

# BIOLOGY

Biologists develop and test scientific models that deepen our understanding of life. The pace with which Biology changes (new knowledge, new methods, and new technology) is matched by the speed and depth of its integration into society. Biological expertise is needed, to an unprecedented degree, to address many of the most pressing challenges associated with living in today's world. Toward that end, our overarching goal, embedded within the framework of a liberal arts education, is to educate Skidmore students in a manner that empowers them to successfully address challenges as they relate to the biological sciences, health professions, industry, environment, and society. The major leads to a bachelor of arts degree.

Students who major in biology and plan to attend professional schools (medical, dental, veterinary, and others) are encouraged to take two semesters of organic chemistry (CH 221 Organic Chemistry I and CH 222 Organic Chemistry II) and two semesters of calculus-based physics (PY 130 Introductory Physics I with Laboratory: Forces and Energy and PY 140 Introductory Physics II with Laboratory: Electrodynamics). See *Health Professions*.

*Chair of the Department of Biology:* Patricia Hilleren

*Associate Chair of the Department of Biology:* Sylvia McDevitt

Professors: Jason Breves, Corey R. Freeman-Gallant, Bernard Possidente

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## Biology B.A.

Students majoring in biology are required to fulfill the general college requirements and to complete the following (50 minimum credits):

Code	Title	Hours
<b>Foundation Requirement</b>		
BI 107	Molecular and Cellular Foundations of Life	4
BI 108	Organismal Biology	4
CH 125	Principles of Chemistry <sup>1</sup>	4
<b>Concentration Courses</b>		
<i>Physiological Systems and Integrative Biology</i>		
Select one 200-level course of the following:		4
BI 244	Comparative Vertebrate Physiology	
BI 246	General Microbiology	
<i>Ecology and Evolution</i>		
Select one 200-level course of the following:		4
BI 224	Evolution	

BI 241	Ecology	
BI 239	Parasitology, Epidemiology, and Public Health	
<i>Cell- &amp; Molecular Biology</i>		
Select one 200-level course of the following:		4
BI 242	Molecular Cell Biology	
BI 245	Principles of Genetics	
BI 247	Cell Biology	
<b>Quantitative Methods</b>		
BI 235	Biostatistics	4
<b>Outside Biology Course</b>		
Select one course from the Outside Biology list below <sup>2</sup>		3-8
<b>Concentration</b>		
Select three courses at the 300-level in one of the areas of concentration listed below: <sup>3,4</sup>		11
Biomedical Science (p. 3)		
Cell and Molecular Biology (p. 3)		
Ecology, Evolution and Behavior (p. 3)		
Integrative Biology (p. 4)		
<b>Additional Courses</b>		
Select one of the following:		6-10
Select two additional courses from the offerings at the 200 or 300-level in Biology not taken to fulfill a requirement listed above <sup>5</sup>		
Two courses at the 200 or 300-level from the list of Outside Biology Courses not taken to fulfill a requirement above		
<b>Scientific Communications in the Life Sciences</b>		
BI 373	Scientific Communications in Life Sciences	3
<b>Senior Seminar</b>		
BI 374	Senior Seminar Series in Biology (two semesters)	2

<sup>1</sup> CH 115 Fundamentals of Chemistry with Lab may be taken in preparation for CH 125 Principles of Chemistry, but it does not count toward the Biology major add in some information

<sup>2</sup> Note: Please be aware that some of the courses listed have prerequisites. It is your responsibility to ensure those are met prior to enrolling in one of those courses.

<sup>3</sup> Two of the courses must be with lab

<sup>4</sup> Note: Topics courses in Biology (BI 351 Topics in Biology and BI 352 Topics in Biology with Lab) will be assigned to one or more of the concentrations above as appropriate.

<sup>5</sup> Excluding BI 275 Introduction to Biological Research, BI 299 Professional Internship in Biology, BI 371 Independent Study in Biology, BI 375 Advanced Research in Biology, BI 399 Professional Internship in Biology, BI 373 Scientific Communications in Life Sciences, BI 374 Senior Seminar Series in Biology

<sup>6</sup> Only BI 107 Molecular and Cellular Foundations of Life, BI 108 Organismal Biology, 200 and 300 level BI courses count toward the Biology major and minor GPA.

<sup>7</sup> The following courses DO NOT count toward the Biology major and minor GPA: BI AP, BI 110, BI 112, BI 115H, BI 120, BI 120H, BI 136, BI 140, BI 149, BI 150, BI 151, BI 152, BI 152H, BI 155, BI 160, BI 165, BI 170, BI 195, BI 299, BI 399.

## Outside Biology Courses

Code	Title	Hours
<b>Course Options</b>		
AN 349	Medical Anthropology	3

AR 136	Digital Foundations	4	ID 210	Introduction to GIS	4
AR 209	Communication Design I	4	MA 109	Calculus with Algebra II	3
AR 307	Communication Design II	4	MA 111	Calculus I	4
AR 337	Communication Design III	4	MA 113	Calculus II	4
AR 355	3D Modeling and Animation	4	MA 200	Linear Algebra	4
CH 214	Inorganic Compounds and Materials	5	MA 202	Calculus III	4
CH 221	Organic Chemistry I	5	MA 204	Probability and Statistics	3
CH 222	Organic Chemistry II	5	MA 211	Calculus III	3
CH 232	Analytical Methods in Chemistry	5	MA 214	Theory of Numbers	3
CH 301	Polymer Chemistry	3	MA 270	Differential Equations	4
CH 313	Inorganic Chemistry	3	MA 302	Graph Theory	3
CH 314	Inorganic Chemistry With Lab	5	MA 303	Introduction to Analysis	4
CH 323	Advanced Organic Chemistry	3	MA 309	Elements of Modern Geometry	3
CH 324	Advanced Organic Chemistry With Lab	5	MA 310	History of Mathematics	3
CH 330	Chemical Thermodynamics and Kinetics	3	MA 311	Differential Geometry	3
CH 331	Quantum Chemistry and Spectroscopy	3	MA 313	Introduction to Topology	3
CH 332	Chemical Thermodynamics and Kinetics with Lab	5	MA 316	Numerical Algorithms	3
CH 333	Quantum Chemistry and Spectroscopy with Lab	5	MA 319	Abstract Algebra I	4
CH 340	Biochemistry: Macromolecular Structure and Function	3	MA 320	Abstract Algebra II	3
CH 341	Biochemistry: Macromolecular Structure and Function with Lab	5	MA 323	Real Analysis	3
CH 342	Biochemistry: Intermediary Metabolism	3	MA 324	Complex Analysis	3
CS 206	Introduction to Computer Science II	4	MA 331	Dynamical Systems	3
CS 225	Applied Data Science	4	MA 215	Introduction to Mathematical Reasoning and Proof	4
CS 230	Programming Languages	4	MA 302	Graph Theory	3
CS 305	Design and Analysis of Algorithms	4	MA 316	Numerical Algorithms	3
CS 306	Computability, Complexity, and Heuristics	4	MS 240	Applied Regression Analysis	4
CS 318	Introduction to Computer Organization	4	NS 101	Introduction to Neuroscience	4
CS 322	Artificial Intelligence	4	NS 201	Cellular and Molecular Neuroscience	4
CS 225	Applied Data Science	4	NS 315	Mechanisms of Alzheimer's Disease	3
CS 325	Computer Graphics	4	PH 207	Introduction to Logic	4
ES 205	Ecosystem Science and Analysis of Forested Landscapes	4	PH 211	Ethics	3
ES 206	Environmental Engineering and the Science of Sustainability	4	PH 225	Environmental Philosophy	3
ES 308	Soil and Watershed Science for a Crowded Planet	4	PY 130	Introductory Physics I with Laboratory: Forces and Energy	4
GE 101	Earth Systems Science with Lab	4	PY 140	Introductory Physics II with Laboratory: Electrodynamics	4
GE 211	Climatology	4	PY 210	Foundations of Modern Physics	3
GE 216	Sedimentology	4	PY 212	Optics	4
GE 301	Hydrogeologic Systems	4	PY 213	Electronics	3
GE 304	Geomorphology	4	PY 221H	Galaxies and Cosmology	3
GE 305	Remote Sensing of the Earth and Environment	4	PY 311	Thermal and Statistical Physics	4
GE 309	Field Techniques	4	PY 345	Mechanics	4
GE 310	Paleobiology	4	PY 346	Electricity and Magnetism	4
GE 311	Paleoclimatology	3	PY 348	Quantum Mechanics	4
GE 316	Stratigraphy	4	PS 204	Educational Psychology	3
GE 320	Global Biogeochemical Cycles	4	PS 205	Social Psychology	4
HP 126	Human Anatomy and Physiology I	4	PS 206	Developmental Psychology	4
HP 127	Human Anatomy and Physiology II	4	PS 207	Introduction to Child Development	4
HP 131	Introduction to Public Health	3	PS 208	Adolescent Development	4
HP 242	Principles of Nutrition for Health and Performance	3	PS 209	Adult Development	4
HP 311	Advanced Exercise Physiology	4	PS 210	Personality	4
			PS 211	Applied Psychology	4

PS 213	Hormones and Behavior	4
PS 214	Psychological Disorders	4
PS 218	Cognition	4
PS 219	Health Psychology	3
PS 221	Clinical Psychopharmacology	3
PS 223	Evolutionary Psychology	4
PS 225	Perception (A & B)	3
PS 231	Neuropsychology	4
PS 232	Introduction to Cognitive Science	3
PS 234	Developmental Disabilities and Autism	4
PS 304	Research Methods 2: Physiological Psychology	4
PS 305	Research Methods 2: Cognitive Development (A & B)	4
PS 307	Advanced Personality	3
PS 313	Psychology of Gender	4
PS 314	Psychology of Reading	3-4
PS 315	Clinical Psychology	4
PS 318H	Advanced Statistics in Psychology	4
PS 320	Research Methods 2: Social Psychology	4
PS 321	Motivation and Emotion	4
PS 322	Positive Psychology	4
PS 323	Psycholinguistics	4
PS 328	Seminar in Clinical Psychology: Anxiety and Its Disorders	3
PS 329	Clinical Psychology Field Experience	4
PS 330	Research Methods 2: Memory	4
PS 332	Cross-Cultural & Multicultural Psychology	4
PS 333	Sleep and Dreams	4
PS 334	Psychology of Religion	3
PS 335	Psychology of Race	4
PS 336	Music Cognition	4
PS 341	Seminar in Cognitive Neuroscience: Left Brain/ Right Brain	3
AN 251	Themes in Anthropology (C & D)	1-4
AN 252	Non-Western Themes in Anthropology (C & D)	1-4
AN 351	Topics in Cultural Anthropology (C & D)	1-4
AN 352	Topics in Archeology (C & D)	1-4
<i>Topics Courses</i> <sup>1</sup>		
CH 351	Special Topics in Chemistry	3
CH 352	Special Topics in Biochemistry	3
CH 353	Topics in Environmental Chemistry	3
CS 276	Selected Topics in Computer Science	3
CS 376	Advanced Topics In Computer Science	3
ES 252	Topics in Environmental Studies (C & D)	1-4
ES 352	Advanced Topics in Environmental Studies and Sciences (C & D)	1-4
GE 251	Special Topics in Geosciences (C & D)	1-4
GE 351	Advanced Topics in Geology (C & D)	1-3
MA 251	Selected Topics in Mathematics	1-4
NS 212	Topics in Neuroscience	4
NS 312	Advanced Topics in Neuroscience	4
PY 251	Special Topics in Physics (C & D)	1-4
PY 351	Advanced Topics in Physics (C & D)	1-4

PS 212	Themes in Contemporary Psychology (A & B)	3-4
PS 312	Adv Sem Major Issues (A & B)	3,4

<sup>1</sup> Might be used with prior approval of the department.

## Areas of Concentration in Biology

### Biomedical Science

Code	Title	Hours
BI 306	Mammalian Physiology	4
BI 309	Microbial Genetics	4
BI 341	Neurodevelopment	4
BI 342	Frontiers in Molecular Neuroscience	3
BI 343	Endocrinology	3
BI 344	Biological Clocks	4
BI 345	Human Genetics	4
BI 346	Cannabis sativa	4
BI 351	Topics in Biology (when applicable)	3
BI 352	Topics in Biology with Lab (when applicable)	4
BI 361	Biology of Viruses	3
BI 362	Bacterial Pathogenesis: A Molecular Approach	3

### Cell and Molecular Biology

Code	Title	Hours
BI 309	Microbial Genetics	4
BI 306	Mammalian Physiology	4
BI 311	Biological Electron Microscopy	4
BI 336	Plant Biology	3
BI 337	Plant Biochemistry and Physiology	4
BI 338	Plant Biotechnology	4
BI 341	Neurodevelopment	4
BI 342	Frontiers in Molecular Neuroscience	3
BI 346	Cannabis sativa	4
BI 351	Topics in Biology (when applicable)	3
BI 352	Topics in Biology with Lab (when applicable)	4
BI 360	Genome Biology: Chromatin Structure, Function and Epigenetic Regulation	3
BI 361	Biology of Viruses	3
BI 362	Bacterial Pathogenesis: A Molecular Approach	3
BI 363	RNA Metabolism	3
BI 368	Advanced Light Microscopy	4

### Ecology, Evolution and Behavior

Code	Title	Hours
BI 302	Behavioral Ecology	3
BI 307	Ornithology	4
BI 316	Animal Behavior	4
BI 324		4
BI 325	Tropical Ecology	3
BI 327	Conservation Ecology	3
BI 328	Global Change Biology	3
BI 336	Plant Biology	3
BI 339	Plant-Animal Interactions	4

BI 351	Topics in Biology (when applicable)	3
BI 352	Topics in Biology with Lab (when applicable)	4

### Integrative Biology

Code	Title	Hours
Select any 300-level courses, excluding:		
BI 371	Independent Study in Biology	
BI 375	Advanced Research in Biology	
BI 399	Professional Internship in Biology	

## Health Professions

Students who major in biology and plan to attend professional schools (medical, dental, veterinary, and others) are encouraged to take two semesters of organic chemistry (CH 221 Organic Chemistry I and CH 222 Organic Chemistry II) and two semesters of calculus-based physics (PY 130 Introductory Physics I with Laboratory: Forces and Energy and PY 140 Introductory Physics II with Laboratory: Electrodynamics). See Preparation for Profession: Affiliated Programs and Other Agreements (Health Professions).

## Writing in the Major Requirement

Students are required to communicate scientific ideas (written, visual, and oral) in a manner that meets international biology standards, keeping in mind specific requirements for biological sub-disciplines. Professional biologists give oral presentations, prepare written reports, submit grant proposals and publish results in scholarly journals. In fulfilling the writing requirement in the major, students will learn to:

1. write about scientific observations and conclusions in the style and format of an experienced biologist;
2. maintain properly written laboratory and/or field notebooks;
3. write formal laboratory reports in the format and style of a paper in a scholarly biology journal.

While professional communication is incorporated into all of our courses offered, Biology majors will complete the requirements for Writing in the Major upon the successful completion of BI 373 Scientific Communications in Life Sciences.

## Biology Minor

Students who want to minor in biology must take a total of six courses from among those offered in the department.

Code	Title	Hours
<b>Required Courses</b>		
BI 107	Mol Cell Found of Life	4
BI 108	Organismal Biology	4
Select two 200-level courses in biology		8
Select two 300-level courses in biology <sup>1</sup>		8
CH 115 or CH 125	Fundamentals of Chemistry with Lab Principles of Chemistry	4
<b>Total Hours</b>		<b>28</b>

<sup>1</sup> Note: BI 371 Independent Study in Biology and BI 375 Advanced Research in Biology cannot substitute for one of the 300-level courses in biology.

- Only BI 107 Mol Cell Found of Life, BI 108 Organismal Biology, 200 and 300 level BI courses count toward the Biology major and minor GPA.
- The following courses DO NOT count toward the Biology major and minor GPA:
  - BI AP
  - BI 110 Biology of the Mind
  - BI 112 Straw into Gold: Science in the Fiber Arts
  - BI 115H Ecology of Food
  - BI 120 Human Biology and Medical Decisions: Food, Disease, Sex, Sleep
  - BI 120H Human Biology and Medical Decisions: Food, Disease, Sex, Sleep
  - BI 136 Ecology of the Adirondacks
  - BI 140 Marine Biology
  - BI 149 The Birds and the Bees: the Biology of Sex
  - BI 150 Biology: The Scientific Study of Life
  - BI 151 Topics in Biology without Lab
  - BI 152 Topics in Biology
  - BI 152H Topics in Biology: Honors
  - BI 155 Evolutionary Biology
  - BI 160 Conservation Biology
  - BI 165 Microbes and Society
  - BI 170 Human Genetics
  - BI 195 Inside Equus: Biology of the Horse
  - BI 299 Professional Internship in Biology
  - BI 399 Professional Internship in Biology

## Honors

To be eligible for honors in Biology, a student must meet the requisite grade-point average<sup>1</sup> and complete BI 376 (<https://catalog.skidmore.edu/search/?P=BI%20376>) Senior Thesis in Biology with a grade of A- or higher. Students must also complete an honors application by the withdrawal deadline of the spring semester of the senior year. Within this application, students must describe their research experiences and explain why these experiences should qualify them for honors in Biology.

<sup>1</sup> Note: To be considered for honors, the college requires a GPA of 3.500 or higher for work in the major, and a GPA of 3.000 or higher based on all work taken at Skidmore.

### For students graduating in 2028 and beyond:

To be eligible for honors in Biology, students must meet the all-College requirement of a GPA of 3.00 overall and 3.75 in the major. Additionally, students must complete two semesters of 300-level research (3 credits each) related to biology (work conducted either at Skidmore or at another institution will be considered). Students must also complete an honors application by the withdrawal deadline of the spring semester of the senior year. Within this application, students must describe their research experiences and explain why these experiences should qualify them for honors in Biology.

## Course Listing

### BI 107 - Mol Cell Found of Life

Credits: 4

An introduction to the molecular and cellular processes of life. The course explores topics in molecular biology, biochemistry, cell structure and function, and transmission genetics in a variety of organisms. Students will use a reductionist approach to consider fundamentals, which will be applied to a holistic understanding of the molecular basis of life. In the laboratory, students will carry out inquiry-based exercises using the modern technologies typically deployed by molecular and cellular life scientists.

**Note(s):** This course is a foundation requirement for the major in Biology and other life sciences- while it will satisfy the scientific inquiry requirement, owing to the workload and intensity we strongly discourage non-life science majors from taking this course. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

### BI 108 - Organismal Biology

Credits: 4

An introduction to the processes that shape and regulate individuals, populations, communities and ecosystems. Students develop foundational knowledge of evolutionary theory and, from this perspective, explore topics in organismal biology with an emphasis on physiology and ecology. Students will study the different ways organisms have evolved to maintain their internal milieu in the face of environmental challenges and how the composition, functioning, and stability of communities and ecosystems are shaped by biotic and abiotic factors. The laboratory portion of the course is inquiry-based and introduces students to theories and methodologies of modern biology.

**Note(s):** This course is a foundation requirement for the major in Biology and other life sciences- while it will satisfy the scientific inquiry requirement, owing to the workload and intensity we strongly discourage non-life science majors from taking this course. The course partially fulfills the departmental writing requirement. Three hours of lecture, three hours of lab per week. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

### BI 110 - Biology of the Mind

Credits: 4

An introductory-level examination of the basic neurobiology of the human brain and nervous system. A sufficient depth of biological perspective is developed to allow the student to consider the neurobiological underpinnings of a wide variety of brain-related topics including pathology (select mental and nervous system diseases), socially significant issues (drugs, alcohol), higher function (language, sleep, memory, consciousness), and philosophical issues (mind-body problem, artificial intelligence, ethical issues).

**Note(s):** Three hours of lecture, three hours of lab per week. Fulfills Natural Sciences and QR2 requirements; fulfills Scientific Inquiry requirement.

### BI 112 - Straw into Gold: Science in the Fiber Arts

Credits: 4

An introductory-level class combining the science of fibers and dying dyeing with their use in creating textiles. Students will learn how to form and test hypotheses and draw evidence-based conclusions while exploring the science behind differences between different fibers and dying dyeing techniques. Topics will include how different animal and vegetable fibers are generated, harvested, and prepared; the relationship between the observed structure and physical properties of fibers and their function; and the chemistry of natural and synthetic dyes and dyeing. Students will also be introduced to creating different textiles, weaving a fabric structure, and the stages and processes involved in constructing a creative textile art form. No previous experience in fiber arts or college level science required. Class will use a flipped classroom and case study project-based pedagogy, meeting for two 3 hour periods per week. A one day weekend workshop and two weekend field trips will be required, as well as a final project for display/exhibition.

**Note(s):** Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

### BI 115H - Ecology of Food

Credits: 4

The study of fundamental concepts in ecology from a who-eats-whom perspective. Topics include the behavior and ecology of herbivores, predators, parasites, and mutualists, interactions among competitors in quest of food, trophic connections, and analyses of communities and landscapes managed for agricultural and aquacultural production. Quantitative field investigations of herbivory in Skidmore's North Woods are complemented by laboratory investigations of plant physical defenses and secondary chemicals, including the use and function of these secondary chemicals in world cuisine. A similar investigative approach is taken to the study of pollination, seed dispersal, and predation. Local food producers contribute to the study of agroecology. Ecological impacts of various agricultural and aquacultural practices and the implications and potential ecological impacts of genetically modified foods are explored.

**Prerequisites:** QR1 or MA 100 or placement at the FQR level or placement at the AQR level.

**Note(s):** Three hours of lecture, three hours of lab per week. One Saturday field trip. Fulfills Natural Science requirement; fulfills Scientific Inquiry requirement.

### BI 120 - Human Biology and Medical Decisions: Food, Disease, Sex, Sleep

Credits: 4

We share many fundamental biological processes with other living things (food, disease, sex, sleep), but humans also gain and organize information to make evidence-based decisions about our health and lives. This course examines a range of topics in biology (physiology, cell biology, genetics, and neuroscience) and how information is obtained and used to draw conclusions about biology and health. Topics covered do not overlap with BI 105/106, so this course can be taken by pre-med students to address additional MCAT competencies. BI 120H is appropriate for students who are interested in bioethics and a deeper understanding of evidence-based medical decision making.

**Prerequisites:** QR1 or MA 100 or placement at the FQR level or placement at the AQR level.

**Note(s):** Three hours of lecture, two hours of lab per week plus 1 hour of discussion for 120H. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.



**BI 120H - Human Biology and Medical Decisions: Food, Disease, Sex, Sleep**

Credits: 4

We share many fundamental biological processes with other living things (food, disease, sex, sleep), but humans also gain and organize information to make evidence-based decisions about our health and lives. This course examines a range of topics in biology (physiology, cell biology, genetics, and neuroscience) and how information is obtained and used to draw conclusions about biology and health. Topics covered do not overlap with BI 105/106, so this course can be taken by pre-med students to address additional MCAT competencies. BI 120H is appropriate for students who are interested in bioethics and a deeper understanding of evidence-based medical decision making.

**Prerequisites:** QR1 or MA 100 or placement at the FQR level or placement at the AQR level.

**Note(s):** Three hours of lecture, two hours of lab per week plus 1 hour of discussion for 120H. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

**BI 136 - Ecology of the Adirondacks**

Credits: 4

An introduction to the basic principles of ecology through the lens of the Adirondacks, a 6-million-acre state park in upstate New York. Students will explore the habitats of the Adirondack region, the flow of energy and nutrients through these systems, and how organisms adapt to the environment and interact with one another. Particular emphasis will be given to the way in which environmental issues such as acid rain, invasive species, and climate change affect the ecology of the Adirondacks. Several outdoor labs and one full-day field trip are required.

**Prerequisites:** QR1 or MA 100 or placement at the FQR level or placement at the AQR level.

**Note(s):** Fulfills QR2 and Natural Science requirements; fulfills Scientific Inquiry requirement.

**BI 140 - Marine Biology**

Credits: 4

An examination of the intricate and delicate nature of plant, animal, fungal, and microbial life beneath Earth's oceans and on its shorelines. Lecture topics include ocean chemistry and biochemistry, physiology of marine organisms, evolution and diversity of the marine world, marine ecosystems, and human ocean interactions. The lab will include experimental manipulations of marine plants and animals, survey of various life forms, culture techniques, ecological sampling, and mariculture.

**Note(s):** Three hours of lecture, three hours of lab per week. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

**BI 149 - The Birds and the Bees: the Biology of Sex**

Credits: 4

An introduction to the anatomy, physiology and development of human reproductive systems. Students will become familiar with female and male anatomy and development, and will gain a sophisticated understanding of the process of reproduction. Although the focus of the course is on human sex and reproduction, students will study a variety of biological model systems in the laboratory portion of the course.

**Note(s):** 3 hours lecture and 3 hours lab per week. Fulfills QR2 and Natural Sciences requirements; fulfills Scientific Inquiry requirement.

**BI 150 - Biology: The Scientific Study of Life**

Credits: 4

An introduction to the basic principles underlying the study of life. Topics may range from the origin and evolution of life to the molecular basis of heredity and development, to the structure and function of the global ecosystem. The lectures and labs emphasize the diversity of life, the unifying characteristics shared by all organisms, and an understanding of life based on scientific methods of analysis.

**Note(s):** Three hours of lecture, two hours of lab per week. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

**BI 151 - Topics in Biology without Lab**

Credits: 1-4

An introductory examination of topics in Biology that are not regularly offered. Topics will vary each time the course is taught.

**BI 152 - Topics in Biology**

Credits: 4

An opportunity to study topics at the 100 level that are not offered on a regular basis. This course has a 3-hour laboratory component that complements the lecture. The specific topics will vary each time the course is taught. All BI 152 Topics courses fulfill the natural science requirement, but are not generally counted toward a major in biology. If offered as BI 152H, the specific topic course is approved by the Honors Forum as an honors course and is specifically designed to allow students the opportunity to explore the topic in greater depth.

**Note(s):** May be repeated for credit if on a different topic. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

**BI 152H - Topics in Biology: Honors**

Credits: 4

An opportunity to study topics at the 100 level that are not offered on a regular basis. This course has a 3-hour laboratory component that complements the lecture. The specific topics will vary each time the course is taught. All BI 152 Topics courses fulfill the natural science requirement, but are not generally counted toward a major in biology. If offered as BI 152H, the specific topic course is approved by the Honors Forum as an honors course and is specifically designed to allow students the opportunity to explore the topic in greater depth.

**Note(s):** May be repeated for credit if on a different topic. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

**BI 155 - Evolutionary Biology**

Credits: 4

An introduction to evolution as the central organizing principle of the biological sciences. This writing-intensive course explores the mechanisms of evolutionary change and introduces the academic and applied issues that challenge modern evolutionary theory. Topics include: human origins, Darwinian medicine, adaptation, and sexual selection.

**Note(s):** Three hours of lecture, two hours of lab per week. Fulfills Expository Writing and Natural Sciences requirements; fulfills Scientific Inquiry requirement.

**BI 160 - Conservation Biology**

Credits: 4

The biology of species, communities, and ecosystems that are perturbed or threatened by human activities. This course will examine the principles and tools for preserving biological diversity. Topics to be covered include principles of ecology, geographic distribution, animal and plant classification, and population dynamics.

**Note(s):** Three hours of lecture, two hours of lab per week; one all-day field trip. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

**BI 165 - Microbes and Society**

Credits: 4

An introduction to basic microbiology that focuses on the impact microbes have on our society. While everybody knows microbes can cause diseases and food spoilage, microbes have a much deeper and positive impact on our lives than most of us realize. Students will focus on basic concepts in microbiology while exploring the vast diversity of microbes, the benefits we obtain from them (cheese, anyone?), and the harms they inflict upon us. We will keep track of the latest news regarding the impact of microbes on our society, and explore our own human microbiome. (Did you know that you are composed of more microbial cells than human cells?) In the lab students will learn basic laboratory and analytical tools and techniques for the study of microbes.

In addition the laboratory will focus on aspects of medical microbiology, environmental microbiology, and microscopy.

**Note(s):** Three hours of lecture, three hours of lab per week. Fulfills Natural Sciences and QR2 requirements; fulfills Scientific Inquiry requirement.

**BI 170 - Human Genetics**

Credits: 4

An introduction to the principles of genetics and their application to human biology. Topics include the history of genetics; the structure, function, and inheritance of genes; medical genetics; and genetic engineering.

**Note(s):** Three hours of lecture, two hours of lab per week. Fulfills Natural Sciences and QR2 requirements; fulfills Scientific Inquiry requirement.

**BI 195 - Inside Equus: Biology of the Horse**

Credits: 4

An investigation of equine biology as an exceptional and accessible model of animal physiology and behavior. Students will study what makes horses superb athletes and how the genetics, physiology, and behavior of horses have adapted to domestication. Class time will be spent primarily on case studies and problem solving using real life examples. Labs will involve field trips off campus and in-lab experiments. Previous experience with animals/horses is not required.

**Prerequisites:** QR1.

**Note(s):** Three hours of lecture, three hours of lab per week. Fulfills Natural Sciences requirement and QR2 requirements; fulfills Scientific Inquiry requirement.

**BI 224 - Evolution**

Credits: 4

A survey of topics in evolutionary biology: the evidence for evolution, mechanisms of evolutionary change, species concepts, and speciation. Introduction to the concepts of variability, adaptation, neutrality, and phylogeny through discussion and lab work.

**Prerequisites:** BI 108 and BI 107 or ES 205 or ES 206.

**Note(s):** Three hours of lecture, three hours of lab a week.

**BI 235 - Biostatistics**

Credits: 4

Quantitative and statistical skills required for the study of biology and medicine. Topics include: inference, experimental design and hypothesis testing; assumptions behind statistical models and choice of statistical tests; analysis of variance and covariance; general linear models; regression and multiple regression; parametric and non-parametric tests.

**Prerequisites:** BI 107 and BI 108 and placement at the AQR level or completion of an FQR course or QR1.

**Note(s):** Three hours of lecture/discussion, three hours of lab each week. Fulfills Applied QR requirement.

**BI 239 - Parasitology, Epidemiology, and Public Health**

Credits: 4

An exploration of the intersecting central tenets of parasitology, epidemiology, and public health. Students will study their commonalities to better understand the dynamics of antagonistic networks; their application to veterinary and human medicine, agriculture, and conservation; and to gain, share, and merge knowledge from different levels of biological organization (subcellular to landscapes and social networks). The course contrasts the insights, opportunities, and methodologies particular to correlative studies, manipulative experiments, in-silico experiments, and meta-analyses, and is grounded in an analysis of current published research.

**Prerequisites:** BI 107 and BI 108.

**BI 240 - Environmental Biology**

Credits: 4

An examination of the physical and biotic features of the earth, the role of humans in affecting the planet's ecology, and the ways ecological systems affect humans. This course provides the fundamental concepts of environmental biology, along with specific examples from the natural world and human modification. Topics include the basics of the physical nature of the earth; physiological ecology, including the biochemistry and metabolism of life forms and nutrient cycles; biodiversity; interspecific relationships; population and community dynamics; ecosystem structure; pollution and environmental toxicology; resource management; and restoration design. Laboratory consists of field trips, ecological sampling techniques, ecological survey of local habitats, phytoremediation, pollution simulation, and examination of biodiversity.

**Prerequisites:** ES 105.

**Note(s):** The course explores writing conventions specific to the subdiscipline; partially fulfills the departmental writing requirement. Does not count toward the major.

**BI 241 - Ecology**

Credits: 4

A field, laboratory, and lecture course in which interactions among organisms and between organisms and their environment are explored. Students will observe ecological patterns and evaluate evidence and arguments for why those patterns exist.

**Prerequisites:** BI 108.

**Note(s):** The course explores writing conventions specific to the subdiscipline; partially fulfills the departmental writing requirement.

**BI 242 - Molecular Cell Biology**

Credits: 4

A molecular approach to the study of eukaryotic cell biology. Students gain an understanding of the molecular nature of key processes in cell biology including 1) the dynamic structure of proteins and nucleic acids and how they interact to promote cell function; 2) eukaryotic cell cycle; 3) control of cell growth and cell death by key regulatory molecules that, if misregulated, predictably lead to states characteristic of transformed and cancerous cells; and 4) essentials of eukaryotic gene expression-including chromatin architecture, nuclear pre-mRNA processing, mRNA export and quality control of gene expression. The laboratory portion of the course is project-based and designed to expose students to current methodologies and experimental strategies commonly used in the study of cell biology at the molecular level.

**Prerequisites:** BI 107, BI 108, and CH 125 or CH 126.

**Note(s):** The course explores writing conventions specific to the subdiscipline; partially fulfills the departmental writing requirement.

**BI 244 - Comparative Vertebrate Physiology**

Credits: 4

The function and structure of major systems of vertebrates considered principally from the perspective of their ability to meet environmental demands.

**Prerequisites:** BI 107 and BI 108 and CH 125 or CH 126.

**Note(s):** The course explores writing conventions specific to the subdiscipline; partially fulfills the departmental writing requirement.

**BI 245 - Principles of Genetics**

Credits: 4

A study of biological patterns of heredity explained by genes, their structure, function, and transmission from cell to cell and parent to offspring, and the expression of genetic information. Topics include an in-depth study of mitosis, meiosis, Mendelian genetics and extension of Mendelian genetics, to complex traits and their analysis in individuals and populations. Breeding and analysis of fruit flies requires lab work outside of scheduled lab time.

**Prerequisites:** BI 107 and BI 108 or permission of instructor.

**Note(s):** The course explores writing conventions specific to the subdiscipline; partially fulfills the departmental writing requirement.

**BI 246 - General Microbiology**

Credits: 4

A comprehensive introduction to the biology of three major groups of microbes: bacteria, protists, and viruses. Microbial diversity will be explored in the context of the structure, physiology, metabolism, and molecular genetics of various microbial taxa. We will discuss microbial diseases, nonspecific and specific human immune responses, and general strategies used by microbes to overcome these defenses. The final section of the course will explore key concepts in microbial ecology. Emphasis will be placed on the central role of bacteria in geochemical cycles and symbiotic associations with plants and animals. In the laboratory, students will isolate bacteria from a variety of environments (wounds, soil, etc.) and apply standard techniques used in clinical and environmental microbiology labs to study their physiology and metabolism.

**Prerequisites:** BI 107, BI 108 and CH 125 recommended.

**Note(s):** The course explores writing conventions specific to the subdiscipline; partially fulfills the departmental writing requirement. Fulfills Natural Sciences requirement.

**BI 247 - Cell Biology**

Credits: 4

The course provides a cellular and organismal view of essential features of eukaryotic cell biology. Students will study cellular functions such as protein structure and function, cytoskeletal organization, cell migration, cellular metabolism, and cell signaling. These topics will be explored in the context of healthy and cancerous cells. In the laboratory, students will gain experience with modern techniques for visualizing cell biological processes, with emphasis on model organisms, pharmacology, fluorescence and confocal microscopy.

**Prerequisites:** BI 107, BI 108, and CH 125 or CH 126.

**Note(s):** The course explores writing conventions specific to the subdiscipline; partially fulfills the departmental writing requirement.

**BI 251 - Topics in Biology**

Credits: 3

An opportunity to study topics that are not offered on a regular basis. The specific topics will vary each time the course is taught.

**Note(s):** May be repeated for credit if on a different topic.

**BI 252 - Topics in Biology with Lab**

Credits: 4

An opportunity to study topics that are not offered on a regular basis. This course has a 3-hour laboratory component that complements the lecture. The specific topics will vary each time the course is taught.

**Note(s):** May be repeated for credit if on a different topic.

**BI 275 - Introduction to Biological Research**

Credits: 1

An introductory exploration of research in the biological sciences. Students plan, design, and implement a small research project from the laboratory or field in coordination with a faculty member. This experience will allow students at various stages of their careers to sample research methodologies in particular subdisciplines of biology.

**Prerequisites:** Completion of one 100-level course in biology or requirements set forth in individual sections plus permission of instructor.

**Note(s):** Students may only take four BI 275 courses in their careers and no more than two in any given semester. If more than one is taken in one semester, each BI 275 must be in a different section. BI 275 does not fulfill the departmental writing requirement for the major. Offered as S/U only.

**BI 295 - The Power of Sleep: Sleep, Health, and Society**

Credits: 3

An exploration of the themes of power, justice, and identity as they interact with sleep quality and health. We will first examine biological, medical, and social dimensions of sleep and circadian rhythms. Then we will explore evidence that disadvantaged economic and social status contributes to sleep deficiencies, which in turn contribute to worse health outcomes. Students will define and address specific causes of sleep disruption that are amplified by social and economic factors, and will develop programs for further research, public education, and actionable remedies for practices and policies that contribute to poor sleep hygiene.

**Prerequisites:** SSP 100.

**BI 299 - Professional Internship in Biology**

Credits: 1-4

Internship opportunity for students whose curricular foundations and experience have prepared them for professional work related to the major field. With faculty sponsorship and department approval, students may extend their educational experience into such areas as laboratory or field research, or clinical medicine.

**Prerequisites:** Completion of at least one related 200-level course (as determined by the department).

**Note(s):** Does not count toward the major. Must be taken S/U.

**BI 302 - Behavioral Ecology**

Credits: 3

An examination of the relationship between ecological factors and animal behavior, particularly social behavior. Students will analyze comparative studies of behavior, employ and critique economic models of behavior and models of evolutionarily stable strategies, and explore relationships among resource distribution, kinship, breeding systems, and social evolution.

**Prerequisites:** BI 108 or ES 105 and any two 200-level biology courses, except BI 299.

**BI 306 - Mammalian Physiology**

Credits: 4

A study of selected topics in mammalian physiology, including respiratory, renal, and neural physiology.

**Prerequisites:** BI 108 and BI 244 or permission of instructor; for neuroscience students: NS 101, BI 107, and BI 244.

**Note(s):** Three hours of lecture, three hours of lab per week. Offered in alternate years.



**BI 307 - Ornithology**

Credits: 4

Birds as model organisms for an integrative study of biology. This course explores avian form and function; the ecology, evolution, and behavior of birds; and avian conservation.

**Prerequisites:** BI 108 and any two 200-level biology courses except BI 299, or ES 205 and ES 206.

**Note(s):** Three hours of lecture, three hours of fieldwork or lab a week. One Saturday field trip. Currently not offered.

**BI 309 - Microbial Genetics**

Credits: 4

An advanced exploration of the genetic aspects of microbiology. Students will study the genetic characteristics of prokaryotes and how bacterial model organisms contribute to our understanding of fundamental genetic processes in all living cells. Students will also explore applied topics, including the genetics of bioremediation and increasing prevalence of bacterial antibiotic resistance. In the laboratory, students will use modern methods in molecular genetics to explore the use of microorganisms in basic research.

**Prerequisites:** BI 108, CH 125 and BI 242 or BI 246.

**BI 311 - Biological Electron Microscopy**

Credits: 4

Practical and theoretical study of the operation and application of electron microscopes and the preparation of samples for electron microscopy. Topics include chemical fixation, cryofixation, cytochemistry, immunolabeling, ultramicrotomy, transmission electron microscopy, scanning electron microscopy, and electron microscopic photography.

**Prerequisites:** BI 108 and BI 244 or BI 247.

**Note(s):** Two hours of lecture and four hours of lab a week.

**BI 316 - Animal Behavior**

Credits: 4

Behavior is a product of evolution and a means of animal adaptation. This course considers the mechanisms, proximate causes, and ultimate origins of behavior.

**Prerequisites:** BI 108 and any two 200-level biology courses (except BI 299, ES 205, or ES 206); for neuroscience students: NS 101, BI 107, and BI 244.

**Note(s):** Three lectures, three hours of lab or fieldwork a week. One Saturday field trip.

**BI 322 - Ecology & Evolution of Infectious Disease**

Credits: 4

An integrative approach to the study of ecology and evolution of infectious disease. Students gain an understanding of one of the greatest challenges our society faces: responding to infectious disease threats to human health, agriculture, and biodiversity. Students lead discussions of current research that spans the multifactorial and multi-scale (from sub-cellular to biological communities) dynamics of disease within biological communities. Given that the most common strategy for life on this planet is parasitic, host-parasite interactions result in very diverse outcomes. Thus, students gain an appreciation for this diversity through case studies, activities, guest lectures, and computer simulations of evolutionary and ecological processes. In lab, students complete group research projects of their design to gain experience in quantitative methods and science communication.

**Prerequisites:** BI 108 and two 200-level biology courses.

**BI 325 - Tropical Ecology**

Credits: 3

An introduction to the ecology of tropical regions, with an emphasis on Central and South American forests. In this course, we will take an ecological approach to investigating the patterns, processes, and organisms characterizing tropical ecosystems. We will study the forces that gave rise to tropical biodiversity, and discuss both the preservation and destruction of tropical ecosystems.

**Prerequisites:** BI 108 and ES 206 and any two 200-level biology courses except BI 299 and ES 205.

**Note(s):** Please refer to the companion course TX 301.

**BI 327 - Conservation Ecology**

Credits: 3

Focuses upon developing an understanding of the diversity of life, in an ecological and evolutionary context, and applying that understanding to critical analyses of issues and problems in conservation biology.

**Prerequisites:** BI 108 and any two 200-level biology courses except BI 299, or ES 205 and ES 206.

**BI 328 - Global Change Biology**

Credits: 3

Explores five major facets of global change and their interaction as they relate to living organisms in their current and emerging environments. These are: 1) the redistribution of greenhouse gases and limiting nutrients, 2) climate change, 3) urbanization and associated novel contaminants, 4) habitat fragmentation, and 5) the redistribution of biodiversity. Students will study ongoing change in terrestrial, marine, and freshwater environments; explore responses by microbes, protists, plants, invertebrates and vertebrates, as well as the processes that link the taxa; and make significant use of predictive and descriptive quantitative models.

**Prerequisites:** BI 108 and any two 200-level biology courses except BI 299 or BI 275. ES 205 or ES 206 may be substituted for one of the 200-level Biology courses.

**BI 329 - Marine Biology**

Credits: 3

A deep dive into marine life that applies and leverages the students' diverse expertise and interests within Biology. Students will explore the physiologies and ecological phenomena associated with life in marine environments including the open ocean, deep sea, coastlines, estuaries, coral reef systems, and ice. Connectivity and interaction between these habitats and their occupants is a focus. This course is taxonomically broad fish, sharks, marine mammals and seabirds, as well as invertebrates, algae and bacteria and students will additionally explore how these organisms and their environments change over time in response to historical and emerging pressures.

**Prerequisites:** BI 108 and any one 200-level biology course except BI 299 or BI 275.

**BI 336 - Plant Biology**

Credits: 3

An introduction to the biology of plants, including molecular, cellular, developmental, and ecological approaches. Plants and other photosynthetic eukaryotes (e. g. algae) profoundly influence the infrastructure and functional dynamics of virtually all of Earth's ecosystems. Plants also contribute significantly to the foundation of human economy including the food, pharmaceutical, textile, building and biofuels industries. Students will analyze the biology of plants within the framework of a comprehensive survey of various plant and algal groups. Students will review primary literature focused on novel experimental approaches to the study of plants.

**Prerequisites:** BI 107 and BI 108 and at least one 200-level Biology course. (Fulfills Natural Sciences requirement).

**BI 337 - Plant Biochemistry and Physiology**

Credits: 4

The biochemistry, molecular biology, expansion dynamics, transport processes, and environmental responses of plants. Topics include survey of the structure and biosynthetic pathways of carbohydrates, lipids, proteins and secondary compounds, DNA/RNA mechanics, membrane dynamics and function, plant cell development, mineral and vitamin nutrition, respiration, photosynthesis, hormone action, photoperiodism, taxes and stress biology.

**Prerequisites:** BI 107 and BI 108 and any one 200-level course in biology.

**Note(s):** Two lectures, four hours of lab a week.

**BI 338 - Plant Biotechnology**

Credits: 4

A modern analysis of humankind's use of plants and fungi and their derived products. Major subjects covered include ethnobotany, plant genetic engineering, plant biochemistry, techniques of plant production, agricultural practices, horticulture, and medicinal botany/mycology.

**Prerequisites:** BI 108.

**BI 339 - Plant-Animal Interactions**

Credits: 4

Exploration of the evolution and ecology of interactions between plants and animals. Topics include mutualism (e.g., pollination, frugivory), antagonism (e.g., herbivory, granivory), indirect effects that cascade across taxa, and mechanisms by which plant-animal interactions affect the susceptibility of both groups to pathogenic microbes and fungi. Students perform all the steps of active research (research design, data collection, analysis and presentation), as well as read and critique classic and recent studies from the literature. Student research in Skidmore's North Woods and surrounding areas will be emphasized.

**Prerequisites:** BI 108 and any two 200-level biology courses except BI 299, or ES 205 and ES 206.

**Note(s):** Three hours of lecture/discussion and one three-hour lab per week.

**BI 341 - Neurodevelopment**

Credits: 4

An examination of neurodevelopment from an anatomical, genetic, and molecular perspective. Students will study cellular migrations, tissue organization, patterning, and differentiation. In laboratory, students will gain experience with visualizing the developing nervous system at various stages, using techniques such as immunocytochemistry, in situ hybridization, and live fluorescent and bright field imaging.

**Prerequisites:** BI 108; BI 242 or BI 247; and one additional 200-level BI course (except BI 299 and BI 275).

**Note(s):** Three hours of lecture, three hours of lab per week.

**BI 342 - Frontiers in Molecular Neuroscience**

Credits: 3

Historic examination of axon guidance research using primary sources. Students will review and present seminal research articles that transitioned the field of axon guidance from a small research question to a major field in neurobiology. Students will study mechanisms of axon guidance, model systems, relevant gene families, and cellular and molecular approaches. Substantial emphasis will be placed on strengths and weakness of methodologies currently in use in the field. Students will develop scientific writing and oral presentation skills through multiple graded assignments.

**Prerequisites:** BI 108, BI 242 or BI 247, and one 200-level biology course except BI 299 A-C; for neuroscience students: NS 101, BI 107, and BI 242 or BI 244 or BI 247.

**BI 343 - Endocrinology**

Credits: 3

A survey of the role of hormones in coordinating key aspects of organismal function, including growth, development, metabolism, stress, and reproduction. Students will compare and contrast the structure and function of endocrine systems across vertebrate groups with an emphasis on understanding how endocrine systems mediate adaptive responses to environmental challenges. In addition, students will explore how our understanding of endocrine systems informs the treatment of a variety of human diseases. Through detailed analysis of primary literature, students will focus on the technical approaches and model systems currently used in modern endocrinology.

**Prerequisites:** BI 106 or BI 108 and any two 200-level Biology course.

**BI 344 - Biological Clocks**

Credits: 4

Organisms in all the major taxonomic groups have internalized geophysical and other periodicities in the form of endogenous biological mechanism that function as clocks. Theoretical, molecular, cellular, physiological, behavioral, ecological, and biomedical aspects of biological clocks will be examined, with an emphasis on circadian clocks.

**Prerequisites:** BI 108 and any 200-level course in the natural sciences, or permission of instructor.

**Note(s):** Three hours of lecture, three hours of lab per week. Students that have earned credit for BI-344: Biological Clocks may not earn credit for BI-351: Biological Clocks

**BI 345 - Human Genetics**

Credits: 4

An investigation into the concepts and mechanisms foundational to the study of human genetics and biomedical research on the genetic basis of health and disease. Topics include identifying mutations that cause genetic disorders or contribute to risk of disease, developmental, cellular and molecular mechanisms mediating genetic mechanisms of disease, and the use of genetic technology in diagnosis and treatment of medical disorders. A working knowledge of basic concepts in Mendelian and molecular genetics is assumed.

**Prerequisites:** BI 242 or BI 245 or BI 246 or BI 247 or permission of instructor.

**BI 346 - Cannabis sativa**

Credits: 4

An exploration of cell biological functions and effects of Cannabis sativa. Students will examine cellular, developmental, behavioral and physiological questions posed in Cannabis research. In lecture, students will read and present cutting-edge primary literature that addresses these questions. In lab, students will engage completely in problem-based activities where they develop their own hypothesis, methodology and analysis and communicate their results in written and oral formats. Students will become familiar with Cannabis macro- and micro-anatomy, growth, and harvest coupled with greenhouse technology. They will determine the chemical constituents of Cannabis sativa. Finally, they will explore the effect of Cannabis extracts on zebrafish nervous system development using cell biological approaches. Sophisticated technologies include stereomicroscopy, conventional fluorescent microscopy, and Liquid Chromatography and Mass Spectrophotometry.

**Prerequisites:** Two of the following: NS 201, NS 202, BI 247, BI 242, BI 244, BI 245, BI 246.

**BI 351 - Topics in Biology**

Credits: 3

This course gives students an opportunity to study topics that are not offered on a regular basis. The specific topics will vary each time the course is taught.

**Prerequisites:** Permission of department.

**Note(s):** May be repeated for credit if on a different topic. Students that have earned credit for BI-344: Biological Clocks may not earn credit for BI-351: Biological Clocks

**BI 352 - Topics in Biology with Lab**

Credits: 4

An opportunity to study advanced topics that are not offered on a regular basis. This 4-credit course has a 3-hour laboratory component that complements the lecture. The specific topics will vary each time the course is taught, and prerequisites will vary according to the topic.

**Prerequisites:** Permission of the department.

**Note(s):** May be repeated for credit if on a different topic.

**BI 360 - Genome Biology: Chromatin Structure, Function and Epigenetic Regulation**

Credits: 3

A study of eukaryotic genome structure, evolution and function. We will explore genome structural complexity including the dynamic composition and architecture of chromatin and the mechanisms by which its integrity is maintained and its function is regulated. This course will culminate in the exploration of the causes and consequences of epigenetic control that together drive genome plasticity. Integral to this course will be the study of the various modes of inquiry and research tools utilized by scientists to investigate these questions.

**Prerequisites:** BI 108 and BI 242 and CH 221; BI 245 recommended.

**BI 361 - Biology of Viruses**

Credits: 3

An exploration of the structure, genetics, and pathogenesis of all types of viruses, from bacterial to mammalian. Rather than taking an encyclopedic approach, the course begins as an overview of common themes in the life cycles of all viruses. Building upon this foundation, the course will then draw largely from recent published research to explore features of the life cycle and pathogenesis of specific viruses.

**Prerequisites:** BI 108 and BI 242 or BI 246.

**BI 362 - Bacterial Pathogenesis: A Molecular Approach**

Credits: 3

An exploration of the latest techniques used to study bacteria-host interactions at the molecular level. The course delves into common obstacles that disease-causing bacteria must overcome in order to colonize a human host and the general strategies bacteria have evolved to overcome these obstacles. Comparisons will be made to symbiotic bacteria-host interactions, and questions such as "How did pathogenic bacteria evolve?" will be addressed. Grounded in current published research, the class will also explore, at the molecular level, mechanisms used by specific pathogens to colonize and damage host tissue.

**Prerequisites:** BI 108 and BI 246; BI 245 recommended.

**BI 363 - RNA Metabolism**

Credits: 3

An investigation into our current understanding of the central features of eukaryotic gene expression, including the synthesis, processing, export, translation, and turnover of mRNA and the biological machines that carry out these fundamental processes. When appropriate, we will examine how defects in these processes contribute to human disease. We will also explore how structural (micro and long non-coding) RNA molecules exert regulatory control over gene expression. Central to our work will be an exploration of the biochemical, molecular, and genetic methods and emerging technologies used to study RNA metabolism.

**Prerequisites:** BI 108, BI 242, and CH 221.

**BI 368 - Advanced Light Microscopy**

Credits: 4

A study of the theory and practice of advanced light microscopy. This course will introduce students to the theory and practice of advanced light microscopy and its role in biological research. Lecture and laboratory will interact closely and present students with such topics as immunocytochemistry, fluorescent protein construction and transformation, three-dimensional reconstruction, and time-lapse imaging. In the laboratory, students will have extensive hands-on practice with our fluorescence research microscopes and confocal laser scanning microscopy culminating in digital portfolio.

**Prerequisites:** BI 108 and one 200-level BI course or BI 311 or BI 338.

**Note(s):** Three hours of lecture, three hours of lab per week.

**BI 370 - Computer Modeling of Biological Systems**

Credits: 3

An introductory course in the methods, procedures, uses, and implications of digital computer modeling of biological processes, from the molecular through the population level or organization, with particular focus on the systems level.

**Prerequisites:** BI 108.

**BI 371 - Independent Study in Biology**

Credits: 1-3

An opportunity for students to pursue in-depth specialized topics not available through regular course offerings.

**Prerequisites:** Agreement of a faculty member to serve as tutor, a topic acceptable both to student and tutor, and permission of the Department.

**BI 373 - Scientific Communications in Life Sciences**

Credits: 3

An opportunity for students to identify and prepare for pre- and post-baccalaureate goals in the biological sciences. Students will work with the Career Development Center and peers to craft a polished résumé, curriculum vitae, and cover letter addressing internship opportunities, graduate and professional programs, and jobs. Students will also generate and critique examples of the three main forms of scientific communication—posters, oral presentations, and journal articles—and practice the communication of scientific information to the general public.

**Prerequisites:** Two 200-level courses in Biology.

**Note(s):** Fulfills the Writing in the Major requirement. To be taken during the Junior year.

**BI 374 - Senior Seminar Series in Biology**

Credits: 1

A seminar where students engage with biological topics of broader relevance through interaction with speakers, group discussion/projects, and reflection. Speakers (current Department faculty members and guests from other institutions) will present their work as well as career path. Students will discuss and communicate relevant topics in Biology and reflect on their own biology education and career goals.

**Prerequisites:** BI 373 and senior status. Offered as S/U only.

**Note(s):** Fulfills Senior Experience Coda requirement.

**BI 375 - Advanced Research in Biology**

Credits: 1-3

An opportunity for students to engage in advanced laboratory or field research under the guidance of a faculty member. The emphasis is on the development of analytical and technical expertise in biological research.

**Prerequisites:** Two 200-level courses in biology (except BI 275 and BI 299) and permission of instructor.

**BI 376 - Senior Thesis in Biology**

Credits: 4

An opportunity for Biology seniors for in-depth research or independent study under supervision of a Biology faculty member cumulating in a research paper and presentation to the department.

**Prerequisites:** BI 375C or equivalent and BI 373 and permission of department.

**Note(s):** This course is required of all majors who wish to be considered for Biology honors. A proposal for the thesis project, prepared in consultation with the faculty project advisor and second reader, which can be outside the department or college, must be submitted to the Biology department during the semester prior to enrollment. See the Biology website for additional information on thesis proposal submission, including deadlines.

**BI 399 - Professional Internship in Biology**

Credits: 1-4

Professional experience at an advanced level for juniors and seniors with substantial academic experience in the major field. With faculty sponsorship and department approval, students may extend their educational experience into such areas as laboratory or field research, or clinical medicine.

**Prerequisites:** Completion of at least one related 300-level course (as determined by the department).

**Note(s):** Does not count toward the major. Must be taken S/U.

**Additional Courses****NS 101 - Introduction to Neuroscience**

Credits: 4

An interdisciplinary examination of the neurobiological bases of behavior and mental processing. Topics include the structure and functioning of the nervous system, brain-behavior relationships, and hormonal and genetic effects on behavior and mental processing. Laboratories develop students' understanding of functional neuroanatomy, neural transmission, and human psychophysiology.

**Note(s):** Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

**NS 277 - Integrative Seminar in Neuroscience Research**

Credits: 1

A study of selected areas of neuroscience research and techniques. Both primary source articles and first-person accounts by faculty in the biology and psychology departments are used to introduce the theoretical and practical aspects of neuroscience research. Emphasis will be placed on understanding the multiple levels (e.g., molecular to behavioral) at which research topics in neuroscience can be addressed and also the ways in which research techniques define the types of questions that can be asked at a given level of analysis.

**Prerequisites:** This course should be taken upon completion of NS 101 and the completion of or current enrollment in at least one other core or elective course from the list of courses in the neuroscience major.

**Note(s):** Must be taken S/U.

**Courses for the Major/Joint Majors**