games; this part deals with the theoretical foundations of bargaining and dispute resolution. Knowledge from economics and mathematics will be helpful but not required.

Offered in Spring, 1.5 credits, Letter graded (A, A-, B+, etc.)
TMP 551: Data Analysis for Technology Managers
The use and limitations of mathematical and statistical techniques, especially for the use of data in choosing between alternative strategies for companies. Probability, estimation, hypothesis testing, analysis of variance, and regression analysis are among the topics covered. Summer 
1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 552: Management Science for Technology Managers
An introduction to the use of modeling in management, particularly in high technology contexts. Basic concepts of management science are covered and a variety of models are examined for application in quantitative decision making. Summer 
1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 555: Technology, Government and Business
Examines the role of government as a regulator of technological business activity, a customer for technological products and services, a source of funding for technological development, and a facilitator of technological innovation. Special topics include technology assessment, technology transfer, and frameworks for national and regional technology policy. Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 573: Basic Marketing Principles and the Information Economy
Introduction to the basic principles of marketing, including: the influence of the marketplace and the marketing environment on marketing decision making; the determination of a firm's product, prices, channels, and communication strategies; and the firm's system for planning and controlling its marketing effort. Special emphasis will be given to marketing in information industries and knowledge intensive industries. Prerequisites: TMP 552 
Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 574: Marketing of Technology Based Products
Adaptation and extension of basic marketing concepts for technological products. Topics include: understanding unarticulated user needs, demand forecasting and strategic planning in technology markets, product design and architecture, product platform strategy, managing new product realization programs, and managing the technology adoption lifecycle. Summer 
1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 575: Introduction to Management Information Systems
The analysis and design of information systems to aid in managerial decision making and the effective operation of corporations. Pertinent computing, telecommunication and systems technologies will be surveyed. Summer 
1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 576: Management Information Systems for Accounting, Budgeting and Human Resources Management
Examination of recent MIS options for specialized functions in an organization, such as accounting, budgeting and human resources. Includes review and assessment of integrated multi-function software suites for organizational management, and comparison of packaged software systems versus web-based subscription software services. Summer 
1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 577: Competitiveness Project (A): Models and Concepts
First part of course-pair TMP577 & TMP578. Students choose a project that focuses on technology management issues in their own industry or organization and apply tools learnt in other courses to analyze the issues. Part A of this pair of courses concentrates on problem formulation and the planning of research and analysis. This course is intended to commence mid-way through the program and be taken concurrently with the next several courses in the program. 
Prerequisites: TMP 552 
Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 578: Competitiveness Project (B): Quantitative Methods
Second part of course-pair TMP577 & TMP578. Students take the issues formulated during Part A of this pair of courses and proceed to implement the research plan also developed in that course. Part B of this pair of courses involves detailed data collection, analysis, and reporting of results. This course is intended to commence three-quarters of the way through the program and to be taken concurrently with the next several courses. Submission of the project report and a formal presentation of results are required near the end of the program. Summer 
1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 585: Operations Management for Technology Organizations
Introduction to the analysis and measurement of processes for creating and delivering goods and services. Covers trade-offs in operations management decisions, product and process planning, layout and location strategy, production scheduling, inventory control, quality management, computer integrated manufacturing, and cost justification, especially in the adoption of new technologies. Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 592: Role of Technology Standards
Second part of course-pair TMP591 & TMP592. Introduction to salient issues facing managers of enterprises involved in the development and implementation of new technologies. Use will be made of case histories and presentations by technological managers and innovators, wherever possible. Part B of this pair of courses will concentrate on the role of technical standards in the dynamics of competition between firms in high technology industries. Summer 
1.5 credits, Letter graded (A, A-, B+, etc.)

TMP 593: Developing Technology Management Solutions (A)
First part of course-pair TMP593 & TMP595. Special course customized each year to address current trends and solutions to management problems in technological
evaluate their effectiveness, and manage the organization can plan and develop initiatives, all elements of the program and examines how an organization can plan and develop initiatives, evaluate their effectiveness, and manage the change process. Part A emphasizes corporate strategy. 

**Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)**

**TMP 598: Technology and Entrepreneurship**

Second part of a course-triad TMP597, TMP598 & TMP578. Concepts and techniques of strategic management are examined and applied to relevant cases involving technology management. The class synthesizes all elements of the program and examines how an organization can plan and develop initiatives, evaluate their effectiveness, and manage the change process. Part B emphasizes entrepreneurial strategy.

**Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)**

**TMP 599: Intellectual Property Strategy**

Third part of a course-triad TMP597, TMP598 & TMP578. Concepts and techniques of intellectual property strategy are examined and applied to relevant cases involving technology management. The class synthesizes all elements of the program and examines how an organization can plan and develop initiatives, evaluate their effectiveness, and manage the change process.  

**1.5 credits, Letter graded (A, A-, B+, etc.)**

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**TMP 594: Financial Management**

Business concepts, practices and procedures to analyze financial flows, especially in high technology settings. Topics covered include the basic mathematics of finance, capital budgeting, capital structure, dividend policy, mergers, and working capital management.

**Prerequisites:** TMP 552, TMP 546

**Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)**

**TMP 595: Developing Technology Management Solutions (B)**

Second part of course-pair TMP93 & TMP95. Special course customized each year to address current trends and solutions to management problems in technological enterprises. Examples would include trends in electronic commerce, new approaches to product development strategy for technology, information security and privacy, or trends in the biotechnology industry. The course will involve field to companies and guest lectures by executives from technology companies wherever possible.

**Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)**

**TMP 596: Financial Markets and Venture Finance**

Covers the variety of means by which corporations, especially high technology firms, may be financed. Topics include capital markets, investment principles, venture finance, and a continuation of the mathematics of finance covered by TMP 594.

**Prerequisite:** TMP 594

**Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)**

**TMP 597: Technology Management and Strategy**

First part of a course-triad TMPS97, TMP598 & TMP578. Concepts and techniques of strategic management are examined and applied to relevant cases involving technology management. The class synthesizes all elements of the program and examines how an organization can plan and develop initiatives, evaluate their effectiveness, and manage the change process. Part A emphasizes corporate strategy.

**Summer, 1.5 credits, Letter graded (A, A-, B+, etc.)**

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**WRT**

**WRT 506: Studies in Literary Theory**

Prerequisite: Matriculation in a graduate program or the composition studies certificate.

**3 credits, Letter graded (A, A-, B+, etc.)**

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**WRT 592: Problems in Teaching Writing or Composition**

This course provides an overview of writing pedagogy as applied to tutoring in a Writing Center or in an English classroom. Included in the course is fieldwork in the campus Writing Center.

**3 credits, Letter graded (A, A-, B+, etc.)**

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**WRT 605: Scientific Writing for Chemists**

This course, taught primarily in a workshop format, will prepare students to write graduate papers, communications, journal articles, and dissertations. Rhetorical principles of organization, attention to audience, conciseness, cogency, clarity, and using an appropriate scientific voice will be stressed, as will correctness of grammar and punctuation, including grammatical issues particular to non-native speakers of English. The class will examine in detail models of clear writing from scientific journals. Students will also bring their writing to class frequently for review by both the instructor and their classmates so that students will gradually internalize standards for writing and be able to write effectively in all genres typically used by chemists. Offered
WRT 612: Theories in Composition
This course explores the relationship between reading and writing skills, the differences between speech production and writing production, and the relationship between literacy, culture, and language politics.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

WRT 613: Research in Composition
This course provides an introduction to the nature of empirical research in Composition Studies. Students will survey landmark research studies, learn how to read research reports critically, and conduct a mini-research project in their own classrooms or tutoring situations to analyze underlying causes of students’ writing problems.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

WRT 614: Topics in Composition and Writing
This course will consist of directed readings in particular areas of interest in rhetoric, the history of rhetoric and pedagogy, and teaching strategies for teachers.
Offered Fall and Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

WRT 690: Directed Readings
May be repeated for credit.

WRT 698: Practicum in Teaching Writing
Students take the seminar in conjunction with teaching a section of WRT 101. This course provides hands-on experience and instruction in the basics of writing pedagogy, including designing writing assignments, sequencing assignments, motivating writing, writing skill development and evaluating writing. Students will also be given a preliminary overview of the major theories driving composition pedagogy.
3 credits, Letter graded (A, A-, B+, etc.)

WST 510: Gender and Culture
A variable topics course on the many ways in which culture and gender interact. Possible topics include women in multiethnic America, women in the labor movement, and women and social policy.
Co-scheduled with HIS 515.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

WST 511: Gender and Culture
A variable topics course on the many ways in which culture and gender interact. Possible topics include women in multiethnic America, women in the labor movement, and women and social policy.
Prerequisite: Permission of instructor
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

WST 512: Gender and Culture
A variable topics course on the many ways in which culture and gender interact. Possible topics include women in multiethnic America, women in the labor movement, and women and social policy.
Prerequisite: Permission of instructor
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

This course explores the various ways in which gender, race, and class, along with other aspects of identity, shape the lives and experiences of women of color in the United States and globally. It presents the ongoing debates concerning the interconnections of gender, race, and shifting identities. It will examine the relationships between the construction of personal identities, identity statuses, cultural and ideological meaning systems, and the search for alternative images. Permission from advisor required.
3 credits, Letter graded (A, A-, B+, etc.)

WST 559: Gender and Health
This course explores gender differences in physical and mental health through the study of psychology, sociology, medicine, and epidemiology.
Co-scheduled with PSY 559.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

WST 595: Reading Colloquium in Women's History
A topics course dealing with such subjects as women in social movements, the place of gender in particular historical circumstances, imperialism and woman, changing views of sexuality, or relations between family policies and other political programs. This course offered as both HIS 595 and WST 595.
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)

WST 599: Directed Readings in Women's Studies
Students study any subject not ordinarily covered by a course offering if the reading course is supervised by a member of the Affiliates Network and approved by the director of the Graduate Certificate Program in Women's Studies. May be repeated as topic varies, but only three credits count toward the certificate.
Prerequisite: Permission of instructor
Fall or Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

WST 600: History and Methods of Women's Studies
A study of the emergence of modern Western feminism provides the context for an analysis of the formation of Women's Studies as an area of pedagogy and research. The course investigates the concepts and methods appropriate to interdisciplinary research on women and gender, and how these approaches define Women's Studies as a new area of knowledge. The effects of this interdisciplinary research on assumptions and methods in the traditional disciplines will be analyzed.
3 credits, Letter graded (A, A-, B+, etc.)

WST 601: Feminist Theory
This course covers critical works of feminist theory in the humanities. Readings focus on significant works that deal either with the theory and practice of feminism or with feminist methods of scholarship.
Prerequisite: Admission to the Graduate Certificate Program in Women's Studies
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

WST 602: Social Perspectives on Feminist Theory
This course introduces students to the main currents of feminist social, political, and intellectual theory. It will explore theories and texts and the linkages between developing feminism and such fields as economics, sociology, history, and philosophy.
Prerequisite: Admission to the Graduate Certificate Program in Women's Studies
Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

**WST 610: Advanced Topics in Women's Studies**

A variable topics seminar course in women's studies for the advanced student. Topics might include feminist peace politics, women in Third World cinema, feminist theology, or feminist philosophy. Course may be repeated as topic varies.

*Sections of this course are co-scheduled with SOC 509, PHI 615, and PHI 616.*
*Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)*
*May be repeated for credit.*

**WST 611: Advanced Topics in Women's Studies**

A variable topics seminar course in women's studies for the advanced student. Topics might include feminist peace politics, women in Third World cinema, feminist theology, or feminist philosophy. Course may be repeated as topic varies.

*Sections of this course are co-scheduled with SOC 509, PHI 615, and PHI 616.*
*Fall or Spring, 3 credits, Letter graded (A, A-, B+, etc.)*
*May be repeated for credit.*

**WST 690: Advanced Readings in Women's Studies**

Advanced students read on any subject not normally covered by a course offering with any member of the Women's Studies Faculty Affiliates Network. Permission of the instructor and of the director of the Graduate Certificate Program in Women's Studies required.

*Fall or Spring, 1-3 credits, Letter graded (A, A-, B+, etc.)*
*May be repeated for credit.*

**WST 699: Practicum in Women's Studies**

An interdisciplinary colloquium. The syllabus developed in this course will be evaluated by the instructor who will normally be the director of Women's Studies. Prerequisite: A graduate feminist theory course

*Co-requisite: Completion of the requirements for the Graduate Certificate in Women's Studies*
*Spring, 3 credits, Letter graded (A, A-, B+, etc.)*