For your advising appointment you will need:
✓ Course Directory
✓ Degree Advice Report
✓ Major Guidelines Worksheet
✓ Transcript

COURSE NOTES:

Courses fulfilling breadth requirements:
Cell & Molecular (CM)
CAS BI 203 Cell Biology
CAS BI 213 Intensive Cell Biology
CAS BI 218 Cell Biology with ISE II Lab

Ecology, Behavior & Evolution (EBE)
CAS BI 225 Behavioral Biology
CAS BI 306 Biology of Global Change
CAS BI 309 Evolution
CAS BI 407 Animal Behavior

Physiology & Neurobiology (PN)
CAS BI 315 Systems Physiology
CAS BI 325/NE 203 Principles of Neuroscience

Upper Level Lab Courses Offered Fall 2017:
CAS BI 218 Cell Biology with ISE II Lab
CAS BI 306 Biology of Global Change
CAS BI 311 General Microbiology
CAS BI 315 Systems Physiology
CAS BI 407 Animal Behavior
CAS BI 421 Biochemistry I
CAS BI 445 Cell & Molecular Neurophysiology
CAS BI 513 Genetics Laboratory
CAS BI 527 Biochemistry Lab I
CAS NE 203 Principles of Neuroscience
CAS BI Marine Semester Courses
CAS BI Tropical Ecology Program Courses

REGISTRATION NOTES:

• For permission required courses: You may not register for these courses on your own. Forward email approval from instructor to department contact to be registered.

• 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 may request this fee waiver through the CAS Advising Office.

• PDP, ROTC, and CAS FY/SY courses do not count towards the 128 credits needed to graduate.

• The following courses do not count toward the Biology or BMB major or minor:
  - CAS BI 105 Introductory Biology for Health Sciences
  - CAS BI 211 Human Physiology
BIOCHEMISTRY & MOLECULAR BIOLOGY COURSES

NOTE: 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.

CAS BB 191: UNDERGRADUATE RESEARCH IN BIOCHEMISTRY AND MOLECULAR BIOLOGY I
Prereq: freshman standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approval of application by the BMB Research and Honors Committee.

[2 cr] Not for BMB major credit. Laboratory research under the supervision of a BMB faculty mentor. 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 291: UNDERGRADUATE RESEARCH IN BIOCHEMISTRY AND MOLECULAR BIOLOGY II
Prereq: sophomore standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approval of application by the BMB Research and Honors Committee.

[2 cr] Not for BMB major credit. Laboratory research under the supervision of a BMB faculty mentor. 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 391: UNDERGRADUATE RESEARCH IN BIOCHEMISTRY AND MOLECULAR BIOLOGY III
Prereq: junior standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approval of application by the BMB Research and Honors Committee.

[2 or 4 cr] Two credit option is not for BMB major credit. Laboratory research under the supervision of a BMB faculty mentor. Research outside the BMB program is acceptable if approved and overseen by a BMB faculty sponsor. Students can use one semester of 4-credit research to fulfill a BMB elective if not using Undergraduate Research or Honors Research for the advanced lab elective.

Grading: Course grade is determined by laboratory performance.

CAS BB 491: UNDERGRADUATE RESEARCH IN BIOCHEMISTRY AND MOLECULAR BIOLOGY IV
Prereq: senior standing, GPA in biochemistry and molecular biology (BMB) courses of at least 3.0, consent of instructor (faculty research mentor/sponsor), and approval of application by the BMB Research and Honors Committee.

Laboratory research under the supervision of a BMB faculty mentor. Research outside the BMB program is acceptable if approved and overseen by a BMB faculty sponsor. Students can use one semester of 4-credit research to fulfill a BMB elective if not using Undergraduate Research or Honors Research for the advanced lab elective.

Grading: Course grade is determined by laboratory performance.

CAS BB 401: HONORS RESEARCH IN BIOCHEMISTRY AND MOLECULAR BIOLOGY
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

Independent laboratory research under the supervision of a BMB faculty mentor. Research outside the BMB program is acceptable if approved and overseen by a BMB faculty sponsor. Successful completion of both CAS BB 401 and BB 402 may lead to a degree with honors in the major. Students must also present a research talk at the BMB symposium at the end of the spring semester of the academic year.

Grading: Course grade is determined by laboratory performance, oral presentation, written thesis, and defense of the thesis before a committee of three BMB faculty members.

CAS BB 497: HONORS RESEARCH IN BIOCHEMISTRY AND MOLECULAR BIOLOGY SEMINAR I
Prereq: For students currently enrolled in the Honors BMB Program.

Coreq: CAS BB 401

[1 cr ] A one-credit research seminar for students enrolled in Honors Research in BMB (CAS BB 401) or Graduate Research in BMB (CAS BB 591). Students present at the BMB Symposium. A minimum grade of B+ in BB497/498 and BB401/402 is required to graduate with Honors in BMB.

Grading: Attendance and participation.
CAS BB 591: GRADUATE RESEARCH IN BIOCHEMISTRY AND MOLECULAR BIOLOGY

Prereq: Admission to the BA/MA Program.
Coreq: CAS BB 497 is encouraged.

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.

Grading: Course grade is determined by laboratory performance.

GRS BI 753: ADVANCED MOLECULAR BIOLOGY

Prereq: CAS BI 552 and consent of instructor.

In-depth analysis of current topics in molecular biology regarding the flow of information in the nucleus of eukaryotic cells. Focus on primary literature. Includes genomic flexibility, signal transduction to the nucleus, chromatin structure, gene expression, cell cycle checkpoints, health-related topics.

Lecture and Discussion

A1 Hansen Tue, Thu 3:30pm - 4:45pm
Wed 1:25pm - 2:15pm

Textbook: Primary literature papers will be posted on the course website.

Grading: Participation (25%), 3 exams (50%), and oral presentation of literature paper (25%).
**CAS BI 105: INTRODUCTORY BIOLOGY FOR HEALTH SCIENCES**

*Prereq: None*

**Not for Biology or BMB major/minor credit.** Principles of biology; emphasis on cellular structure, genetics, microbiology, development, biochemistry, metabolism, and immunology. This course is appropriate for non-majors and students in the health and paramedical sciences (Sargent College). Students may not receive credit for CAS BI 105 if CAS BI 108 has already been passed. Carries natural science divisional credit (with lab) in CAS.

**Lecture**
A1 Muscedere Mon, Wed, Fri 9:05am - 9:55am

**Lab**
C2 Tue 1:30pm - 3:15pm
C3 Tue 3:30pm - 5:15pm
D1 Wed 10:10am - 11:55am
D2 Wed 2:30pm - 4:15pm
E1 Thu 9:00am - 10:45am
E2 Thu 1:30pm - 3:15pm
E3 Thu 3:30pm - 5:15pm

**Note:** Not for Biology or BMB major or minor credit (BI 108 is recommended instead).


**Grading:** Three lecture exams (39%), lecture assignments and homework (10%), laboratory exercises and exam (25%), and course final exam (26%).

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**CAS BI 203: CELL BIOLOGY**

*Prereq: CAS BI 108 and CAS CH 102 or equivalent; Coreq: CAS CH 203 or equivalent.*

Principles of cellular organization and function. Topics include biological molecules, flow of genetic information, membranes and subcellular organelles, and cell regulation.

**Lecture**
A1 Beffert Tue, Thu 9:30am - 10:45am
Mon 6:30pm - 8:00pm *
A2 Beffert Tue, Thu 3:30pm - 4:45pm
Mon 6:30pm - 8:00pm *

* These time slots are reserved for exams.

**Discussion**
B2 Mon 11:15am - 12:05pm
D3 Wed 3:35pm - 4:25pm
B3 Mon 12:20pm - 1:10pm
D4 Wed 4:40pm - 5:30pm
B4 Mon 1:25pm - 2:15pm
D5 Wed 3:35pm - 4:25pm
B5 Fri 3:35pm - 4:25pm
D6 Wed 12:20pm - 1:10pm
C1 Tue 11:15am - 12:05pm
D7 Wed 12:20pm - 1:10pm
D1 Wed 12:20pm - 1:10pm
E1 Thu 11:15am - 12:05pm
D2 Wed 1:25pm - 2:15pm
E2 Mon 4:40pm - 5:30pm

**Notes:** Class meets with BI 281 and A1 also meets with BI 218.


**Grading:** Four midterm exams and final examination.

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**CAS BI 213: INTENSIVE CELL BIOLOGY**

*Prereq: CAS BI 108 and CAS CH 102 or equivalent*

Coreq: CAS CH 203 or equivalent

Molecular basics of cell biology including genomics, subcellular organelles, cell signaling, stem cells, and cancer.

**Lecture**
A1 Naya Tue, Thu 9:30am - 10:45am

**Discussion**
B1 Mon 1:25pm - 2:15pm
B3 Wed 4:40pm - 5:30pm
B2 Wed 12:20pm - 1:10pm
B4 Thu 3:35pm - 4:25pm

**Notes:** This course meets with CAS BI 218.


**Grading:** 2 midterms, final exam, and discussion.
**CAS BI 311: GENERAL MICROBIOLOGY**  
*Prereq: CAS BI 203 and CAS BI 206 or equivalent*

Organisms discussed include bacteria, archaea, viruses, fungi, protists, and algae. Course will cover microbial diversity, the environmental and human micro biomes, and technologies used to study microbes today. Global issues of emerging infectious disease, agriculture and microbial responses to global change are discussed.

**Lecture**

A1  TBA  Mon, Wed, Fri  9:05am - 9:55am

**Lab**

B1  Mon, Wed  12:20pm - 2:05pm  
B2  Mon, Wed  2:30pm - 4:15pm  
B3  Tue, Thu  9:00am - 10:45am  
B4  Tue, Thu  1:30pm - 3:15pm


**Grading:** Exams (21%), wiki assignment (13%), lab assignments (45%), participation (5%), and final exam (13%).

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**CAS BI 410: DEVELOPMENTAL BIOLOGY**  
*Prereq: CAS BI 203 or BI 213 or BI 218 or consent of the instructor.*

Contemporary aspects of embryonic development are covered, drawing from current literature. There is an emphasis on the use of experimental approaches to address topics such as polarity in the egg, body axis specification, embryonic patterning, and organogenesis.

**Lecture**

A1  Bradham  Tue, Thu  2:00pm - 3:15pm

**Discussion**

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

**Notes:** Meets with GRS BI 610.


**Grading:** Three exams plus discussion grade.

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**CAS BI 421: BIOCHEMISTRY I**  
*Prereq: CAS CH 204 or CAS CH 212 or CAS CH 214 or equivalent*

Introductory biochemistry. The following topics are covered: protein structure and folding enzyme mechanisms, kinetics, and allostery; nucleic acid structure; lipids and membrane structure; bioenergetics; vitamins and coenzymes; introduction to intermediary metabolism. See BI 527 for lab content.

**Lecture**

A1  Tolan  Mon  8:00am - 9:55am  
A2  Perlstein  Tue, Thu  2:00pm - 3:15pm  
A3  Perlstein  Mon  6:30pm - 8:30pm *  

* This time slot is reserved for exams.

**Lab**

B1  Wed  12:20pm - 4:20pm  
B5  Fri  10:10am - 2:10pm  
B2  Wed  5:30pm - 9:30pm  
B6  Fri  3:35pm - 7:35pm  
B3  Thu  9:15am - 1:15pm  
B7  Mon  12:20pm - 4:20pm  
B4  Thu  3:30pm - 7:30pm  
B8  Mon  5:30pm - 9:30pm

**Discussion**

C1  Mon  11:15am - 12:05pm  
C2  Mon  1:25pm - 2:15pm  
C3  Thu  9:30am - 10:20am  
C4  Thu  11:15am - 12:05pm

**Notes:** This class meets with CH 421, BI 621, CH 621, BI 527, and MET CH 421.

**Textbook:** TBD.

**Grading:** Exams (65%), and lab (35%).
**CAS BI 513: GENETICS LAB**  
**Prereq:** CAS BI 203 and CAS BI 206 and senior standing and consent of instructor  
Genetic techniques such as mutant selection and screening, complementation, mapping, recombinant DNA, and targeted mutagenesis are taught using the genetic model systems *Escherichia coli*, *Saccharomyces cerevisiae*, and *Arabidopsis thaliana*. Short-term and long-term projects in which students formulate and test hypotheses.  

*Lab*  
A1 Celenza Tue,Thu 12:30pm - 3:15pm  

*Textbook:* Class notes and assigned papers.  

*Grading:* Lab reports, homework, notebook and attendance.  

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**CAS BI 527: BIOCHEMISTRY LAB I**  
**Prereq:** (CAS CH 204 and CAS CH 212 and CAS CH 214) or CAS CH 282  
[2 cr] Not for Biology major or minor credit unless both BI 527 and BI 528 are taken. Emphasizes the purification and characterization of proteins and DNA. Development and use of modern instrumentation and techniques.  

*Lecture*  
A1 Tolan Mon 11:15am - 12:05pm  
A2 Tolan Mon 1:25pm - 2:15pm  
A3 Tolan Thu 9:30am - 10:20am  
A4 Tolan Thu 11:15am - 12:05pm  

*Lab*  
B1 Wed 12:20pm - 4:20pm  
B2 Wed 5:30pm - 9:30pm  
B3 Thu 9:15am - 1:15pm  
B4 Thu 3:30pm - 7:30pm  
B5 Fri 10:10am - 2:10pm  
B6 Fri 3:35pm - 7:35pm  
B7 Mon 12:20pm - 4:20pm  
B8 Mon 5:30pm - 9:30pm  

*Notes:* Meets with CAS CH 527, CAS BI/CH 421, GRS BI/CH 621 and MET CH 421.  


*Grading:* Lab notebook, reports, attendance, safety, and participation.  

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**CAS BI 551: BIOLOGY OF STEM CELLS**  
**Prereq:** CAS BI 203 or CAS BI 206 or consent of instructor  
Views on stem cell research range from assumptions of a potential cure for most diseases to fears that it will depreciate the value of human life. This course equips students with the science that underlies this discussion, including the biological properties of stem cells and the experimental hurdles to its utilization in regenerative medicine.  

*Lecture*  
A1 Frydman Tue,Thu 9:30am - 10:45am  

*Discussion*  
B1 Thu 11:15am - 12:05pm  

*Textbook:* Primary literature will be provided on the blackboard site.  

*Grading:* Midterm, final, presentation, and participation.  

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**CAS BI 552: MOLECULAR BIOLOGY I**  
**Prereq:** (CAS BI 203 or CAS BI 213) and CAS BI 206 or CAS BI 216  
Synthesis, structure, and function of biologically important macromolecules (DNA, RNA, and proteins). Regulation and control of the synthesis of RNA and proteins. Introduction to molecular biology of eukaryotes. Discussion of molecular biological techniques, including genetics and recombinant DNA techniques.  

*Lecture*  
A1 Loechler Tue, Thu 3:30pm - 4:45pm  

*Discussion*  
B1 Tue 5:00pm - 5:50pm  
B2 Wed 10:10am - 11:00am  
B3 Wed 2:30pm - 3:20pm  
B4 Thur 5:00pm - 5:50pm  
B5 Wed 3:35pm - 4:25pm  

*Textbook:* TBD.  

*Grading:* 3 exams (25% each), homework (12.5%), and discussion participation (12.5%).
**CAS BI 560: SYSTEMS BIOLOGY**

*Prereq: CAS BI 552 or consent of the instructor*

Examines critical components of systems biology, including design principles of biological systems (e.g., feedback, synergy, cooperativity), and the generation and analysis of large-scale datasets (e.g., protein-protein interaction, mRNA expression).

*Lecture and Discussion*
- **A1** Siggers  
  Mon, Wed, Fri  
  11:15am - 12:05pm  
  Wed  
  12:20pm - 1:10pm

**Textbook:** Course readings provided via Blackboard.

**Grading:** Midterm 1 (20%), midterm 2 (30%), final exam (30%), and class participation (20%).

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**CAS BI 572: ADVANCED GENETICS**

*Prereq: CAS BI 206 and CAS BI 203; CAS BI 552 is recommended*

An in-depth study of eukaryotic genetics, ranging from the history and basic principles to current topics and modern experimental approaches. Genetics of Drosophila, C. elegans, mice, and humans are explored in detail, including readings from primary literature.

*Lecture*
- **A1** McCall  
  Tue, Thu  
  9:30am - 10:45am

*Discussion*
- **B1** Wed  
  10:10am - 11:00am
- **B2** Wed  
  1:25pm - 2:15pm

**Textbook:** Meneely, *Genetic Analysis: Genes, Genomes, and Networks in Eukaryotes*, 2nd Ed., Oxford University Press, 2014

**Grading:** 2 Midterms (20%), final exam (25%), problem sets (15%), discussion/participation (10%), and final presentation (10%).
ECOLOGY, BEHAVIOR & EVOLUTION

**CAS BI 107: BIOLOGY I**

*Prereq: None; high school biology assumed.*

The evolution and diversity of life; principles of ecology; behavioral biology. For students who plan to major in the natural sciences or environmental science, and for premedical students. Required for biology majors. Carries natural science divisional credit (with lab) in CAS.

**Lecture**
- A1 Schneider, Sorenson, Spilios, Wasserman
  - Tue, Thu 12:30pm - 1:45pm
- A2 Schneider, Sorenson, Spilios, Wasserman
  - Mon, Wed, Fri 2:30pm - 3:20pm

**Lab**
- B1 Mon 2:30pm - 5:15pm
- B2 Mon 2:30pm - 5:15pm
- B3 Mon 2:30pm - 5:15pm
- C1 Tue 8:00am - 10:45am
- C2 Tue 8:00am - 10:45am
- C3 Tue 8:00am - 10:45am
- C4 Tue 12:30pm - 3:15pm
- C5 Tue 12:30pm - 3:15pm
- C6 Tue 12:30pm - 3:15pm
- D1 Wed 8:00am - 10:45am
- D2 Wed 8:00am - 10:45am
- D3 Wed 8:00am - 10:45am
- D4 Wed 2:30pm - 5:15pm
- D5 Wed 2:30pm - 5:15pm

**Textbook:** TBD.

**Grading:** 4 Lecture exams and Lab assignments.

**CAS BI 225: BEHAVIORAL BIOLOGY**

*Prereq: CAS BI 107 and CAS BI 108 and at least sophomore standing.*

Enrollment limited to students specializing in behavioral biology. Other students must receive consent of instructor. CAS AN 102 may be accepted as a prerequisite with consent of instructor.

Introduction to the evolution, ecology, physiology, neurobiology and genetics of behavior. Topics include behavioral ecology, sociobiology, hormones and behavior, neuroethology, behavioral genetics, development, communication, reproductive behavior, cooperation and altruism, cognition and brain evolution. Emphasis on integrative analysis.

**Independent**
- A1 Traniello
  - Tue, Thu 1:30pm - 3:15pm


**Grading:** 3 quizzes, research paper, class presentations, engagement, and participation.

**CAS BI 306: BIOLOGY OF GLOBAL CHANGE**

*Prereq: CAS BI 107; Recommended: CAS CH 101 or CH 171*

The ecological impacts of human activity on terrestrial and aquatic ecosystems. Climate change, forest decline, eutrophication, acidification, loss of species diversity, and restoration of ecosystems.

**Lecture**
- A1 Templer
  - Tue, Thu 11:00am - 12:15pm

**Lab**
- B1 Tue 3:30pm - 6:15pm
- C2 Fri 11:15am - 2:00pm
- C1 Wed 2:30pm - 5:15pm
- F1 Thu 3:30pm - 6:15pm


**Grading:** 2 midterms (40%), final examination (20%), and laboratory (included paper and presentation) (40%).

**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 Mullen
  - Mon, Wed, Fri 10:10am - 11:00am

**Discussion**
- B1 Wed 12:20pm - 1:10pm
- B3 Thu 11:15pm - 12:05pm
- B2 Wed 1:25pm - 2:15pm
- B4 Fri 3:35pm - 4:25pm


**Grading:** 2 midterms (40%), final exam (20%), discussion (20%), and paper assignment (20%).
CAS BI 407: ANIMAL BEHAVIOR

Prereq: CAS BI 107

The science of ethology on a hormonal, neural, and evolutionary level. Special emphasis will be on significance and adaptiveness of an expressed behavior. Individual lab projects as well as some prepared labs may require more than the scheduled time.

Lecture
A1  Wasserman  Tue, Thu 3:30pm - 4:45pm

Lab
B1  Mon 2:30pm - 5:15pm  F1  Fri 2:30pm - 5:15pm
D1  Thu 12:30pm - 3:15pm

Notes: Meets with BI 607.

Textbook: None.

Grading: 3 Lecture exams (66%) and lab (34%).

CAS BI 443: TERRESTRIAL BIOGEOCHEMISTRY

Prereq: (CAS BI 107 or CAS ES 101 or CAS ES 105) and CH 101/102, or consent of instructor.

The patterns and processes controlling earth’s element cycles with application to global change. Scales range from planetary development through earth’s future climate. Topics include net primary production, nutrient cycling and ecosystem science.

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

Notes: Meets with ES 443, BI 643, and ES 643.


Grading: 3 In-class exams, class participation, notebooks and problem sets.

CAS BI 448: BIODIVERSITY AND CONSERVATION BIOLOGY

Prereq: CAS BI 303 or CAS BI 306 or consent of instructor

The study of biological diversity and modern methods to protect endangered plant and animal species. The environment, population, and genetic and human factors that affect the survival of species are examined for temperate and tropical communities, as well as terrestrial and aquatic habitats.

Lecture and Discussion
A1  Primack  Mon, Wed, Fri 11:15am - 12:05pm
       Wed  3:35pm - 4:25pm

Notes: Meets with BI 648.


Grading: Two hour exams, oral presentation, term paper, and quizzes.
# PHYSIOLOGY & NEUROBIOLOGY

## CAS BI 211: HUMAN PHYSIOLOGY

**Prereq:** (CAS BI 105 or CAS BI 108) and CAS BI 106 or equivalent. Some knowledge of chemistry and anatomy assumed.

**Not for Biology or BMB major/minor credit.** Introduction to principles of systemic mammalian physiology with special reference to humans.

**Lecture**

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**Lab**

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**Notes:** Not for Biology or BMB major/minor credit (BI 315 is recommended instead).


**Grading:** Lecture (75%: 3 midterm exams, 1 cumulative final, small assignments); Lab (25%: 2 lab exams and assignments).

## CAS BI 315: SYSTEMS PHYSIOLOGY

**Prereq:** (CAS BI 108 or CAS BI 209), and CAS CH 101 and CAS CH 102, 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.

**Lecture**

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**Lab**

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**Grading:** Lecture (75%: 3 midterm exams, 1 cumulative final, small assignments); Lab (25%: 1 lab exams and assignments).

## CAS BI 325: PRINCIPLES OF NEUROSCIENCE

**Prereq:** CAS BI 203 or consent of instructor.

Fundamentals of the nervous system, emphasizing synaptic transmission; hierarchical organization; autonomic nervous system; mechanisms of sensory perception; reflexes and motor function; biorhythms; and neural mechanisms of feeding, mating, learning, and memory.

**Lecture**

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**Discussion**

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**Notes:** Students may elect to take NE 203, which features a laboratory component. Meets with NE 203.


**Grading:** Texts, quizzes, and participation.

## CAS BI 445: CELLULAR AND MOLECULAR NEUROPHYSIOLOGY

**Prereq:** CAS BI 203 or CAS BI 315 or BI 325 or CAS NE 203 or consent of instructor

Cellular and molecular basis of neural excitability and synaptic transmission. The molecular understanding of ion channels is extrapolated to higher brain functions such as learning, memory, and sleep. In the lab, we learn to obtain intracellular and extracellular recordings from muscle fibers and the third motor nerve of crayfish ventral nerve cord. The extracellular recordings allow us to monitor the network activity that controls the animal’s posture while the intracellular recordings allow us to investigate synaptic transmission. Quantitative analyses of experimental data will be performed. The entire class will contribute to a research project with the expectation that the data pooled from all students should be of sufficient quantity and quality for a publication.

**Lecture**

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<tr>
<td>A1</td>
<td>Lin</td>
<td>Mon, Wed, Fri</td>
<td>12:20pm - 1:10pm</td>
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**Lab**

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**Notes:** Meets with BI 645 and NE 445.

**Textbook:** Purves et al., *Neuroscience*, 4th or 5th ed., Sinauer Associates

**Grading:** Midterm 1 (15%), midterm 2 (25%), final (25%), lab reports, presentations, and participation (35%: 15% oral, 20% written).
CAS BI 455: DEVELOPMENTAL NEUROBIOLOGY
Prereq: CAS BI 203 or CAS BI 201 or CAS BI 325 or CAS NE 201 or consent of instructor.

This course will introduce current theories regarding the formation of the nervous system. Emphasis will be placed on the cellular and molecular mechanisms underlying events including neuronal determination, neurogenesis, patterning, axonal growth and guidance, polarity, synaptogenesis, synaptic modification, and cell death.

Lecture and Discussion
A1  Man  Fri  10:10am - 11:55am
     Wed*  10:10am - 11:55am

*Also includes paper presentation

Notes: Meets with NE 455.


Grading: One midterm and one final exam.

CAS BI 525: BIOLOGY OF NEURODEGENERATIVE DISEASES
Prereq: (CAS NE 102 or CAS BI 203) and (CAS NE 203 or CAS BI 325)

This course focuses on understanding the molecular mechanisms that are at the basis of neurodegenerative diseases and 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.

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

Notes: Meets with NE 525.

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

Grading: Exams (66%), assignments (13%), paper presentation (13%), and participation in class (8%).

CAS BI 535: TRANSLATIONAL RESEARCH IN ALZHEIMER’S DISEASE
Prereq: (CAS BI 203 or CAS BI 102) and (CAS BI 325 or CAS BI 203)

An introduction to translational research focused on Alzheimer’s disease, with particular emphasis on the search for new therapeutic targets, from observations of pathogenic phenotypes in patients to the development of appropriate animal and cellular models of the disease.

Independent
A1  Pastorino  Mon, Wed, Fri  1:25pm - 2:15pm
     Wed  2:30pm - 3:20pm

Notes: Meets with NE 535.

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

Grading: Exams (66%), assignments (13%), paper presentation (13%), and participation in class (8%).
CAS BI 545: NEUROBIOLOGY OF MOTIVATED BEHAVIOR

Prereq: (CAS BI 315 or CAS BI 325 or CAS NE 201) or consent of instructor.

Neural circuits and neuroendocrine mechanisms controlling reproductive, parental, and affiliative behaviors, decision making, ingestive behaviors and metabolism, circadian rhythms, pain perception, and reward in animals, with an emphasis on vertebrates. Lectures are integrated with student-led discussions of relevant research papers.

Independent

A1 Muscedere Tue, Thu 2:30pm - 5:15pm

Notes: Meets with NE 545.

Textbook: None.

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

CAS BI 581 H1: NEUROBIOLOGY OF BRAIN DISORDERS

Prereq: CAS BI 203 and BI 325

[2 cr] Not for Biology major or minor credit unless two semesters of different topics are taken. This course reviews recent topics and readings in the field of neurodegeneration that span disorders affecting neurodevelopment, learning and memory and aging. Specifically, the course will probe cellular and molecular mechanisms underlying cell death. In addition, the class will probe commonalities of the diseases, genetic risk factors and the usefulness and limitations of animal models. Also, we will discuss different interdisciplinary approaches that include molecular genetics tools in mice, biochemistry, cell biology and electrophysiology in addressing biomedical-related problems in neuroscience.

Independent

H1 Ho Mon 2:30pm - 4:15pm

Note: Not for Biology major or minor credit unless two semester of different topics are taken.

Textbook: None.

Grading: Participation (50%), Oral Presentation (50%)

CAS BI 598: NEURAL CIRCUITS

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

This course reviews modern techniques and toolsets that are capable of dissecting neural circuits, which are critical for understanding how coordinated patterns of neural activity lead to complex behavior. Recent literature on information processing, guided behavior and cognition is discussed.

Independent

A1 Cruz-Martin Tue, Thu 9:00am - 10:45am

Notes: Meets with NE 598.


Grading: Weekly quizzes, three exams and discussion.
### Biology students are encouraged to apply for the Marine Semester.
Applications are accepted on a rolling basis:
www.bu.edu/bump/marine-semester-prereqapp

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<td>CAS BI 523:</td>
<td>MARINE URBAN</td>
<td>Acceptance into the Marine Semester</td>
<td>Marine Urban Ecology is an emerging, interdisciplinary field that aims to understand how human and ecological processes can coexist in human-dominated systems. Topics, ecosystems, and organisms associated with urbanization in the Greater Boston area. Also offered as CAS GE 523.</td>
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<td>CAS BI 531:</td>
<td>ICHTHYOLOGY:</td>
<td>CAS BI 260 and consent of instructor; acceptance into the Marine Semester.</td>
<td>A comprehensive introduction to fish biology and systematics. Emphasis on phylogenetic relationships, ecology, and behavior. Labs include morphological studies of specimens and behavioral studies of live fish. This course is a prerequisite for the field course.</td>
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<td>ICHTHYOLOGY:</td>
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<td>ECOLOGY, AND EVOLUTION OF FISH</td>
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<td>CAS BI 539:</td>
<td>CORAL REEF DYNAMICS:</td>
<td>Acceptance into the Marine Semester.</td>
<td>Tropical reefs-- diverse, complex, and ancient-- exhibit lawful cycles of growth, degradation, and regeneration. Explore these through observations on the Belize Barrier Reef in fossil reef environments and through laboratory experiments. Insights are applied to reef conservation in today's changing world. Also offered as CAS ES 539. This course involves a 12-day field trip to Belize.</td>
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<td>CAS BI 541:</td>
<td>CORAL REEF RESILIENCE AND RESTORATION</td>
<td>Junior or senior standing; acceptance into the Marine Semester.</td>
<td>Caribbean coral reefs have fallen into ruin. Students develop methods to restore reef health by applying natural history and home aquarium skills, genomics, community and landscape ecology, and climatology. This is the clinical (conservation applications) sister course to CAS BI/ES 539 (Coral Reef Dynamics), and includes field work in Belize.</td>
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<td>CAS BI 546:</td>
<td>MARINE MEGAFAUNAL ECOLOGY: STELLWAGEN BANK NATIONAL MARINE SANCTUARY AND SURROUNDING WATERS</td>
<td>(CAS BI 260 and CAS MA 213) or consent of the instructor; acceptance into the Marine Semester.</td>
<td>Marine macrofauna: whales, seals, seabirds, fishes, turtles, jellies, and people in Stellwagen Bank National Marine Sanctuary. Evolution, food webs, and distributional ecology; physical and human influences on foraging and movement behavior. Student research builds ecosystem-based science for Sanctuary management.</td>
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<td>CAS BI 550:</td>
<td>MARINE GENOMICS</td>
<td>Acceptance into the Marine Semester.</td>
<td>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.</td>
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<td>MS Finnerty</td>
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CAS BI 569: TROPICAL MARINE INVERTEBRATES

Prereq: CAS BI 107 and CAS BI 260; acceptance into the Marine Semester.

Explores the diversity of marine invertebrates, including body plans, feeding biology, reproductive strategies, and developmental programs. Field biodiversity surveys and behavioral studies in shallow water tropical marine environments, especially seagrass beds and mangrove. This course involves a 12-day field trip to Belize.

Lecture
MS  Finnerty  Arranged  Oct. 30 - Nov. 21

CAS BI 578: MARINE GEOGRAPHIC INFORMATION SCIENCE

Prereq: CAS BI 107 and CAS ES 114; CAS MA 213 is strongly recommended; acceptance into the Marine Semester.

Introduction to marine geographic information systems and spatial analysis for conservation, management, and marine landscape ecology. Comparative examples from Gulf of Maine and tropics. Solve problems in coastal zoning and marine park design, whale and coral reef conservation.

Lecture
MS  Wikgren  Arranged  Oct. 3 - Oct. 27

CAS BI 591: BIO-OPTICAL OCEANOGRAPHY

Prereq: CAS BI 107 and CAS ES 114; CAS MA 213 is strongly recommended; acceptance into the Marine Semester.

This field- and lab-based course explores how the optically active constituents in seawater affect the in-water light field, and in turn, how field optics and remote sensing can facilitate the study of marine biogeochemistry, biological oceanography and water quality.

Lecture
MS  Fichot  Arranged  Oct. 3 - Oct. 27

CAS BI 593: MARINE PHYSIOLOGY AND CLIMATE CHANGE

Prereq: CAS BI 107 and CAS ES 114; CAS MA 213 is strongly recommended; acceptance into the Marine Semester.

Explores the range of physiological responses marine organisms exhibit in response to climate change. Investigates phenotypic plasticity exhibited across different organisms and how this plasticity can influence an organism’s resilience to its changing environment.

Lecture
MS  Davies  Arranged  Nov. 27 - Dec. 21
MET BI 105: INTRODUCTORY BIOLOGY FOR HEALTH SCIENCES

*Prereq: High school biology and chemistry are assumed.*

**Not for Biology or BMB major/minor credit.** Principles of biology: emphasis on cellular structure, heredity, development, and organic evolution. Intended for non-majors as well as for those concentrating in the health and paramedical sciences.

**Lecture**
- A1  Staff  Mon  6:00pm - 8:45pm
- C1  Wed  6:00pm - 8:45pm

**Lab**
- C1  Wed  6:00pm - 8:45pm

**Notes:** Not for Biology or BMB major/minor credit.

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MET BI 107: BIOLOGY I

*Prereq: Assumes year of high school biology and chemistry*

The evolution and diversity of life; principles of ecology; behavioral biology. For premedical students and students who plan to concentrate in the natural sciences.

**Lecture**
- A1  Lavalli  Mon  6:00pm - 8:45pm
- C1  Wed  6:00pm - 8:45pm

**Notes:** BI 107 is required of Biology majors. It is recommended that CH 101 and CH 102 be taken prior to or concurrently.

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MET BI 203: CELL BIOLOGY

*Prereq: BI 108 and CH 102 or equivalent*

Principles of cellular organization and function: biological molecules, enzymes, bioenergetics, membranes, motility, regulatory mechanisms.

**Lecture**
- B1  Adams  Tue  6:00pm - 8:00pm
  Thu  6:00pm - 7:00pm

**Discussion**
- D1  Thu  7:00pm - 8:00pm

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MET BI 211: HUMAN PHYSIOLOGY

*Prereq: BI 105 or equivalent.*

**Not for Biology or BMB major/minor credit.** Designed for non-biology majors. Introduction to physiology. Principles of physiology with special reference to humans.

**Lecture**
- D1  Vyshedskiy  Thu  6:00pm - 8:45pm

**Lab**
- B1  Tue  6:00pm - 8:45pm

**Notes:** Not for Biology or BMB major/minor credit.

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MET BI 407: ANIMAL BEHAVIOR

*Prereq: BI 105 or equivalent*

Ethological approach to animal behavior, including humans; physiological, ontogenetic, and phylogenetic causes and adaptive significance of behavior within an evolutionary framework.

**Lecture**
- A1  Wasserman  Mon  6:00pm - 8:45pm

**Lab**
- C1  Wed  6:00pm - 8:45pm

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MET BI 552: MOLECULAR BIOLOGY I

*Prereq: MET BI 203, BI 206, or consent of instructor.*

Structure, synthesis, and control of biologically important macromolecules, especially DNA, RNA, and proteins. Biochemistry of transcription and translation of genetic material. Introduction to molecular problems peculiar to eukaryotes.

**Lecture**
- B1  TBA  Tue  6:00pm - 7:45pm
  Thu  6:00pm - 6:50pm

**Discussion**
- D1  Thu  7:05pm - 7:55pm

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MET BI 566: NEUROBIOLOGY OF CONSCIOUSNESS

*Prereq: BI 108 or equivalent*

In this class we will dive into the neuroscience of imagination: from neurons to memory to neurological control of novel conscious experiences. We will study what makes your brain unique and the selectional forces that shaped the brains of our ancestors. We will discuss what makes human language special and how it evolved.

**Independent**
- C1  Vyshedskiy  Wed  6:00pm - 8:45pm
**CAS BI 191: UNDERGRADUATE RESEARCH IN BIOLOGY I**

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

[2 cr] Not for biology major or minor credit. Laboratory research or field work under the supervision of a Biology faculty mentor. Research outside of 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 291: UNDERGRADUATE RESEARCH IN BIOLOGY II**

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

[2 cr] Not for biology major or minor credit. Laboratory research or field work under the supervision of a Biology faculty mentor. Research outside of 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 391: UNDERGRADUATE RESEARCH IN BIOLOGY III**

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

[2 or 4 cr] Two credit option not for Biology major or minor credit. Laboratory research or field work under the supervision of a Biology faculty mentor. Research outside of the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Up to two 4-credit research courses may be counted as electives and one of those can apply towards the three-lab requirement.

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

**CAS BI 491: UNDERGRADUATE RESEARCH IN BIOLOGY IV**

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

Laboratory research or field work under the supervision of a Biology faculty sponsor. Research outside of the Biology Department is acceptable if approved and overseen by a Biology faculty sponsor. Up to two 4-credit research courses may be counted as electives and one of those can apply towards the three-lab requirement.

**Grading:** Course grade is determined by laboratory/fieldwork performance and written report.

**CAS BI 401: HONORS RESEARCH IN BIOLOGY**

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

Mentored laboratory or field research with a faculty member of the Biology Department leading to graduation with Honors in Biology. One 4 credit research course can count toward the 3-lab requirement and fulfill an upper level elective. A second 4 credit research course can fulfill an upper level elective.

**Grading:** Course grade is determined by laboratory/fieldwork performance, written thesis, and defense of the thesis before a committee of three Biology faculty members.

**CAS BI 497: HONORS RESEARCH IN BIOLOGY SEMINAR**

*Prereq: For students currently enrolled in or intending to apply to the Honors in Biology Program.*

[2 cr] A 2-credit weekly research seminar for students in the Honors in Biology Program. A minimum grade of B+ and written assignments based on research topics in the seminar are required to graduate with departmental honors.

A1 Wasserman Arr.

**Notes:** A minimum grade of B+ is required to graduate with Honors in Biology.

**Grading:** Attendance and written assignments.

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**RESEARCH & READINGS**

**NOTE:** Time commitment is a minimum of 6 hours a week for 2-credit research and 12 hours a week for 4-credit research.
CAS BI 171: READINGS IN BIOLOGY I
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 271: READINGS IN BIOLOGY II
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 371: READINGS IN BIOLOGY III
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 471: READINGS IN BIOLOGY IV
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 BI 401/402 or BI 491/492.

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

NOTE: Time commitment is a minimum of 6 hours a week for 2-credit research and 12 hours a week for 4-credit research.
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* Marine Semester