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, 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.)

BEE 561: Macroevolution
This course emphasizes the process generating large-scale evolutionary trends and patterns. Topics include rates of evolutionary change; patterns of speciation and extinction, including radiations and mass extinctions; the role of constraint and innovation in molding evolutionary patterns; adaptive landscapes and complex character evolution; development and evolution; the origin and importance of major body plans; and the role of biogeography and climate in evolution.
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

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 565: Molecular Evolution
An introduction to the use of molecular information in population genetics, evolution, and taxonomy. This course combines discussions of methodology, data, and theory to illustrate how molecular information is changing our view of the evolutionary process.
Prerequisite: BEE 551 or permission of instructor
Spring, 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.

**Offered in:**
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 573: Developmental Thinking in Evolutionary Biology**
One major goal of this course is to introduce the theoretical framework of evolutionary Developmental Biology (Evo-Devo). Much of the research in this field of biology aims to uncover how developmental mechanisms and genes have changed in the evolution of phenotypes. One ultimate goal is to discover the ‘logic’ that governs the production of the phenotypic variation available for natural selection. These diverse goals also mean that Evo-Devo encompasses research from empirical investigation of developmental mechanisms to theoretical models and predictions. A common requirement for all these endeavors is the introduction of developmental thinking into formulation of research questions and interpretation of results. The course will teach a broad understanding of developmental thinking and how it influences various concepts used in evolutionary biology. Throughout the course we will consider both the effects of evolution on development, and the effects of development on evolution. The most critical papers will be reviewed and discussed and possibilities for future research will be evaluated. Topics covered will include evolutionary transitions, biological variation, stem cells and aging, developmental reprogramming, causality bottlenecks, development in innovations and extinctions.

**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 in:**
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 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.

**Offered:**
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.
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 689: 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 690: Seminar on Evolutionary Processes
Seminars on selected topics concerning evolutionary processes.
Fall or Spring, 0-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

BEE 691: Seminar on Systematics and Phylogeny
Seminars on selected topics in systematics. Topics will include the theory of classification and numerical taxonomy, both phenetic and cladistic.
Fall or Spring, 0-2 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

BEE 692: 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 693: 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 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.

BEE 800: Full-Time Summer Research
May be repeated for credit.