FALL 2017
BIOLOGY COURSE DIRECTORY

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
CAB 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

TABLE OF CONTENTS:

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.

BIOCHEMISTRY & MOLECULAR BIOLOGY COURSES

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%).

CELL & MOLECULAR

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).

Textbook: Brooker, Widmaier, Graham, and Stiling, *Principles of Biology*, 2nd ed., McGraw-Hill, 2018.

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

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.

Textbook: Cooper and Hausman, *The Cell: A Molecular Approach*, 7th ed., Sinauer Associates, 2015

Grading: Four midterm exams and final examination.

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.

Textbook: Cooper and Hausman, *The Cell: A Molecular Approach*, 7th ed., Sinauer Associates, 2015

Grading: 2 midterms, final exam, and discussion.

CELL & MOLECULAR

CAS BI 218: CELL BIOLOGY WITH INTEGRATED SCIENCE EXPERIENCE II LAB

Prereq: CAS BI 108 and CAS CH 102 or equivalent

[5 cr] Integration of cell biology with organic chemistry and neuroscience, with emphasis on how each discipline interacts experimentally. Laboratory focuses on synthesizing compounds and testing in biological systems.

Lecture and Discussion

A1	Beffert	Tue, Thu	9:30am - 10:45am
		Mon	6:30pm - 8:00pm
B1		Register for a BI 203 discussion.	

Lecture and Discussion

A2	Naya	Tue, Thu	9:30am - 10:45am
B1		Register for a BI 213 discussion.	

Lab

L1	Spilios	Wed.	12:20pm - 4:20pm

Prelab:

P1	Spilios	Thu	3:30pm - 4:45pm

Textbook: Cooper and Hausman, *The Cell: A Molecular Approach*, 7th ed., Sinauer Associates, 2015

Grading: Lecture (75%) and laboratory (25%).

CAS BI 311: GENERAL MICROBIOLOGY

Prereq: CAS BI 203 and CAS BI 206 or equivalent or consent of the instructor

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

Textbook: Slonczewski and Foster, *Microbiology: An Evolving Science,* 4th ed., W.W. Norton & Company, Inc., 2017

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

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.

Textbook: Gilbert, *Developmental Biology*, 10th ed., Sinauer, 2013

Grading: Three exams plus discussion grade.

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
		Wed, Fri	9:05am - 9:55am
A2	Perlstein	Tue, Thu	2:00pm - 3:15pm
		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	C3	Thu	9:30am -	10:20am
C2	Mon	1:25pm -	2:15pm	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%).

CELL & MOLECULAR

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.

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	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

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

Textbook: Tolan, *Biochemistry Laboratory Manual*, 3rd Ed., 2013

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

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.

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%).

CELL & MOLECULAR

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%).

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	D6	Wed	2:30pm - 5:15pm
B2	Mon	2:30pm - 5:15pm	D7	Wed	6:30pm - 9:15pm
B3	Mon	2:30pm - 5:15pm	E1	Thu	8:00am - 10:45am
C1	Tue	8:00am - 10:45am	E2	Thu	8:00am - 10:45am
C2	Tue	8:00am - 10:45am	E3	Thu	8:00am - 10:45am
C3	Tue	8:00am - 10:45am	E4	Thu	12:30pm - 3:15pm
C4	Tue	12:30pm - 3:15pm	E5	Thu	12:30pm - 3:15pm
C5	Tue	12:30pm - 3:15pm	E6	Thu	12:30pm - 3:15pm
C6	Tue	12:30pm - 3:15pm	E7	Thu	6:30pm - 9:15pm
D1	Wed	8:00am - 10:45am	E8	Thu	6:30pm - 9:15pm
D2	Wed	8:00am - 10:45am	F1	Fri	8:00am - 10:45am
D3	Wed	8:00am - 10:45am	F2	Fri	8:00am - 10:45am
D4	Wed	2:30pm - 5:15pm	F3	Fri	8:00am - 10:45am
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

Textbook: Primary literature and complementary readings; Traniello, *Introduction to Behavioral Biology*, 1st ed., 2012**;** Alcock, *Animal Behavior*, edition TBA

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

Textbook: Wright, *Environmental Science: Toward a Sustainable Future,* 12th ed., Pearson, 2013

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

Textbook: Herron and Freeman, *Evolutionary Analysis*, 5th ed., Pearson, 2013

Grading: 2 midterms (40%), final exam (20%), discussion (20%), and paper assignment (20%).

ECOLOGY, BEHAVIOR & EVOLUTION

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 BI107 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.

Textbook: W.H. Schlesinger, *Biogeochemistry: An Analysis of Global Change*. 3rd Edition. Academic Press. 2013

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.

Textbook: Primack, *Essentials of Conservation Biology*, 6th ed., 2017

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

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

Lab

B1	Mon	2:30pm - 5:15pm	D3	Wed	6:30pm - 9:15pm
B2	Mon	6:30pm - 9:15pm	E1	Thu	12:30pm - 3:15pm
C1	Tue	12:30pm - 3:15pm	E2	Thu	6:30pm - 9:15pm
D1	Wed	8:00am - 10:45am	F1	Fri	8:00am - 10:45pm
D2	Wed	2:30pm - 5:15pm			

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

Textbook: Sherwood, *Fundamentals of Human Physiology*, 4th ed., Brooks Cole, 2011; McCarthy, Seliga, and Valdes, *Human Physiology Laboratory Manual*

Grading: Lecture (75%: 3 midterm exams, 1 cumulative final, small assignments); Lan (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

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

Lab

B1	Mon	2:30pm - 5:15pm	D3	Wed	6:30pm - 9:15pm
B2	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	6:30pm - 9:15pm	E3	Thu	6:30pm - 9:15pm
D1	Wed	8:00am - 10:45pm	F1	Fri	8:00am - 10:45am
D2	Wed	2:30pm - 5:15pm			

Textbook: Widmaier et al., *Vander's Human Physiology: The Mechanisms of Body Function*, 14th ed., McGraw-Hill Education, 2013; Sanxaradis Mantis, Rycroft, Seliga, Reilley-Luther, *Systems Physiology Lab*

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

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

Discussion

B1	Wed	12:20pm - 1:10pm	B4	Fri	10:10am - 11:00am
B2	Wed	1:25pm - 2:15pm	B5	Fri	11:15am - 12:05pm
B3	Fri	9:05am - 9:55am	B6	Fri	12:20pm - 1:10pm

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

Textbook: Bear, Connor, and Paradiso, *Neuroscience: Exploring the Brain*, 4th ed., Lippincott Williams & Wilkins, 2015

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

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

Lab

B1	Fri	2:30pm - 5:15pm

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).

PHYSIOLOGY & NEUROBIOLOGY

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.

Textbook: (Recommended) Sanes, Reh, and Harris, *Development of the Nervous System*, 3rd ed., Academic Press, 2011; (Optional) Rao and Jacobson, *Developmental Neurobiology*, 4th ed., Springer, 2005

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 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.

Independent

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

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 NE 102) and (CAS BI 325 or CAS NE 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%).

PHYSIOLOGY & NEUROBIOLOGY

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	3:30pm - 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.

Textbook: Bear, Connors, and Paradioso, *Neuroscience: Exploring the Brain*, 4th ed., Wolters Kluwer, 2016.

Grading: Weekly quizzes, three exams and discussion.

MARINE SEMESTER

Biology students are encouraged to apply for the Marine Semester.
Applications are accepted on a rolling basis:
www.bu.edu/bump/marine-semester-prereqapp

CAS BI 523: MARINE URBAN ECOLOGY

Prereq: Acceptance into the Marine Semester

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.

Lecture

MS	Rotjan	Arranged	Oct. 3 - Oct. 27

CAS BI 531: ICHTHYOLOGY: BEHAVIOR, ECOLOGY, AND EVOLUTION OF FISH

Prereq: CAS BI 260 and consent of instructor; acceptance into the Marine Semester.

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.

Lecture

MS	Lobel	Arranged	Oct. 30 - Nov. 21

CAS BI 539: CORAL REEF DYNAMICS: SHALLOW WATERS, DEEP TIME

Prereq: Acceptance into the Marine Semester.

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.

Lecture

MS	Rotjan	Arranged	Nov. 27 - Dec. 21

CAS BI 541: CORAL REEF RESILIENCE AND RESTORATION

Prereq: Junior or senior standing; acceptance into the Marine Semester.

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.

Lecture

MS	Kaufman	Arranged	Nov. 27 - Dec. 21

CAS BI 546: MARINE MEGAFAUNAL ECOLOGY: STELLWAGEN BANK NATIONAL MARINE SANCTUARY AND SURROUNDING WATERS

Prereq: (CAS BI 260 and CAS MA 213) or consent of the instructor; acceptance into the Marine Semester.

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.

Lecture

MS	Biedron	Arranged	Sept. 7 - Oct. 2

CAS BI 550: MARINE GENOMICS

Prereq: Acceptance into the Marine Semester.

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.

Lecture

MS	Finnerty	Arranged	Nov. 27 - Dec. 21

MARINE SEMESTER

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

METROPOLITAN COLLEGE (MET)

MET BI evening courses count toward a student's major the same way CAS BI courses do.

Juniors and seniors can take one MET course per semester. All other students must request permission from Dean Jarvi in CAS Advising (sjarvi@bu.edu).

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

Lab

C1	Wed	6:00pm - 8:45pm

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

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

Lab

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.

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	

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.

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

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	

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

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 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.

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.

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* Marine Semester