

SPRING 2024 BIOLOGY COURSE DIRECTORY

For advising you will need:

- ✓ Degree Advice Report
- ✓ Transcript Preview
- ✓ Advising Worksheet
- ✓ Course Directory

COURSE NOTES:

Courses fulfilling breadth requirements:

Cell & Molecular (CM)

CAS BI 203 Cell Biology
CAS BI 206 Genetics
CAS BI 216 Intensive Genetics

Ecology, Behavior & Evolution (EBE)

CAS BI 225 Behavioral Biology
CAS BI 260 Marine Biology
CAS BI 303 Evolutionary Ecology
CAS BI 306 Biology of Global Change
CAS BI 309 Evolution

Neurobiology & Physiology (PN)

CAS BI 315 Systems Physiology
CAS BI 325 Principles of Neuroscience

Upper Level Lab Courses Offered Spring 2024:

CAS BI 302 Vertebrate Zoology
CAS BI 303 Evolutionary Ecology
CAS BI 306 Biology of Global Change
CAS BI 315 Systems Physiology
CAS BI/CH 422 Biochemistry 2
CAS BI/NE 449 Neuroscience Design Lab
CAS BI 519 Theor. Evol. Ecology
CAS BB 522 Molecular Biology Lab
CAS BI 550 Marine Genomics
CAS BI Undergrad. Research Courses (first 4-credit semester)

10/13/2023

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REGISTRATION NOTES:

- **Permission required courses:** Students may not register for these courses on their own, but need the instructor's permission. An [Add/Drop form](#) may be required for registration (no advisor signature needed).
- **Full time status** is 12-18 credits per semester. Seniors are automatically awarded a fee waiver so that they may take up to 20 credits per semester without additional fees. Non-seniors with a 3.3 GPA may submit the [CAS Course Overload Fee Waiver form](#).
- **PDP, ROTC, and CAS FY/SY courses do not count** toward the 128 credits needed to graduate with a BA.
- The following courses **do not count** toward the Biology or BMB major or minor:
 - CAS BI 114 Human Infectious Diseases
 - CAS/MET BI 210 Human Anatomy
 - CAS BI 528 (unless both sections of BI 527/528 are taken)
 - MET BI 366 Neurobio. of Consc. & Evol. of Lang.
 - CAS BI Readings or Research Courses (2 credits)

CELL & MOLECULAR

CAS BI 108: BIOLOGY 2

Prereq: High school biology and one semester college chemistry strongly recommended.

For students planning to major in the natural sciences and for premedical students. Required for biology majors. It is strongly recommended students complete CAS CH 101 (or equivalent) before this course. High school biology is assumed. Biochemistry, cell & molecular biology, Mendelian & molecular genetics, physiology, and neurobiology. Three hours lecture, three hours lab. This course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry II, Quantitative Reasoning II, Teamwork/Collaboration, Critical Thinking

Lecture

A1	Loechler	Mon,Wed,Fri	10:10am - 11:00am
A2	Hartmann	Mon,Wed,Fri	11:15am - 12:05pm
A3	Spilios	Mon,Wed,Fri	1:25pm - 2:15pm

Lab

B1	Mon	2:30pm - 5:15pm	D3	Wed	2:30pm - 5:15pm
B2	Mon	2:30pm - 5:15pm	D4	Wed	2:30pm - 5:15pm
B3	Mon	2:30pm - 5:15pm	D5	Wed	2:30pm - 5:15pm
B4	Mon	6:30pm - 9:15pm	D6	Wed	6:30pm - 9:15pm
B6	Mon	6:30pm - 9:15pm	D7	Wed	6:30pm - 9:15pm
C0	Tue	8:00am - 10:45am	E0	Thu	8:00am - 10:45am
C1	Tue	8:00am - 10:45am	E1	Thu	8:00am - 10:45am
C2	Tue	8:00am - 10:45am	E2	Thu	8:00am - 10:45am
C3	Tue	12:30pm - 3:15pm	E3	Thu	12:30pm - 3:15pm
C4	Tue	12:30pm - 3:15pm	E4	Thu	12:30pm - 3:15pm
C5	Tue	3:30pm - 6:15pm	E5	Thu	12:30pm - 3:15pm
C6	Tue	3:30pm - 6:15pm	E6	Thu	3:30pm - 6:15pm
C7	Tue	3:30pm - 6:15pm	E7	Thu	3:30pm - 6:15pm
C8	Tue	6:30pm - 9:15pm	E8	Thu	3:30pm - 6:15pm
C9	Tue	6:30pm - 9:15pm	E9	Thu	6:30pm - 9:15pm
D2	Wed	8:00am - 10:45am	F0	Thu	6:30pm - 9:15pm
			F1	Fri	8:00am - 10:45am

Notes: Meets with CAS BI 116 lecture.

Textbooks & Technology: Hillis et al, *Principles of Life*, 3rd ed, Sinauer, 2019; ExamSoft Account.

Grading: Lecture exams and quizzes account for approximately 2/3 of the final grade and lab accounts for approximately 1/3 of the final grade.

CAS BI 114: HUMAN INFECTIOUS DISEASES

Prereq: None

Not for Biology major or minor credit. A study of the world's major human diseases, their causes, effects on history, pathology, and cures. Principles of immunology. Emphasis on present maladies such as AIDS, herpes, cancer, mononucleosis, tuberculosis, influenza, and hepatitis. This course is appropriate for non- majors and students in the health and paramedical sciences (Sargent College). Three hours lecture, three hours lab. This course fulfills a single unit in the following BU Hub area(s): Scientific Inquiry I, Quantitative Reasoning II, Critical Thinking.

Lecture

A1	Beg	Mon,Wed,Fri	9:05am - 9:55am
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Lab

B1	Mon,Wed	2:30pm - 4:15pm	C3	Tue,Thu	3:30pm - 5:15pm
C1	Tue,Thu	9:00am - 10:45am	D1	Mon,Wed	10:10am - 11:55am
C2	Tue,Thu	1:30pm - 3:15pm	D2	Mon,Wed	12:20pm - 2:05pm

Notes: Not for Biology major or minor credit.

Textbooks & Technology: Foster et al., *Microbiology: The Human Experience*, 1st ed, 2017, TopHat Account.

Grading: 4 lecture exams; laboratory.

CAS BI 116: BIOLOGY 2 WITH ISE LAB

Prereq: CH 101

Coreq: CH 116

Integration of general chemistry with biology and neuroscience, with an emphasis on how each discipline interacts experimentally. Laboratory focuses on projects relating to enzymes and their function. 3 lecture hours (meets with CAS BI 108 lecture), 3 hours lab. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry II, Quantitative Reasoning II, Writing-Intensive Course, Critical Thinking.

Lecture

A1	Loechler, Spilios	Mon,Wed,Fri	10:10am - 11:00am
A2	Hartmann, Spilios	Mon,Wed,Fri	11:15am - 12:05pm
A3	Spilios, Loechler	Mon,Wed,Fri	1:25pm - 2:15pm

Lab

L1	Wed, Fri	8:00am - 10:45am	L2	Wed, Fri	2:30pm - 5:15pm
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Notes: Meets with BI 108 Lecture.

Textbooks & Technology: Hillis et al, *Principles of Life*, 3rd ed, Sinauer, 2019; TopHat Account; ExamSoft Account.

Grading: 4 lecture exams (52%), lecture homework (2%), in-lecture quizzes (4%), in-lecture TopHat questions (2%), lab (40%).

CELL & MOLECULAR

CAS BI 203: CELL BIOLOGY

Prereq: (BI 108/116 or NE 102) and CH 102 or equivalent.

Coreq: CH 203 or equivalent.

Principles of cellular organization and function: biological molecules, flow of genetic information, membranes and subcellular organelles, and cell regulation. Three hours lecture, one hour discussion. This course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry I, Quantitative Reasoning I, Critical Thinking.

Lecture

A1	Hartmann	Tue, Thu	9:30am - 10:45am
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Discussion

B1	Wed	12:20pm - 1:10pm
B2	Wed	3:35pm - 4:25pm
B3	Fri	8:00am - 8:50am
B4	Fri	11:15am - 12:05pm

Notes: Students may receive credit for CAS BI 203 or 213, but not both courses.

Textbook & Technology: *The Cell* 8e by Geoffrey Cooper, Oxford University Press, 2018, electronic access to Dashboard (supplied with certain editions of the textbook available through the BU Bookstore)

Grading: Four midterm exams, homework, and in class questions.

CAS BI 206: GENETICS

Prereq: BI 108/116 and CH 203 or equivalent

Principles of classical, molecular, and evolutionary genetics derived from analytical, molecular, and whole genome cytological evidence in animals, plants, and microorganisms. For CMG and BMB majors, BI 216 is highly recommended instead of BI 206. Three hours lecture, one hour discussion. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Historical Consciousness, Quantitative Reasoning II, Critical Thinking.

Lecture

A1	Celenza	Tue, Thu	12:30pm - 1:45pm
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Discussion

B1	Mon	12:20pm - 1:10pm	D1	Wed	8:00am - 8:50am
B2	Mon	12:20pm - 1:10pm	D2	Wed	12:20pm - 1:10pm
B3	Mon	1:25pm - 2:15pm	D3	Wed	1:25pm - 2:15pm
B4	Mon	2:30pm - 3:20pm	D5	Wed	2:30pm - 3:20pm
C1	Tue	8:00am - 8:50am			

Notes: Meets with BI 282 and with BI 216 for the first half of the semester. Students may receive credit for CAS BI 206 or 216, but not both courses.

Textbooks & Technology: Required textbook: "Genetics: From Genes to Genome"; Hartwell et al.; Publisher: McGraw-Hill Edition, 8th edition. Earlier editions of the textbook will not be supported. We are participating in the BU Bookstore's FirstDay program which offers you the e-textbook and Connect subscription for a discounted price and is integrated into Blackboard. Graded chapter review quizzes will be given through Connect, so it is highly recommended to use the FirstDay program to purchase all materials at the discounted price.

Grading: Average of four exam scores given during the semester (75%); discussion (25%)

CELL & MOLECULAR

CAS BI 216: INTENSIVE GENETICS

Prereq: BI 108/116 and BI 203/213, and CH 203 or consent of instructor

Advanced alternative to CAS BI 206, emphasizing depth of coverage, class discussion, and reading research papers. BI216 (instead of BI206) is highly recommended for BMB majors and Biology majors in the CMG track. Principles of classical, molecular, and evolutionary genetics derived from analytical, molecular, and whole genome cytological evidence in animals, plants, and microorganisms. Three hours lecture, one hour discussion. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Historical Consciousness, Quantitative Reasoning II, Research and Information Literacy.

Lecture

A1	Celenza, Loechler	Tue,Thu	12:30pm - 1:45pm
		Thu	6:30pm - 8:15pm*

*Thursday evening timeslot reserved for exams after spring break.
Exams are coordinated with CH 204/214 exam blocks to avoid overlap.

Discussion

B1	Mon	12:20pm - 1:10pm	D2	Mon	11:15am - 12:05pm
B2	Mon	2:30pm - 3:20pm	E1	Wed	10:10am - 11:00am
D1	Wed	2:30pm - 3:20pm	E2	Tue	8:00am - 8:50am

Notes: Meets with BI206/282 for the first half of the semester. Students may receive credit for BI 216 or 206 but not both courses.

Textbooks & Technology: Required textbook: "Genetics: From Genes to Genome"; Hartwell et al.; Publisher: McGraw-Hill Edition, 8th edition. Earlier editions of the textbook will not be supported. We are participating in the BU Bookstore's FirstDay program which offers you the e-textbook and Connect subscription for a discounted price and is integrated into Blackboard. Graded chapter review quizzes will be given through Connect, so it is highly recommended to use the FirstDay program to purchase all materials at the discounted price.

Grading: Average of four exam scores given during the semester (75%); discussion (25%)

CAS BI 328: CELL BIOLOGY & TRANSLATIONAL MEDICINE

Prereq: CAS BI 203

This course integrates recent advances in Cell Biology research with the latest developments in translational medicine. The course includes a student-led discussion of topical articles in cell biology and translational medicine.

Lecture

A1	Beffert	Tue,Thu	9:30am - 10:45am
B1	Beffert	Fri	11:15am - 12:05am

Textbooks & Technology: Scientific papers will be made available to the students throughout the course via Blackboard.

Grading: 2 midterms, oral presentation, participation

CAS BI 282: FUNDAMENTALS OF BIOLOGY 2

Prereq: (CAS CH182) or equivalent, and consent of instructor.

Principles of classical, molecular, and evolutionary genetics derived from analytical, molecular, and whole genome cytological evidence in animals, plants, & microorganisms. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Historical Consciousness, Quantitative Reasoning II, Critical Thinking.

Lecture

A1	Celenza	Tues,Thu	12:30pm - 1:45pm
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Lab

B1	Mon	12:20pm - 1:10pm	C1	Tue	8:00am - 8:50am
B4	Mon	2:30pm - 3:20pm	D3	Wed	1:25pm - 2:15pm

Notes: Limited to seven-year medical students. Meets with BI 206.

Textbooks & Technology: See BI 206.

Grading: See BI 206.

CAS BI 385: IMMUNOLOGY

Prereq: BI 203, BI 206 and junior standing

The constituents and regulation of mammalian immune systems are described at the levels of the gene, protein, and cell. Topics include nonspecific, T cell and B cell recognition and responses, genetics of immune receptors, inflammation, tolerance, memory, and evolution and manipulation of defense systems. Three hours lecture, one hour discussion.

Lecture

A1	Siggers	Mon,Wed,Fri	1:25pm - 2:15pm
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Discussion

C1	Wed	12:20pm - 1:10pm	G1	Wed	11:15am - 12:05pm
D1	Thu	8:00am - 8:50am	H1	Wed	11:15am - 12:05pm
E1	Fri	2:30pm - 3:20pm	I1	Fri	3:35pm - 4:25pm

Textbooks & Technology: Peter Parham. *The Immune System*. 4th Edition. Garland Science Publishing, NY, NY; TopHat Account.

Grading: 3 exams (2 midterms and 1 final) 80%; discussion/participation 20%.

CELL & MOLECULAR

CAS BI 411: MICROBIOME: OUR INTIMATE RELATIONSHIP WITH MICROORGANISMS

Prereq: BI 203 (or equivalent) and BI 206 (or equivalent)

There are more bacterial cells inhabiting our bodies than actual human cells. This abundant and diverse population of microbes – referred to as the “microbiome” – colonizes several tissues in our body and plays important roles in maintaining our health. Topics will include the evolutionary, ecological, cellular, molecular and medical aspects of the interactions between animals and the bacterial communities that have evolved with them. Three hours lecture; one hour discussion.

Lecture and Discussion

A1	Frydman	Tue,Thu	3:30pm - 4:45pm
		Thu	5:00pm - 5:50pm

Notes: Meets with GRS BI 611.

Textbooks & Technology: Scientific papers will be made available to the students throughout the course via Blackboard.

Grading: Midterm 30%; Oral Presentation and Discussion 20%; Final Exam 40%; Participation 10%.

CAS BI 422: BIOCHEMISTRY 2

Prereq: BI/CH 421 or equivalent

Cell metabolism, with special emphasis on the uptake of food materials, the integration and regulation of catabolic, anabolic, and anaplerotic routes, and the generation and utilization of energy. Lectures include consideration of events in prokaryotic and eukaryotic organisms.

Lecture

A1	Tolan	Mon,Wed,Fri	9:05am - 9:55am
		Wed	7:00pm - 9:00pm

**Wednesday evening timeslot reserved for exams*

Lab & Discussion

B1	Mon	6:00pm - 10:00pm	Lab
B2	Tue	8:00am - 12:00pm	Lab
B3	Tue	5:30pm - 9:30pm	Lab
B5	Thu	8:00am - 12:00pm	Lab
B6	Thu	5:30pm - 9:30pm	Lab
B7	Fri	10:10am - 2:10pm	Lab
B8	Fri	3:35pm - 7:35pm	Lab
C1	Fri	1:30pm - 3:15pm	Discussion
C2	Mon	2:30pm - 4:15pm	Discussion
C3	Tue	3:30pm - 5:15pm	Discussion

Notes: Meets with CAS CH 422 A1 and GRS BI/CH 622 A1.

Textbooks & Technology: 1) Tolan & Medrano, *Biochemistry Laboratory Manual*, 5th Ed., 2020. 2) Lehninger's *Principles of Biochemistry 8th edition* by Nelson, Cox & Hoskins 3) Achieve
Grading: Homework, hour exams, creativity project, lab, final.

CAS BI 481: MOLECULAR BIOLOGY OF THE NEURON

Prereq: BI 325 (preferred) or BI 203.

Topics include electrical properties of neurons, a survey of neurotransmitters, molecular structure and function of receptors, synaptic transmission, intracellular signaling, and the molecular biology of sensory transduction.

Independent

A1	Ho	Mon, Wed	2:30pm - 4:15pm
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Notes: Meets with CAS NE 481 and GRS BI 681.

Textbooks & Technology: none.

Grading: 2 midterms, 1 final exam, and discussion.

CAS BI 510: INSTITUTIONAL RACISM IN HEALTH AND SCIENCE

Prereq: CAS BI 126 or CAS 206/216 or ENG BE 209 and senior standing

Historically, pseudoscientific theories have provided the justification for establishing and maintaining racial hierarchies, which resulted in centuries of dehumanizing and unethical practices meted out to Blacks, Indigenous, and People of Color (BIPOC). Unfortunately, many of these pernicious ideas persist, such that they hinder BIPOC's opportunities in Science and exacerbate their health outcomes. This course traces the historical roots (e.g. mischaracterization of race as a biological construct) and physiological manifestations of racism in science, and examines harmful consequences on victims' health outcomes.

Independent

A1	Osborne	Tue, Thu	12:30pm - 3:15pm
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Notes: Meets with ENG BF 510.

Textbooks & Technology: *Superior: The Return of Race Science* by Angela Saini ISBN-13 978-0-8070-2842-1; Assigned papers

Grading: Writing assignments/homework, discussion, capstone project

CELL & MOLECULAR

CAS BB 522: MOLECULAR BIOLOGY LAB

Prereq: BI 552

Introduction to techniques of cellular and molecular biology research, including analysis of DNA and protein molecules, by techniques such as plasmid isolation, restriction enzyme digestions, PCR, subcloning, DNA sequence analysis, reporter gene assays, mammalian cell culturing, immunofluorescence, yeast molecular biology, RNA isolation and quantification, RT-qPCR analysis and introduction to RNA-seq bioinformatic analysis.

Lab

A1 Wunderlich Tue,Thu 1:00pm - 4:45pm

Notes: Permission required.

Textbooks & Technology: Lab guide provided on Blackboard

Grading: Midterm (20%); final (20%); lab reports (35%); lab participation and preparation (25%).

CAS BI 553: MOLECULAR BIOLOGY 2

Prereq: BI 552, recommended: BI/CH 421/422

This course focuses on gene regulatory mechanisms with emphasis on eukaryotes, and current research in molecular biology. General areas of focus include genomics, gene regulation, and cell signaling. Course topics include genome organization and DNA rearrangement, RNA interference and noncoding RNAs, gene editing, mouse transgenic approaches, signal transduction pathways, chromatin structure, and cell cycle. Research articles and molecular biology approaches will be discussed.

Independent

A1 Naya Tue,Thu 9:00am - 10:45am

Textbooks & Technology: none.

Grading: Three exams, discussion, participation.

CAS BI 559: QUANTITATIVE MICROBIOLOGY

Prereq: BI 108 or equivalent, MA 121 or equivalent, and PY 105 or equivalent

Important bacterial behaviors and phenomena are described with mathematical models including growth, multispecies interactions, motility, and cell differentiation. Every subject is motivated directly by experimental data, with specific discussion of the techniques used to collect the data, their biases, and their limitations. The goal is to show how quantitative models can give a unified, conceptual understanding of complicated, living systems and generate new hypotheses for experiments. Homework assignments will be in python and the course will include an introduction to python. No prior programming experience needed. Even though the course deals specifically with prokaryotes, the techniques and approaches learned are applicable to any area of the life sciences.

Independent

L1 Larkin Mon, Wed, Fri 4:30pm - 6:15pm

Notes: Meets with GRS PY 896

Textbooks & Technology: None. Required reading will be provided by the instructor.

Grading: Homework (75%), Final presentation or project (25%)

CAS BI 576: CARCINOGENESIS

Prereq: BI 203, BI 206, BI 552

The course covers multiple aspects of cancer biology with a focus on molecular mechanisms underlying cancer development and progression, and the implications for therapy. Topics include oncogenes, tumor suppressors, apoptosis, angiogenesis, metastasis, mouse models, cancer immunity, immunotherapy, and chemotherapy. Emphasis on current research.

Lecture

A1 Tullai Mon 2:30pm - 4:15pm
Wed 2:30pm - 3:20pm

Discussion

B1 Wed 3:35pm - 4:25pm
B2 Wed 4:40pm - 5:30pm
B3 Thu 3:35pm - 4:25pm

Notes: No credit if CAS BI 327 or GMS BT 520 were taken previously.

Textbooks & Technology: Weinberg (2013). *The Biology of Cancer*. Garland Science.

Grading: Three exams, presentation, participation.

CELL & MOLECULAR

CAS BI 589: NEURAL IMPACTS ON TUMORIGENESIS

Prereq: NE 203 or BI 325

It has been known for some time that cancer cells leverage the tissue around them in order to allow for the formation and growth of a tumor, and ultimately to aid in its invasion of adjacent tissue and metastasize. Recent studies have shown a novel symbiotic interaction between the peripheral nervous system and tumors using reciprocal cross-talk. Topics of discussion will include neuronal invasion and mechanisms of neurogenesis into solid tumors, cross-talk in tumor microenvironments, nervous system influence on cancer modulators such as stem cells, inflammation and immune surveillance and extracellular signaling events that enhance tumorigenesis with attention paid to potential therapeutic interventions. Finally, we will explore if this nervous system/cancer interface might be a mediator for the effects of stress-induced cancer.

Independent

A1 Tullai Tue, Thu 1:30pm - 3:15pm

Notes: Meets with NE 589.

Textbooks & Technology: Primary literature will be provided on the Blackboard site.

Grading: Weekly quizzes, individual class presentations and participation in daily literature discussions.

Hub Units: Scientific Inquiry 2, Oral/Signed Communication, Research and Information Literacy

CAS BI 594: R STATISTICS FOR BIOLOGISTS

In this course, we focus on the application of common statistical techniques to complex biological datasets. Class is designed for young scientists across biological disciplines. Our goal is to better understand how to leverage statistical concepts to design and interpret experiments. Students are encouraged to incorporate their own data into class exercises. By the end of the course, you should be prepared to develop, fit, and interpret statistical models for a wide range of experiments. Learning Outcomes: Core learning goal is to understand statistical models for a wide range of experiments.

Independent

A1 Serrato-Capuchina TBD

Additional electives for the CMG specialization can be found in other sections of the Course Directory.

A list of courses accepted toward the CMG specialization can be found in the Bulletin at www.bu.edu/biology/cmg-bulletin.

ECOLOGY, BEHAVIOR & EVOLUTION

CAS BI 225: BEHAVIORAL BIOLOGY

Prereq: BI 107, BI 108 and sophomore standing. Seats reserved for Behavioral Biology majors; other students must receive consent of instructor. BI 225 and BI 407 cannot be taken concurrently, and BI 225 cannot be taken following completion of BI 407.

Introduction to the evolution, ecology, physiology, neurobiology and genetics of behavior, from classic studies to current trends. Topics include behavioral adaptation, hormones and behavior, nerve cells, circuits, neuromodulators and behavior, behavioral genetics and genomics, the development of behavior, communication, reproductive behavior, social evolution and culture, cooperation and altruism, sociality and brain evolution. Emphasis on the integrative analysis of behavior. This course fulfills a single unit in each of the following BU Hub areas: Oral and/or Signed Communication, Writing-Intensive Course, Philosophical Inquiry and Life's Meanings.

Lecture

A1 Pain Tue, Thu 12:30pm - 1:45pm

Discussion

B1 Pain Thu 3:35pm - 4:25pm

B2 Pain Fri 9:05am - 9:55am

Textbooks & Technology: Primary literature and complementary readings; Traniello, *Behavioral Biology*, 1st ed., 2012; Alcock, *Animal Behavior*, edition TBA

Grading: 3 quizzes, research paper and class presentation, article analysis and discussion, engagement, and participation.

CAS BI 260: MARINE BIOLOGY

Prereq: BI 107

Life in the seas: its ecology, evolution, and human impacts. Includes behavioral, physiological, structural, ecological, and evolutionary perspectives. A prerequisite for the Marine Semester. Effective Spring 2019, this course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry I, Critical Thinking, Research and Information Literacy.

Lecture

A1 Francis Mon, Wed, Fri 10:10am - 11:00am

Discussion

B1 Mon 2:30pm - 3:20pm C3 Tue 3:35pm - 4:25pm

B2 Wed 4:40pm - 5:30pm E1 Thu 11:15pm - 12:05pm

C1 Thu 3:35pm - 4:25pm F1 Fri 9:05am - 9:55am

C2 Tue 11:15am - 12:05pm

Textbooks & Technology: Castro & Huber. *Marine Biology*. 9th Edition

Grading: Three exams, discussion, and participation.

CAS BI 302: VERTEBRATE ZOOLOGY

Prereq: BI 107

Methods and principles of comparative vertebrate zoology. Phylogeny, natural history, adaptation, and taxonomy. Laboratory emphasis on correlation among structural, physiological, and evolutionary features of selected vertebrates by both dissection and experimentation. Field trips. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Historical Consciousness, Scientific Inquiry II, Critical Thinking.

Lecture

A1 Wasserman Tue, Thu 11:00am - 12:15pm

Lab

B1 Tue, Thu 8:00am - 10:45am

B2 Tue, Thu 12:30pm - 3:15pm

Textbooks & Technology: Pough, et al. *Vertebrate Life*. 10th edition

Grading: Multiple lecture quizzes, lab quizzes, and class participation.

CAS BI 303: EVOLUTIONARY ECOLOGY

Prereq: BI 107 recommended: BI 206, MA 121/123

Investigation of ecological processes and patterns at the individual, population, and community level. An evolutionary approach is emphasized. One day-long field trip required. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry II, Quantitative Reasoning II, Digital/Multimedia Expression.

Lecture

A1 Helmberger Mon, Wed, Fri 11:15am - 12:05pm

Lab

B1 Mon 2:30pm - 5:15pm

C1 Tue 3:30pm - 6:15pm

E1 Thu 12:30pm - 3:15pm

F1 Fri 2:30pm - 5:15pm

Textbooks & Technology: Molles. *Ecology*. 6th Edition

Grading: Two exams, a final exam, lab, 3-minute video assignment, and participation.

ECOLOGY, BEHAVIOR & EVOLUTION

CAS BI 306: BIOLOGY OF GLOBAL CHANGE

Prereq: BI 107, Recommended: CH 101 or CH 171

The ecological impacts of human activity on the Earth's climate and terrestrial and aquatic ecosystems. Climate change, productivity and land-atmosphere feedbacks. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry II, Ethical Reasoning, Research and Information Literacy.

Lecture

A1 Scavo Mon,Wed,Fri 10:10am - 11:00am

Lab

B1 Mon 2:30pm - 5:15pm D1 Wed 2:30pm - 5:15pm

C1 Tue 12:30pm - 3:15pm E1 Thu 3:30pm - 6:15pm

Textbooks & Technology: There is no required textbook for this course. Readings will be assigned from the scientific literature and will be available through Blackboard.

Grading: Two exams (20%), final exam (30%), lab and participation (30%).

CAS BI 309: EVOLUTION

Prereq: CAS BI 107 and CAS BI 108 or equivalent.

Introduction to modern concepts, controversies, and analytical approaches in evolutionary biology. Topics include adaptation, natural and sexual selection, species and speciation, phylogenetics, comparative analysis, basic population and quantitative genetics, origin of novelty, adaptive radiation, development and evolution.

Lecture

A1 Strickland Mon, Wed, Fri 2:30pm - 3:20pm

Discussion

B1 Wed 12:20pm - 1:10pm

B2 Thu 3:35pm - 4:25pm

Textbooks & Technology: Herron and Freeman, *Evolutionary Analysis*, 5th ed., Pearson, 2013

Grading: 2 midterms (50%), final (25%), and discussion (25%)

Hub Units: Ethical Reasoning

CAS BI 413: MICROBIAL ECOLOGY

Prereq: BI 107 & BI 108 and CH 101 & CH 102

Microbes (bacteria, archaea, and fungi) are the most diverse and abundant living organisms on the planet and microbial communities are key contributors to ecosystems and their functioning. This course studies how microbes interact with each other and with the environment. Topics will include microbial cell structure and physiology, microbe-microbe interactions including biofilm formation and quorum sensing, and microbe-environment interactions including microbiomes and geochemical cycling.

Lecture and Discussion

A1 Marlow Tues, Thu 9:30am - 10:45am

Wed 9:05am - 9:55am

Notes: Meets with GRS BI 613.

Textbooks & Technology: *Processes in Microbial Ecology* (2nd Edition), David L. Kirchman, ISBN: 978-0198789413

Grading: Two exams (15%), final paper (25%), homework (15%), discussion participation and presentation (30%).

CAS BI 500: SHARK BIOLOGY & CONSERVATION

Prereq: some background in ecology and/or evolution recommended.

Explores the natural history and behavior of sharks and their relationship to other animals in the ecosystem. Conservation of sharks and other elasmobranchs is crucial to ecosystem function and requires accurate scientific knowledge to implement the best conservation practices. Effective Spring 2021, this course fulfills a single unit in each of the following BU Hub areas: Oral and/or Signed Communication, Scientific Inquiry II, Research and Information Literacy.

Independent

A1 Lobel Tue,Thu 9:00am - 10:45am

Textbooks & Technology: All materials provided in class.

Grading: Midterm 40%; Project and Discussion 40%; Dissection lab 10%; Participation 10%

CAS BI 505: EVOLUTION AND DEVELOPMENT

Prereq: BI 107 and BI 303 or BI 309

This course focuses on the evolution of development. We explore how biodiversity arises by examining the intersection of development, genetics, evolution and ecology. Topics include: the origin of novel traits, developmental constraints, heterochrony, epigenetic inheritance, evolution of gene networks, developmental systems drift and the evolution of complex traits. We also cover common tools used in Evo Devo research, including: RNAseq, RNA interference, CRISPR/Cas-9 and in situ hybridization.

Independent

A1 Casasa Mon, Wed 2:30pm - 4:15pm

ECOLOGY, BEHAVIOR & EVOLUTION

CAS BI 506: PHENOTYPIC PLASTICITY

Prereq: BI 107 and one of the following: BI 303, BI 309, BI 315, or BI 410 or consent of instructor.

Explores the flexible phenotype as a product of development and a target of natural selection, and addresses the role of phenotypic plasticity in ecological interactions and evolutionary diversity. Topics: mechanisms and evolution of plasticity; role of plasticity in ecology, diversification of life, and conservation in a changing environment.

Lecture and Discussion

A1	Warkentin	Mon, Wed, Fri	10:10am - 11:00am
B1	Warkentin	Wed	1:25pm- 2:15pm
B2	Warkentin	Wed	2:30pm- 3:20pm

Textbooks & Technology: Chapters from Gibert & Epel, *Ecological Developmental Biology* (2nd edition 2015), West-Eberhard *Developmental Plasticity and Evolution* (2003), Papers from the scientific literature and chapters from other books posted on the course website.

Grading: Multi-stage project, peer reviews, leading discussion, class participation, quizzes

CAS BI 530: FOREST ECOLOGY

Prereq: BI 107 and (BI 303 or BI 306)

The major biotic and abiotic factors influencing forest ecosystem composition, structure, and function. Role of solar radiation, hydrology, soils, succession, and management of forest ecosystems. Includes New England case study. Three hours lecture plus discussion. Effective Spring 2023, this course fulfills a single unit in each of the following BU Hub areas: Oral and/or Signed Communication, Scientific Inquiry II, Research and Information Literacy.

Lecture and Discussion

A1	Helmberger	Tues, Thu	11:00am - 12:15pm
		Wed	1:25pm - 2:15pm

Notes: Meets with EE 530.

Textbooks and Technology: DA Perry, R Oren and SC Hart, *Forest Ecosystems*. 2008, Johns Hopkins University Press.

Grading: Two exams (40%), Class assignments (55%), Class participation (5%)

CAS BI 508: BEHAVIORAL ECOLOGY

Examination of the adaptive significance of behavior in an ecological context. Topics include the evolution of social behavior, mating systems, sexual selection, alternative reproductive behaviors, life history strategies, optimal foraging, territoriality, cooperation and conflict, host-parasite co-evolution, the ecology of communication, and comparative analyses. The course emphasizes basic concepts and theory as well as model-based and experimental approaches to exploring questions in Behavioral Ecology. Empirical examples will emphasize vertebrate animals, but some examples will involve other metazoans (e.g., insects and such) and human behavior.

A1	Sorenson	Mon, Wed, Fri	TBD
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CAS BI 550: MARINE GENOMICS

Prereq: BI 108/116 or equivalent.

Covers the evolution of genomes, the architecture of gene networks, and the connection between genotype and phenotype in marine organisms, as well as the technical development of modern genomics. Student research projects utilize modern genomics experimental approaches. Effective Fall 2019, this course fulfills a single unit in the following BU Hub area: Teamwork/ Collaboration.

Independent

A1	Finnerty	Tue, Thu	12:30pm - 3:15pm
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Textbooks and Technology: Readings are from lecture handouts prepared by the professor and articles in the primary literature.

Grading: based primarily on original research

CAS BI 519: THEORETICAL EVOLUTIONARY ECOLOGY

Prereq: CAS BI 107 and CAS MA 121/123 (also recommended: CAS BI 225 OR CAS BI 303 OR CAS BI 309); or consent of the instructor.

Familiarizes students with the theory of evolutionary ecology. Students gain enough background to read theoretical evolutionary ecology literature, do simple modeling, and move on to more complex theory. Students gain experience through homework assignments and computer labs.

Lecture and Lab

A1	Schlatter	Mon, Wed, Fri	11:15am - 12:05pm
		Tue	3:30pm - 6:15pm

Textbooks and Technology: none

Grading: homework, labs, and three exams

Additional electives for the ECB specialization can be found other sections of the Course Directory.

A list of courses accepted toward the ECB specialization can be found in the Bulletin at www.bu.edu/biology/ecb-bulletin.

Additional electives for the SBB specialization can be found in other sections of the Course Directory.

A list of courses accepted toward the SBB specialization can be found in the Bulletin at www.bu.edu/biology/sbb-bulletin.

PHYSIOLOGY & NEUROBIOLOGY

CAS BI 210: HUMAN ANATOMY

Prereq: BI 105 or equivalent

Not for Biology major or minor credit. Intensive pre-professional course for students whose programs require anatomy. Gross structure of the human body; skeletal, muscular, nervous, respiratory, circulatory, digestive, urinary, and reproductive systems. Lab requires dissection. Effective Spring 2020, this course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry I, Digital/Multimedia Expression, Creativity/Innovation.

Lecture

A1 Co Mon,Wed,Fri 11:15am - 12:05pm

Lab

B1	Mon	12:20pm - 2:05pm	D2	Wed	12:20pm - 2:05pm
B2	Mon	2:30pm - 4:15pm	D3	Wed	2:30pm - 4:15pm
C1	Tue	9:00am - 10:45am	E1	Thu	1:30pm - 3:15pm
C3	Tue	3:30pm - 5:15pm	E2	Thu	3:30pm - 5:15pm
D1	Wed	8:00am - 11:45am	E3	Thu	6:00pm - 7:45pm
C2	Tue	1:30pm - 3:15pm			

Notes: Not for Biology major or minor credit.

Textbooks & Technology: Co, 1e, Anatomy & Physiology

Grading: 3 midterm lecture exams; 1 cumulative lecture final; 2 laboratory practical exams.

CAS BI 315: SYSTEMS PHYSIOLOGY

Prereq: (BI 108 or ENG BE 209), and CH 101 & CH 102, and First-Year Writing Seminar (e.g., CAS WR 120), or equivalent.

An introduction to physiological principles applied across all levels of organization (cell, tissue, organ system). Preparation for more advanced courses in physiology. Topics include homeostasis and neural, muscle, respiratory, cardiovascular, renal, endocrine, gastrointestinal, and metabolic physiology. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry II, Writing-Intensive Course, Critical Thinking, Teamwork/Collaboration.

Lecture

A1 Muscedere Mon, Wed, Fri 12:20pm - 1:10pm

Lab

B1	Mon	2:30pm - 5:15pm	D2	Wed	2:30pm - 5:15pm
B2	Mon	2:30pm - 5:15pm	D3	Wed	2:30pm - 5:15pm
B3	Mon	6:30pm - 9:15pm	D4	Wed	6:30pm - 9:15pm
B4	Mon	6:30pm - 9:15pm	E1	Thu	8:00am - 10:45am
C1	Tue	8:00am - 10:45am	E2	Thu	12:30pm - 3:15pm
C2	Tue	12:30pm - 3:15pm	E5	Thu	12:30pm - 3:15pm
C3	Tue	6:30pm - 9:15pm	F1	Fri	8:00am - 10:45m
C4	Tue	6:30pm - 9:15pm			
D1	Wed	8:00am - 10:45am			

Textbooks & Technology: Widmaier et al., Vander's Human Physiology: The Mechanisms of Body Function, 16th ed., McGraw-Hill Education, 2022; TopHat Account

Grading: Lecture (60%: 4 exams, small assignments); Lab (40%, 4 writing assignments, teamwork assignments).

PHYSIOLOGY & NEUROBIOLOGY

CAS BI 325: PRINCIPLES OF NEUROSCIENCE

Prereq: CAS BI 203 or consent of instructor.

This course will introduce fundamentals of the nervous system at descriptive scales ranging from individual cells to the entire brain. Topics will include biophysics of excitable membranes, synaptic transmission, sensory and motor systems, learning and memory, plasticity, neuromodulation, and the biological basis of complex behaviors. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Scientific Inquiry II, Critical Thinking.

Lecture

A1	Cruz-Martin	Tue,Thu	2:00pm - 3:15pm
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Discussion

B1	Mon	2:30pm - 3:20pm
B2	Wed	3:35pm - 4:25pm
B3	Thu	3:35pm - 4:25pm

Textbooks & Technology: Bear, et al. *Neuroscience: Exploring the Brain*. 4th Ed. Wolters Kluwer.

Grading: Three midterms.

CAS BI 349: NEUROTOXINS IN BIOLOGY, MEDICINE, AGRICULTURE AND WAR

Prereq: BI 108 or NE 102 or equivalent.

We will start by examining how neurotoxins in different animals are used for distinct behavioral needs, such as defense versus predation. Examining evolutionary lineage of different types Neurotoxins will also be discussed and give us insights on how neurotoxins evolved and their roles in evolutionary "arm race". We will also cover mechanisms of neurotoxin actions at cellular and molecular levels. At system level, envenomation by poisonous animal is of clinical importance in many parts of the world, consequences of venoms on mammalian physiological systems will be discussed. In addition to naturally occurring neurotoxins, many synthetic chemicals used as pesticides and chemical weapons are also neurotoxins. We will discuss the history, mechanisms and physiological effects of these manmade agents. Effective Fall 2019, this course fulfills a single unit in each of the following BU Hub areas: Quantitative Reasoning I, Critical Thinking.

Independent

A1	Lin	Tue,Thu	3:30pm - 5:15pm
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Notes: Meets with CAS NE 349.

Textbooks & Technology: *Neuroscience: Exploring the Brain*. Bear, Connors and Paradiso. 4th ed.

Grading: Midterm 1 (25%); Midterm 2 (25%); Final (25%)
Discussion/presentation (25%)

CAS BI 449: NEUROSCIENCE DESIGN LAB

Prereq: (BI 315 OR BI 325 OR NE 203) or consent of instructor.

Design and build devices for neuroscience experiments. Interface sensors with computers using Arduino microprocessors. Guided exercises followed by independent design projects to quantify human sensory and motor performance, or emulate animal sensory-motor circuits. All levels of programming experience accepted.

Lab

A1	Gavornik	Tue,Thu	12:30pm- 3:15pm
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Notes: Meets with CAS NE 449 and GRS BI/NE 649.

Textbooks & Technology: Purchase of an Arduino kit.

Grading: Lab notebook, project and participation.

CAS BI 481: MOLECULAR BIOLOGY OF THE NEURON

Prereq: BI 325 (preferred) or BI 203.

Topics include electrical properties of neurons, a survey of neurotransmitters, molecular structure and function of receptors, synaptic transmission, intracellular signaling, and the molecular biology of sensory transduction. This course fulfills a single unit in each of the following BU Hub areas: Oral and/or Signed Communication, Scientific Inquiry II, Research and Information Literacy.

Independent

A1	Ho	Mon, Wed	2:30pm - 4:15pm
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Notes: Meets with CAS NE 481 and GRS BI 681.

Textbooks & Technology: none

Grading: 2 midterms, 1 final exam, and discussion.

PHYSIOLOGY & NEUROBIOLOGY

CAS BI 525: BIOLOGY OF NEURODEGENERATIVE DISEASES

Prereq: (NE 102 or BI 203) and (NE 203 or BI 325).

This course focuses on understanding the molecular mechanisms that are at the basis of neurodegenerative diseases and on their impact and relevance in clinical diagnosis and treatment. Neurodegenerative diseases like Alzheimer's disease, Parkinson's disease, Amyotrophic Lateral Sclerosis, Huntington's Disease and Cruetzfeldt-Jakob disease are becoming more and more common since people are more exposed to pathogenic agents (as in Cruetzfeldt-Jakob disease and Mad Cow disease) or just encounter these diseases as a result of aging (like Alzheimer's or Parkinson's disease). Although very different from one another, these diseases share common mechanisms and features leading to neuronal death, including protein misfolding and aggregation, oxidative stress, impaired protein degradation, and apoptosis. This course will study how these molecular pathways define each disease, contributing to neurodegenerative phenomena. Relevance will be given to Alzheimer's disease. This course fulfills a single unit in each of the following BU Hub areas: Oral and/or Signed Communication, Ethical Reasoning, Research and Information Literacy.

Independent

A1	Pastorino	Mon, Wed, Fri	9:05am - 9:55am
		Wed	10:10am - 11:00am

Notes: Meets with CAS NE 525.

Textbooks & Technology: Powerpoint presentations on research articles will be provided to students the day before class.

Grading: Exams (66%), assignments (12%), paper presentation (12%), and participation in class (10%).

CAS BI 542: NEUROETHOLOGY

Prereq: CAS BI 315 or CAS NE 203, or consent of instructor.

An in-depth study of the neural mechanisms underlying natural behaviors in animals, integrating perspectives from behavioral ecology and neurobiology. Behaviors that are central to fitness will be studied in detail, including the sensory and motor bases of prey detection, predator avoidance, communication, courtship, navigation, and migration. A wide variety of non-model organisms such as honey bees, owls, bats, and crickets will be discussed. Lectures are integrated with student-led discussions of relevant research papers.

Independent

A1	Muscudere	Tue,Thu	9:00am - 10:45am
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Notes: Meets with CAS NE 542.

Textbooks & Technology: Guenther Zupanc, *Behavioral Neurobiology: An Integrative Approach*, 2nd Edition 2010, Oxford University Press, Oxford, New York.

Grading: Exams, class presentations, and participation in daily literature discussions.

SAR HS 331: PHYSIOLOGY OF SEX AND REPRRODUCTION

Prereq: CAS BI 315 or BI 211

In this course we will learn the physiological mechanisms behind fertility, gametogenesis, copulation, pregnancy and birth. We will explore the impacts of biological reproduction on the body and we will connect these topics to our everyday world. We utilize diverse perspectives and language in this class. Class time is split between active learning and lecture time. Grades are based on daily work, quizzes and presentations.

Lecture and Discussion

A1	Co	Mon, Wed, Fri	1:25pm - 2:15pm
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Notes: This course will be cross-listed with BI in future semesters. For now, please submit a petition to request that this course counts for your major's electives. It meets with SAR HS 534.

Textbooks & Technology: *Human Reproductive Biology*, 4e, Jones and Lopez

Grading: Quizzes, papers, case studies

Additional electives for the Neurobiology specialization can be found in other sections of the Course Directory.

A list of courses accepted toward the Neurobiology specialization can be found in the Bulletin at www.bu.edu/biology/nb-bulletin.

RESEARCH & READINGS

UNDERGRADUATE RESEARCH IN BIOLOGY

Undergraduate Research in Biology courses (CAS BI 140 - CAS BI 453) require an online application. For more information on research requirements and to apply, visit www.bu.edu/biology/ug-research. Time commitment is a minimum of 6 hours a week for 2-credit research and 12 hours a week for 4-credit research. 4-cr research courses can fulfill up to two Electives, one of which can count toward the three-lab requirement for Biology and specialization majors.

CAS BI 140: FIRST YEAR RESEARCH IN BIOLOGY 1

Prereq: first year standing, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for Biology major or minor credit. First semester first year laboratory research under the supervision of a Biology faculty mentor. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor.

Grading: Course grade is determined by laboratory/field work performance.

CAS BI 141: FIRST YEAR RESEARCH IN BIOLOGY 2

Prereq: first year standing, (BI 140 or UROP semester or equivalent), consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for Biology major or minor credit. Second semester first year laboratory research under the supervision of a Biology faculty mentor. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor.

Grading: Course grade is determined by laboratory/field work performance.

CAS BI 240: SOPHOMORE RESEARCH IN BIOLOGY 1

Prereq: sophomore standing, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for Biology major or minor credit. First semester sophomore laboratory research under the supervision of a Biology faculty mentor. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor.

Grading: Course grade is determined by laboratory/field work performance.

CAS BI 241: SOPHOMORE RESEARCH IN BIOLOGY 2

Prereq: sophomore standing, (BI 140 or BI 240 or UROP semester or equivalent), consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for Biology major or minor credit. Second semester sophomore laboratory research under the supervision of a Biology faculty mentor. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor.

Grading: Course grade is determined by laboratory/field work performance.

CAS BI 340: JUNIOR RESEARCH IN BIOLOGY 1 (2 CREDITS)

Prereq: junior standing, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for Biology major or minor credit. First semester junior research including the use of research literature. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings required. This course fulfills a single unit in the following BU Hub area: Research and Information Literacy.

Grading: Course grade is determined by laboratory/field work performance.

CAS BI 341: JUNIOR RESEARCH IN BIOLOGY 2 (2 CREDITS)

Prereq: junior standing, consent of instructor (faculty research mentor/sponsor), BI 340 or BI 350 or 2 semesters of first year (BI 140/141) or sophomore research (BI 240/241) or UROP semester or equivalent, and approved application.

[2 cr] Not for Biology major or minor credit. Second semester junior research including the use of research literature and active participation at group meetings. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance with oral presentations at group meetings required. This course fulfills a single unit in the following BU Hub area: Oral/Signed Communication.

Grading: Course grade is determined by laboratory/field work performance.

RESEARCH & READINGS

CAS BI 350: JUNIOR RESEARCH IN BIOLOGY 1 (4 CREDITS)

Prereq: junior standing, consent of instructor (faculty research mentor/sponsor), and approved application.

First semester junior research including the use of research literature and active participation at group meetings. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance with oral presentations at group meetings required. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy and Oral/Signed Communication.

Grading: Course grade is determined by laboratory/field work performance.

CAS BI 351: JUNIOR RESEARCH IN BIOLOGY 2 (4 CREDITS)

Prereq: junior standing, [BI 340 or BI 350 or 2 semesters of first year (BI 140/141) or sophomore research (BI 240/241) or UROP semester or equivalent], consent of instructor (faculty research mentor/sponsor), and approved application.

Second semester junior research including the use of research literature. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Students expected to attend group meetings and take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy and Creativity/Innovation.

Grading: Course grade is determined by laboratory/field work performance.

CAS BI 352: JUNIOR RESEARCH IN BIOLOGY 3 (4 CREDITS)

Prereq: junior standing, (BI 341 or BI 351 or equivalent), consent of instructor (faculty research mentor/sponsor), and approved application.

Third semester junior research including the use of the research literature. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings and final report required. Students expected to take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Writing-Intensive and Creativity/Innovation.

Grading: Course grade is determined by laboratory/field work performance.

CAS BI 450: SENIOR RESEARCH IN BIOLOGY 1

Prereq: senior standing, consent of instructor (faculty research mentor/sponsor), and approved application.

First semester senior research including the use of research literature and active participation at group meetings. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings required. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy and Oral/Signed Communication.

Grading: Course grade is determined by laboratory/fieldwork performance.

CAS BI 451: SENIOR RESEARCH IN BIOLOGY 2

Prereq: senior standing, [BI 340 or BI 350 or BI 450 or 2 semesters of first year (BI 140/141) or sophomore research (BI 240/241) or UROP semester or equivalent], consent of instructor (faculty research mentor/sponsor), and approved application.

Second semester senior research including the use of the research literature. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Students expected to attend group meetings and take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy and Creativity/Innovation.

Grading: Course grade is determined by laboratory/fieldwork performance.

CAS BI 452: SENIOR RESEARCH IN BIOLOGY 3

Prereq: senior standing, (BI 341 or BI 351 or BI 451 or equivalent), consent of instructor (faculty research mentor/sponsor), and approved application.

Third semester senior research including the use of research literature. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings and final report required. Students expected to take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Writing-Intensive and Creativity/Innovation.

Grading: Course grade is determined by laboratory performance.

RESEARCH & READINGS

CAS BI 453: SENIOR RESEARCH IN BIOLOGY 4

Prereq: senior standing, (BI 352 or BI 452 or equivalent), consent of instructor (faculty research mentor/sponsor), and approved application.

Coreq: CAS BI 497 or BI 498

Fourth semester senior research including the use of research literature. Application through the Biology Department. Research outside the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings and final report required.

Grading: Course grade is determined by laboratory performance.

HONORS RESEARCH IN BIOLOGY

Honors Research in Biology offers students the ability to participate in two semesters of mentored 4-credit research (CAS BI 401 and 402) and a 2-credit research seminar (CAS BI 497 or 498). Students also write and defend an honors thesis on their research. For more information on research requirements and to apply, visit www.bu.edu/biology/research-credit. Time commitment is minimum 12 hours/week in lab or fieldwork, meetings, data analysis, and writing.

CAS BI 401: HONORS RESEARCH IN BIOLOGY 1

Prereq: senior standing, cumulative GPA of at least 3.5, and approval of the Biology Research and Honors Committee.

First semester of Honors-level mentored laboratory or field research with a faculty member of the Biology Department leading to graduation with Honors in Biology. A minimum grade of B+ in this course and in BI 497 or 498 and BI 401/402 is required to graduate with Honors in Biology. Application through the Biology Department including use of research literature and active participation at group meetings. This course fulfills a single unit in the following BU Hub area: Research and Information Literacy and Oral/Signed Communication.

Grading: Course grade for both BI 401 and 402 is determined by laboratory performance, oral presentation, written thesis, and defense of the thesis before a committee of three faculty members. Grades for both BI 401 and 402 are determined upon completion of BI 402.

CAS BI 402: HONORS RESEARCH IN BIOLOGY 2

Prereq: senior standing, cumulative GPA of at least 3.5, and approval of the Biology Research and Honors Committee.

Honors-level mentored laboratory or field research with a faculty member of the Biology Department leading to graduation with Honors in Biology. A minimum grade of B+ in this course and in BI 497 or 498 and BI 402 is required to graduate with Honors in Biology. Application through the Biology Department including use of research literature. Students expected to attend and participate at group meetings and take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Oral/Signed Communication, Writing-Intensive, and Creativity/Innovation.

Grading: Course grade for BI 402 is determined by laboratory performance, oral presentation, written thesis, and defense of the thesis before a committee of three faculty members. Grades for both BI 401 and 402 are determined upon completion of BI 402.

CAS BI 498: HONORS RESEARCH IN BIOLOGY SEMINAR 2

Prereq: For students currently enrolled in BI 401, BI 402, or BI 453 in the spring semester.

[2 cr] A 2-credit weekly research seminar for students in BI 401, BI 402, or BI 453 in the spring semester. Students learn and present digitally produced descriptions of their research and prepare their theses for defense under the guidance of the Research and Honors Committee. A minimum grade of B+ in this course and BI 402 is required to graduate with honors. Students participate in only one course, either BI 497 or BI 498. This course fulfills a single unit in the following BU Hub areas: Digital/Multimedia Expression.

Grading: Attendance and participation.

RESEARCH & READINGS

GRADUATE RESEARCH IN BIOLOGY

Graduate Research in Biology is offered as part of the BA/MS program. This dual degree program is only open to Biology and specialization majors. Students will receive both Bachelor's of Arts and Master's of Science degrees upon graduation. For more information on the BA/MS program, visit <https://www.bu.edu/biology/undergrad/bams/>.

CAS BI 595: MASTER'S RESEARCH IN BIOLOGY

Prereq: Admission into the MS or BA/MS combined program

Biology laboratory research conducted under supervision of a faculty member. Externships are acceptable with prior approval. Minimum of 7.5 or 15 hours per week in the lab, culminating in submission of a written progress report.

Grading: Course grade is determined by laboratory performance.

READINGS IN BIOLOGY

Readings in Biology offers students the opportunity to do library research on a chosen topic in the biological sciences. Students must ask a Biology faculty member familiar with the topic to be their sponsor and submit the application found at www.bu.edu/biology/forms. These courses are often used as preparation for Undergraduate Research in Biology or Honors Research in Biology.

CAS BI 172: READINGS IN BIOLOGY 1

Prereq: freshman standing, consent of instructor (Biology faculty mentor), and approved application.

[2 cr] Not for Biology major or minor credit. Library research on a well-defined topic in the biological sciences, chosen in conjunction with a Biology faculty member.

Grading: Individual discussions and/or a paper presentation may be required.

CAS BI 272: READINGS IN BIOLOGY 2

Prereq: sophomore standing, consent of instructor (Biology faculty mentor), and approved application.

[2 cr] Not for Biology major or minor credit. Library research on a well-defined topic in the biological sciences, chosen in conjunction with a Biology faculty member.

Grading: Individual discussions and/or a paper presentation may be required.

CAS BI 372: READINGS IN BIOLOGY 3

Prereq: junior standing, consent of instructor (Biology faculty mentor), and approved application.

[2 cr] Not for Biology major or minor credit. Library research on a well-defined topic in the biological sciences, chosen in conjunction with a Biology faculty member.

Grading: Individual discussions and/or a paper presentation may be required.

CAS BI 472: READINGS IN BIOLOGY 4

Prereq: junior or senior standing, cumulative GPA in biology of at least 3.0, and consent of instructor (Biology faculty mentor).

[2 cr] Not for Biology major or minor credit. Intensive library research on a well-defined topic in the biological sciences, chosen in conjunction with a Biology faculty member. May be taken as preparation for Undergraduate Research or Honors Research in Biology.

Grading: Individual discussions and/or a paper presentation may be required.

GRADUATE READINGS IN BIOLOGY

Graduate Readings in Biology is offered as part of the BA/MS program. This dual degree program is only open to Biology and specialization majors. Students will receive both Bachelor's of Arts and Master's of Science degrees upon graduation. For more information on the BA/MS program, visit <https://www.bu.edu/biology/undergrad/bams/>.

GRS BI 701: GRADUATE READINGS IN BIOLOGY

Prereq: consent of instructor, limited to BA/MS students and graduate students in the scholarly paper MS program.

Library research on well-defined subjects determined in consultation with faculty member.

Grading: Individual discussions and/or a paper presentation may be required.

RESEARCH & READINGS

UNDERGRADUATE RESEARCH IN BMB

Undergraduate Research in Biochemistry and Molecular Biology courses (CAS BB 140 - CAS BB 453) require an application. For more information on research requirements and to apply, visit www.bu.edu/bmb/research. Time commitment is a minimum of 6 hours a week for 2-credit research and 12 hours a week for 4-credit research, not including preparation and evaluation. 4-cr research courses can fulfill an elective for BMB majors. Two semesters of senior-level research can fulfill the Advanced Lab Elective for BMB majors.

CAS BB 140: FIRST YEAR RESEARCH IN BMB 1

Prereq: first year standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for BMB major credit. First semester first year laboratory research under the supervision of a BMB faculty mentor. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor.

Grading: Course grade is determined by laboratory performance.

CAS BB 141: FIRST YEAR RESEARCH IN BMB 2

Prereq: first year standing, (BB 140 or UROP semester or equivalent), GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for BMB major credit. Second semester first year laboratory research under the supervision of a BMB faculty mentor. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor.

Grading: Course grade is determined by laboratory performance.

CAS BB 240: SOPHOMORE RESEARCH IN BMB 1

Prereq: sophomore standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for BMB major credit. First semester sophomore laboratory research under the supervision of a BMB faculty mentor. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor.

Grading: Course grade is determined by laboratory performance.

CAS BB 241: SOPHOMORE RESEARCH IN BMB 2

Prereq: sophomore standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, BB 140 or BB 141 or BB 240 or UROP semester or equivalent, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for BMB major credit. Second semester sophomore laboratory research under the supervision of a BMB faculty mentor. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor.

Grading: Course grade is determined by laboratory performance.

CAS BB 340: JUNIOR RESEARCH IN BMB 1 (2 CREDITS)

Prereq: junior standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for BMB major credit. First semester junior research including the use of research literature. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings required. This course fulfills a single unit in the following BU Hub area: Research and Information Literacy.

Grading: Course grade is determined by laboratory performance.

CAS BB 341: JUNIOR RESEARCH IN BMB 2 (2 CREDITS)

Prereq: junior standing, [BB 340 or BB 350 or 2 semesters of first year (BB 140/141) or sophomore research (BB 240/241) or UROP semester or equivalent], GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

[2 cr] Not for BMB major credit. Second semester junior research including the use of research literature. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings required. This course fulfills a single unit in the following BU Hub area: Research and Information Literacy.

Grading: Course grade is determined by laboratory performance.

CAS BB 350: JUNIOR RESEARCH IN BMB 1 (4 CREDITS)

Prereq: junior standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

First semester junior research including the use of research literature and active participation at group meetings. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance with oral presentations at group meetings required. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy and Oral/Signed Communication.

Grading: Course grade is determined by laboratory performance.

RESEARCH & READINGS

CAS BB 351: JUNIOR RESEARCH IN BMB 2 (4 CREDITS)

Prereq: junior standing, [BB 340 or BB 350 or 2 semesters of first year (BB 140/141) or sophomore research (BB 240/241) or UROP semester or equivalent], GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

Second semester junior research including the use of research literature. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Students expected to attend group meetings and take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy and Creativity/Innovation.

Grading: Course grade is determined by laboratory performance.

CAS BB 352: JUNIOR RESEARCH IN BMB 3 (4 CREDITS)

Prereq: junior standing, (BB 341 or BB 351 or equivalent), GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

Third semester junior research including the use of the research literature. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings and final report required. Students expected to take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Writing-Intensive and Creativity/Innovation

Grading: Course grade is determined by laboratory performance.

CAS BB 450: SENIOR RESEARCH IN BMB 1

Prereq: senior standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

First semester senior research including the use of research literature and active participation at group meetings. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance with oral presentations at group meetings required. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy and Oral/Signed Communication.

Grading: Course grade is determined by laboratory performance.

CAS BB 451: SENIOR RESEARCH IN BMB 2

Prereq: senior standing, [BB 340 or BB 350 or BB 450 or 2 semesters of first year (BB 140/141) or sophomore research (BB 240/241) or UROP semester or equivalent], GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

Second semester senior research including the use of the research literature. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Students expected to attend group meetings and take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy and Creativity/Innovation.

Grading: Course grade is determined by laboratory performance.

CAS BB 452: SENIOR RESEARCH IN BMB 3

Prereq: senior standing, (BB 341 or BB 351 or BB 451 or equivalent), GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

Third semester senior research including the use of research literature. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings and final report required. Students expected to take a lead and make creative contributions to projects. This course fulfills a single unit in the following BU Hub areas: Writing-Intensive and Creativity/Innovation.

Grading: Course grade is determined by laboratory performance.

CAS BB 453: SENIOR RESEARCH IN BMB 4

Prereq: senior standing, (BB 352 or BB 452 or equivalent), GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approved application.

Coreq: CAS BB 497 or BB 498

Fourth semester senior research including the use of research literature. Application through the BMB Program. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Students conduct research under supervision of a faculty mentor. Attendance at group meetings and final report required.

Grading: Course grade is determined by laboratory performance.

RESEARCH & READINGS

HONORS RESEARCH IN BMB

Honors Research in BMB offers students the ability to participate in two semesters of mentored 4-credit research (CAS BB 401 and 402) and 1-credit research seminars (CAS BB 497 and 498). Students also write and defend an honors thesis on their research. For more information on research requirements and to apply, visit www.bu.edu/bmb/research. Time commitment is a minimum of 12 hours a week, not including preparation and evaluation.

CAS BB 401: HONORS RESEARCH IN BMB 1

Prereq: senior standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.5, consent of instructor (faculty research mentor/sponsor), and approval of application by the BMB Research and Honors Committee.

Coreq: CAS BB 497

First semester of Honors-level undergraduate research in BMB. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. A minimum grade of B+ in this course and in BB 497/498 and BB 401/402 is required to graduate with Honors in BMB. Students must also present a research talk at the BMB symposium at the end of the spring semester of the academic year. Students will conduct mentored laboratory research with a faculty member of the BMB Program leading to graduation with Honors in BMB. Application through the BMB Program including use of research literature and active participation at group meetings. Oral presentations at group meetings required. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy, Writing-Intensive, and Creativity/Innovation.

Grading: Course grade for both BB 401 and 402 is determined by laboratory performance, oral presentation, written thesis, and defense of the thesis before a committee of three faculty members. Grades for both BB 401 and 402 are determined upon completion of BB 402.

CAS BB 402: HONORS RESEARCH IN BMB 2

Prereq: senior standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.5, consent of instructor (faculty research mentor/sponsor), and approval of application by the BMB Research and Honors Committee.

Coreq: CAS BB 498

Second semester of Honors-level undergraduate research leading to graduation with Honors in BMB (continuation of BB 401). Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. A minimum grade of B+ in this course and in BB 497/498 and BB 401/402 is required to graduate with Honors in BMB. Students must also present a research talk at the BMB symposium at the end of the spring semester of the academic year. Students expected to attend and participate at group meetings and take a lead and make creative contributions to projects ending in writing and defending an original thesis with guidance from their mentor. This course fulfills a single unit in the following BU Hub areas: Research and Information Literacy, Writing-Intensive, and Creativity/Innovation.

Grading: Course grade is determined by laboratory performance, oral presentation, written thesis, and defense of the thesis before a committee of BMB faculty members. Grades for both BB 401 and 402 are determined upon completion of BB 402.

CAS BB 498: HONORS RESEARCH IN BMB SEMINAR 2

Prereq: For students currently enrolled in the Honors BMB Program or BB 453 in the spring semester.

Coreq: CAS BB 402 or BB 453 in the spring semester.

[1 cr] A one-credit continuation of BB 497 for students enrolled in Honors Research in BMB (BB 402) or BB 453 in the spring. Students learn and present digitally produced descriptions of their research and prepare their theses for defense under the guidance of the Research and Honors Committee and present at the BMB Symposium at the end of the semester. A minimum grade of B+ in this course and in BB 497 and BB 401/402 is required to graduate with Honors in BMB. This course fulfills a single unit in the following BU Hub areas: Digital/Multimedia Expression.

Grading: Attendance and participation.

GRADUATE RESEARCH IN BMB

Graduate Research in BMB is offered as part of the BA/MA program. This dual-degree program is only open to BMB majors and earns students a Bachelor's degree in BMB and a Master's degree in Biotechnology. For more information on the BA/MA program, visit www.bu.edu/bmb/bama-bulletin.

CAS BB 592: GRADUATE RESEARCH IN BIOCHEMISTRY AND MOLECULAR BIOLOGY

Prereq: Admission to the BA/MA Program.

Laboratory research conducted under the supervision of a BMB faculty sponsor. Research outside the BMB Program is acceptable if approved and overseen by a BMB faculty sponsor. Minimum of 15 hours per week in the lab, culminating in submission to the BMB Director of a written progress report and research outline for CAS BB 592. This course fulfills a single unit in the following Hub areas: Digital/Multimedia Expression and Creativity/Innovation

Grading: Course grade is determined by laboratory performance.

Electives for the BMB major can be found in other sections of the Course Directory.

A list of courses accepted toward the BMB major can be found in the Bulletin at www.bu.edu/bmb/bulletin.

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