BIOLOGICAL SCIENCES

Biological Sciences Department Office:
1203 Altschul Hall
212.854.2437 (phone)
212.280.2011 (fax)

Introductory Laboratory Office:
911 Altschul Hall
212.854.1402

biology.barnard.edu (http://biology.barnard.edu)
Department Administrator: Melissa Flores (mflores@barnard.edu)
Senior Lab Manager: Basil Perkins (bperkins@barnard.edu)

The Department of Biological Sciences

Biology explores the structure, function, and evolution of diverse living systems. It addresses some of the most important issues of our time—genetic engineering, stem cell research, obesity, cancer, and the effects of global warming. Majoring in Biology prepares students to pursue a career in research, teaching, or the allied health sciences. It is also relevant to careers as diverse as environmental policy, law, public health, creative writing, and textbook development.

Mission

The mission of the Biology major is to provide students with a broad education in biology. To this end, students are offered a range of lecture courses that span the molecular, physiological, and ecological levels of organization. Students also complete laboratory courses that help them learn how to design and test hypotheses, use modern scientific equipment, and interpret data. Finally, students learn scientific communication skills by critiquing research articles, writing laboratory reports and research papers, and participating in oral presentations and debates. The department encourages students to become involved in a research project under the guidance of a faculty member at Barnard or elsewhere in New York City.

Student Learning Outcomes

Students graduating with a major in Biology should be able to attain the following outcomes:

- Demonstrate an appreciation of the many different life forms on planet Earth.
- Have the ability to discuss a biological phenomenon from many different levels of organization (e.g., discuss HIV from the perspective of structure to host immune response to evolutionary and epidemiological issues).
- Describe the basic features of Mendelian genetics and the central dogma of molecular biology; understand the basic physiological processes of at least one organism; and demonstrate an understanding of population-level processes.
- Make an oral presentation on either an original research project or a published primary research paper.
- Generate a testable hypothesis and develop and execute a controlled experimental design.
- Write an original scientific paper and/or a review article.

Research

Students are strongly encouraged to engage in research at Barnard. Either or both year-long courses, BIOL BC3591 Guided Research and Seminar-BIOL BC3592 Guided Research and Seminar or BIOL BC3593 Senior Thesis Research & Seminar-BIOL BC3594 Senior Thesis Research & Seminar, may be used to fulfill major requirements while the variable-credit semester-long course, BIOL BC3597 Guided Research, may be used for degree credit.

In addition to conducting research during the academic year, students are encouraged to pursue summer research internships. Barnard faculty engage many students in paid research projects during the summer through the Summer Research Institute (SRI) (https://barnard.edu/summer-research-institute/) at Barnard. The departmental office also has information about summer internships outside of Barnard. In addition, the department awards funds on a competitive basis to support summer research not otherwise funded by internships.

Introductory Course Selection

The Biology Department offers several options at the introductory level; students should select courses on the basis of their preparation and background in biology.

Students who took advanced biology in high school should enroll in the 1500-level sequence. This sequence can be started either in the fall (BIOL BC1500 Introduction to Organismal and Evolutionary Biology & BIOL BC1501 Introductory Lab in Organismal and Evolutionary Biology) *or* the spring (BIOL BC1502 Introduction to Cell and Molecular Biology & BIOL BC1503 Introductory Lab in Cell and Molecular Biology) and fulfills the science lecture and laboratory portion of the General Education Requirements, as well as the premedical requirement in biology. Please note that the Foundations distributional requirements for the sciences includes two science lecture courses, one of which must include a laboratory, but both of which do not necessarily need to be taken from the same scientific discipline.

Students with little or no experience in biology should enroll in the 1000-level sequence, which provides an appropriate introduction to important concepts in the field. Offered in the fall, BIOL BC1002 Global Health and Ecology includes a laboratory component, while BIOL BC1001 Revolutionary Concepts in Biology, offered in the spring, consists only of a lecture component. Taken together, these two lectures and laboratory fulfill the science General Education Requirement.

Students who wish to move on to the 1500-level courses are eligible to do so upon completion of BIOL BC1002 Global Health and Ecology with lab in the fall. Students must complete the entire 1500-level sequence (BIOL BC1500 Introduction to Organismal and Evolutionary Biology, BIOL BC1501 Introductory Lab in Organismal and Evolutionary Biology, BIOL BC1502 Introduction to Cell and Molecular Biology, and BIOL BC1503 Introductory Lab in Cell and Molecular Biology) for the Biology major or minor and for the biology premedical requirements.

AP Course Credit

Students who have passed the Advanced Placement examination in biology with a grade of 4 or 5 receive 3 points of credit toward their degree. However, AP credit neither goes toward fulfillment of the science GER nor does it exempt a student from any introductory course.

AP degree credit is granted regardless of which introductory courses are completed at Barnard.

Chair: Hilary Callahan
Professor Emeritus: Philip Ammirato
Professors: Hilary Callahan, John Glendinning, Paul Hertz, Jennifer Mansfield, and Brian Morton

Associate Professors: Elizabeth Bauer
Assistant Professors: Allison Lopatkin, JJ Miranda, Alison Pischedda, and Jonathan Snow
Lecturer: Rishita Shah
Senior Lecturer: Jessica Goldstein
Research Scholar & Adjunct Assistant Professor: Stephen Sturley
Introductory Lab Associate Directors: James Casey and Henry Truong
Introductory Lab Associate: Diana Heller

Requirements for the Major

There are four ways to complete a major within Biology, referred to as tracks. A student can obtain a general Biology Major or may complete one of the three tracks to specialize in a level of biological organization: Cellular and Molecular; Physiological and Organismal; or Ecological and Evolutionary.

Introductory Biology

You may begin the introductory sequence with BIOL BC1002 Global Health and Ecology and the co-requisite lab BIOL BC1012 in the fall of your freshman year, but for the major you must then complete the entire 1500-level sequence the subsequent spring and fall. Please note that starting in Fall 2020, in order to enroll in BIOL BC1500 or BIOL BC1502, you will need to sign up for a co-requisite discussion section. With the exception of AY20-21, you will also need to enroll in a co-requisite recitation section in order to enroll in either BIOL BC1501 or BIOL BC1503 lab.

BIOL BC1500	Introduction to Organismal and Evolutionary Biology	3
BIOL BC1510	BIOL BC1500 DISCUSSION SECTION	
BIOL BC1501	Introductory Lab in Organismal and Evolutionary Biology	2
BIOL BC1511	BIOL BC1501 Recitation	
BIOL BC1502	Introduction to Cell and Molecular Biology	3
BIOL BC1512	BIOL BC1502 DISCUSSION SECTION	
BIOL BC1503	Introductory Lab in Cell and Molecular Biology	2
BIOL BC1513	BIOL BC1503 Recitation	

Genetics

BIOL BC2100	Molecular and Mendelian Genetics	3

It is recommended, but not required, that this be taken immediately following the completion of the 1500-level courses since Genetics is a pre-requisite for many upper level electives and labs. Students should note that there are several courses that can be taken in their sophomore year WITHOUT completion of Genetics, including BIOL BC2280 Animal Behavior, BIOL BC2840 Plant Evolution and Diversity, and BIOL BC3360 Physiology, to name a few.

Five Upper Level Lecture Courses

Students must complete five courses from the three categories below. To select and complete one of the three tracks, at least four courses must be from the appropriate category and at least one from another category. To complete the Biology Major that is general rather than a specialized track, the five courses must include at least one course from each of the three categories. Although some courses are listed in multiple categories, a student can only use a course toward one of the categories. Additional Columbia courses that can be used to fulfill the major requirements are provided on the Biology website (biology.barnard.edu). If a student completes courses that make them eligible for more than one of the four majors, they may select which one is reflected on their transcript.

Students should note that some courses, such as BIOL BC2500 Matlab for Scientists, can count as either an upper level elective or lab. This course can count toward any of the three categories, but cannot fulfill the breadth requirement for the major (i.e. it cannot be the sole course selected from a category).

1. Cellular & Molecular Biology		
BIOL BC2278	Evolution	3
BIOL BC2490	Coding in Biology	3
BIOL BC3304	Topics in Molecular Genetics	3
BIOL BC3308	Genomics and Bioinformatics	3
BIOL BC3310	Cell Biology	3
BIOL BC3320	Microbiology	3
BIOL BC3352	Development	3
BIOL BC3362	MOLECULAR # CELLULAR NEUROSCIENCE	3
CHEM BC3282	BIOLOGICAL CHEMISTRY	3.00
BIOL UN3034	Biotechnology	3
BIOL UN3073	Cellular and Molecular Immunology	3
BIOL UN3310	Virology	3
2. Physiology & Organismal Biology		
BIOL BC2262	Vertebrate Biology	3
BIOL BC2280	Animal Behavior	3
BIOL BC2286	Statistics and Research Design	3
BIOL BC3320	Microbiology	3
BIOL BC3352	Development	3
BIOL BC3360	Physiology	3
BIOL UN3005	Neurobiology II: Development & Systems	4
EEEB UN3011	Behavioral Biology of the Living Primates	3
EEEB UN3208	Explorations in Primate Anatomy	3
EEEB W4112	Ichthyology	3
3. Ecology & Evolutionary Biology		
BIOL BC2240	Plant Evolution and Diversity	3
BIOL BC2262	Vertebrate Biology	3
BIOL BC2272	Ecology	3
BIOL BC2278	Evolution	3
BIOL BC2280	Animal Behavior	3
BIOL BC2286	Statistics and Research Design	3
BIOL BC2851	Plants and Profits: The Global Power of Botany	4
BIOL BC3320	Microbiology	3
BIOL BC3380	Applied Ecology and Evolution	3
EEEB UN3087	Conservation Biology	3
EEEB W4110	Coastal and Estuarine Ecology	4

Three Upper Level Laboratory Courses

Students must complete at least three Biology laboratories beyond the 1500 level. Laboratories may require a lecture course as a co-requisite or prerequisite; such requirements are specified in the Barnard catalogue. A year-long research-seminar course (BIOL BC3591 followed by BIOL BC3592) may substitute for lab courses. Students may also take lab courses at Columbia (or other institutions) to satisfy the lab requirement, with permission from the Chair.

Research Option

A student may count two consecutive semesters of Guided Research and Seminar (BIOL BC3591 followed by BIOL BC3592) as a laboratory course for the major. Guided Research (BIOL BC3597) counts for degree credit but does not count toward the major. A student may not receive credit for research that is paid.

Senior Capstone Experience

Students must enroll in one section of Senior Seminar (BIOL BC3590) or complete two semesters of Senior Thesis Research Seminar (BIOL BC3593 followed by BIOL BC3594). A student cannot take both Senior Thesis Research and Guided Research and Seminar at the same time.

Chemistry Requirement

One semester of General Chemistry (with laboratory) and one semester of Organic Chemistry (with laboratory) are required.

Requirement for the Minor

A minor in biology includes:

BIOL BC1500	Introduction to Organismal and Evolutionary Biology	3
BIOL BC1501	Introductory Lab in Organismal and Evolutionary Biology	2
BIOL BC1502	Introduction to Cell and Molecular Biology	3
BIOL BC1503	Introductory Lab in Cell and Molecular Biology	2

Please note that students must enroll in the co-requisite discussion sections (beginning Fall 2020) and recitations (except for AY20-21) for the 1500-level sequence, as described above for the major.

Three additional lecture courses at the 2100 level or higher

Two additional laboratory courses *,**

* One of the lab courses may be replaced by two semesters of Guided Research and Seminar (BIOL BC3591 Guided Research and Seminar followed by BIOL BC3592 Guided Research and Seminar).

** Chemistry, environmental science, physics, and psychology majors need to take only one advanced laboratory instead of two. Students should check with their major advisor in order to determine whether a guided research course is a suitable selection for their major's requirements.

HSPP BC1001 Research Apprenticeship Seminar. *3 points*.
This year-long course is 3 pts (1.5/semester)

Prerequisites: This course is open to 16 first-year students who are also enrolled in an introductory lab science sequence; applications will be made available via the first-year class blog through the Dean of Studies Office.
The course will meet in a seminar format, and will discuss how research problems are defined, how scientists immerse themselves in the existing literature on a topic, how researchers craft experimental protocols and collect data, and how data can be used to test hypotheses. Students will also consider science stories in the *New York Times* and lead formal debates about ethical and social issues. Occasionally, the seminar period will be devoted to tours of faculty science labs to learn about the research that Barnard professors conduct and the research opportunities available on campus.

Additionally, students will participate in a month-long laboratory rotation each semester. During the rotation period, each student will spend 3 hours per week shadowing a Barnard junior or senior Research Intern who is conducting a year-long research project. In addition to this exposure to research at Barnard, students will discuss how to obtain summer science internships in laboratories off campus. Seminar assignments will include readings about the research process, as well as short library-based research projects about scientific claims in textbooks. In the fall, students will develop their presentation skills in a session with Barnard's Speaking Fellows. In the spring, each student will deliver an oral presentation about the research career of a scientist of her choosing.

HSPP BC1002 Research Apprenticeship Seminar. *3 points*.
This year-long course is 3 pts (1.5/semester)

Prerequisites: This course is open to 16 first-year students who are also enrolled in an introductory lab science sequence; applications will be made available via the first-year class blog through the Dean of Studies Office.
The course will meet in a seminar format, and will discuss how research problems are defined, how scientists immerse themselves in the existing literature on a topic, how researchers craft experimental protocols and collect data, and how data can be used to test hypotheses. Students will also consider science stories in the *New York Times* and lead formal debates about ethical and social issues. Occasionally, the seminar period will be devoted to tours of faculty science labs to learn about the research that Barnard professors conduct and the research opportunities available on campus.

Additionally, students will participate in a month-long laboratory rotation each semester. During the rotation period, each student will spend 3 hours per week shadowing a Barnard junior or senior Research Intern who is conducting a year-long research project. In addition to this exposure to research at Barnard, students will discuss how to obtain summer science internships in laboratories off campus. Seminar assignments will include readings about the research process, as well as short library-based research projects about scientific claims in textbooks. In the fall, students will develop their presentation skills in a session with Barnard's Speaking Fellows. In the spring, each student will deliver an oral presentation about the research career of a scientist of her choosing.

BIOL BC1008 HEALTHIER LIFE. *3.00 points*.
This is an introductory biology survey course which explores fundamentals of physiology in humans and other organisms, both in the context of global health and global ecological issues. It emphasizes reciprocal interactions between individual healthy humans and healthy societies, and the function of ecosystems in supporting humans and other biodiversity

Fall 2020: BIOL BC1008

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1008	001/00804	T Th 10:10am - 11:25am Room TBA	Hilary Callahan, Henry Truong	3.00	22/60

BIOL BC1002 Global Health and Ecology. *4.5 points*.
Prerequisites: BIOL BC1012 lab enrollment is required. This lecture & lab course does not fulfill biology major nor pre-health requirements, but is recommended for prospective biology majors who lack a high-school level background in biology. For students fulfilling a Nine Ways of Knowing lab science requirement, this course may be taken with AP/IB credit OR with BIOL BC1502 & BIOL BC1503 in the spring. Students fulfilling a Foundations requirement may take BIOL BC1002/BIOL BC1012 as a one-semester course in addition to another science lecture, such as BIOL BC1001 Revolutionary Concepts in Biology, to fulfill the lab science requirement.
What disease is the number one killer worldwide? What will be the next pandemic? Fundamentals of human physiology and microbiology are explored in the context of major global health issues. Principles of ecology are outlined, with an emphasis on the bidirectional impact of the interactions of humans with the global environment. Lab exercises introduce biological techniques for studying these topics. Enrollment in BIOL BC1012 (BC1002 lab) is required, and limited to 16 students per section.

BIOL BC1012 BIOL BC1002 Lab. *0 points*.
Prerequisites: BIOL BC1002 Global Health & Ecology is a co-requisite. This lab course does not fulfill biology major nor pre-health requirements. Enrollment in each lab section is limited to 16 students per section. Students must attend the first lab to hold their place.
Fundamentals of human physiology and microbiology are explored in the context of major global health issues. Principles of ecology are outlined, with an emphasis on the bidirectional impact of the interactions of humans with the global environment. Lab exercises introduce biological techniques for studying these topics.

BIOL BC1001 Revolutionary Concepts in Biology. *3 points*.
Prerequisites: This lecture course does not fulfill Biology major nor premedical requirements, but does count toward the Science Lecture GER requirement for students fulfilling a Foundations requirement.
Exploration of the major discoveries and ideas that have revolutionized the way we view organisms and understand life. This is an introductory survey course that explores basic concepts of molecular and cellular biology, genetics and evolution. Students will focus on biological concepts, biotechnology and bioethics, which inundate contemporary society.

BIOL BC1500 Introduction to Organismal and Evolutionary Biology. *3 points*.
Prerequisites: This course is suitable for majors & fulfillment of pre-health requirements. A high school biology background or equivalent preparation is highly recommended. For those without this background seeking to major in biology, BIOL BC1002 & BIOL BC1012 are recommended in the fall of their freshmen year, followed by the year-long 1500-level lecture & lab sequence. BIOL BC1500 & BIOL BC1502 do not have to be taken in a fall to spring sequence.
Detailed introduction to biological phenomena above the cellular level; development, anatomy, and physiology of plants and animals; physiological, population, behavioral, and community ecology; evolutionary theory; analysis of micro-evolutionary events; and systematics.

Fall 2020: BIOL BC1500

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1500	001/00074	M W F 9:00am - 9:50am Room TBA	Paul Hertz, James Casey, Henry Truong	3	192/210
BIOL 1500	002/00749	M W F 7:00pm - 7:50pm Room TBA	Paul Hertz, James Casey, Henry Truong	3	35/30

BIOL BC1510 BIOL BC1500 DISCUSSION SECTION. *0.00 points*.
The goals of these discussion sections include providing a space to build community during remote learning and promoting opportunities for active engagement with the lecture material. These discussion sections will also serve as a space for students to consider science from multiple perspectives beyond discipline-specific content in the lecture and text (e.g. hearing guest lectures from BIPOC scientists, considering racial disparities in health outcomes, etc.). Participation will include posting on discussion boards between sessions, delivering short presentations during discussion, working well with partners, and making thoughtful comments during the discussion period

Fall 2020: BIOL BC1510

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1510	001/00826	M 10:00am - 10:50am Room TBA	Paul Hertz, Henry Truong	0.00	21/20
BIOL 1510	002/00827	M 10:00am - 10:50am Room TBA	Paul Hertz, Henry Truong	0.00	22/20
BIOL 1510	003/00828	M 12:10pm - 1:00pm Room TBA	Paul Hertz, Henry Truong	0.00	19/20
BIOL 1510	004/00829	T 12:10pm - 1:00pm Room TBA	Paul Hertz, Henry Truong	0.00	23/20
BIOL 1510	005/00830	W 3:10pm - 4:00pm Room TBA	Paul Hertz, Henry Truong	0.00	19/20
BIOL 1510	006/00831	W 6:10pm - 7:00pm Room TBA	Paul Hertz, Henry Truong	0.00	19/20
BIOL 1510	007/00832	W 8:10pm - 9:00pm Room TBA	Paul Hertz, Henry Truong	0.00	18/20
BIOL 1510	008/00833	Th 12:10pm - 1:00pm Room TBA	Paul Hertz, Henry Truong	0.00	19/20
BIOL 1510	009/00834	W 3:10pm - 4:00pm Room TBA	Paul Hertz, Henry Truong	0.00	14/20
BIOL 1510	010/00835	F 8:00am - 8:50am Room TBA	Paul Hertz, Henry Truong	0.00	21/20
BIOL 1510	011/00836	F 1:10pm - 2:00pm Room TBA	Paul Hertz, Henry Truong	0.00	19/20
BIOL 1510	012/00837	M 12:10pm - 1:00pm Room TBA	Paul Hertz, Henry Truong	0.00	14/20

BIOL BC1501 Introductory Lab in Organismal and Evolutionary Biology. *2 points*.
Prerequisites: BIOL BC1500 lecture is a pre- or co-requisite (preferred). Students must also enroll for a section of BIOL BC1511 recitation. A high school biology background or equivalent preparation is highly recommended. This course is suitable for fulfillment of biology major and pre-health requirements. Enrollment is limited to 16 students per section.
A laboratory-based introduction to the major groups of living organisms; anatomy, physiology, evolution, and systematics; and laboratory techniques for studying and comparing functional adaptations.

Fall 2020: BIOL BC1501

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1501	001/00075	M 1:10pm - 4:00pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1501	002/00076	M 1:10pm - 4:00pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	13/16
BIOL 1501	004/00078	T 9:00am - 11:50am Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	14/16
BIOL 1501	005/00079	T 1:10pm - 4:00pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	15/16
BIOL 1501	006/00080	T 1:10pm - 4:00pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	14/16
BIOL 1501	007/00081	W 10:00am - 12:50pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	15/16
BIOL 1501	010/00084	Th 1:10pm - 4:00pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1501	011/00085	T 7:00pm - 9:50pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	17/16
BIOL 1501	012/00086	F 10:00am - 12:50pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	15/16
BIOL 1501	013/00087	F 10:00am - 12:50pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1501	014/00816	M 1:10pm - 4:00pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	14/16
BIOL 1501	015/00817	T 9:00am - 11:50am Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	15/16
BIOL 1501	016/00890	W 10:00am - 12:50pm Room TBA	Jessica Goldstein, James Casey, Henry Truong	2	16/16

BIOL BC1511 BIOL BC1501 Recitation. *0 points*.
Prerequisites: BIOL BC1500 lecture is a pre- or co-requisite (preferred). This recitation (BIOL BC1511) is a co-requisite course for enrollment in BIOL BC1501 Introductory Lab in Organismal & Evolutionary Biology. Each individual lab section is limited to 16 students per section, however all students must enroll in one of the two recitation sections offered.
A laboratory-based introduction to the major groups of living organisms; anatomy, physiology, evolution, and systematics; and laboratory techniques for studying and comparing functional adaptations.

BIOL BC1502 Introduction to Cell and Molecular Biology. *3 points*.
Prerequisites: BIOL BC1002 or equivalent preparation. Course suitable for fulfillment of premedical requirements. Together with BIOL BC1500 this course is part of a yearlong introductory sequence. BIOL BC1500 and BIOL BC1502 do not need to be taken in sequence.
Detailed introduction to cellular and subcellular biology: cell structures and functions, energy metabolism, biogenesis of cell components, biology of inheritance, molecular genetics, regulation of gene expression, and genes in development.

Spring 2021: BIOL BC1502

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1502	001/00124	M W F 9:00am - 9:50am Online Only	Jonathan Snow, James Casey, Henry Truong	3	196/210
BIOL 1502	002/00125	M W F 7:00pm - 7:50pm Online Only	Jonathan Snow, James Casey, Henry Truong	3	37/40

BIOL BC1512 BIOL BC1502 DISCUSSION SECTION. *0.00 points*.
The goals of these discussion sections include providing a space to build community during remote learning and promoting opportunities for active engagement with the lecture material. These discussion sections will also serve as a space for students to consider science from multiple perspectives beyond discipline-specific content in the lecture and text (e.g. hearing guest lectures from BIPOC scientists, considering racial disparities in health outcomes, etc.). Participation will include posting on discussion boards between sessions, delivering short presentations during discussion, working well with partners, and making thoughtful comments during the discussion period

Spring 2021: BIOL BC1512

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1512	001/00379	M 10:00am - 10:50am Online Only	Jonathan Snow, Henry Truong	0.00	20/20
BIOL 1512	002/00396	M 6:10pm - 7:00pm Online Only	Jonathan Snow, Henry Truong	0.00	21/20
BIOL 1512	003/00398	T 12:10pm - 1:00pm Online Only	Jonathan Snow, Henry Truong	0.00	20/20
BIOL 1512	004/00400	W 3:10pm - 4:00pm Online Only	Jonathan Snow, Henry Truong	0.00	21/20
BIOL 1512	005/00405	F 8:00am - 8:50am Online Only	Jonathan Snow, Henry Truong	0.00	17/20
BIOL 1512	006/00411	Th 11:00am - 11:50am Online Only	Jonathan Snow, Henry Truong	0.00	20/20
BIOL 1512	007/00412	Th 12:10pm - 1:00pm Online Only	Jonathan Snow, Henry Truong	0.00	21/20
BIOL 1512	008/00429	Th 12:10pm - 1:00pm Online Only	Jonathan Snow, Henry Truong	0.00	18/20
BIOL 1512	009/00432	F 1:10pm - 2:00pm Online Only	Jonathan Snow, Henry Truong	0.00	20/20
BIOL 1512	010/00703	M 10:00am - 10:50am Online Only	Jonathan Snow, Henry Truong	0.00	20/20
BIOL 1512	011/00722	M 6:10pm - 7:00pm Online Only	Jonathan Snow, Henry Truong	0.00	0/20
BIOL 1512	012/00723	T 12:10pm - 1:00pm Online Only	Jonathan Snow, Henry Truong	0.00	0/20

BIOL BC1503 Introductory Lab in Cell and Molecular Biology. *2 points*.
Prerequisites: BIOL BC1502 lecture is a pre- or co-requisite (preferred). Students must also enroll for a section of BIOL BC1513 recitation. A high school biology background or equivalent preparation (such as BIOL BC1002 & BIOL BC1012) is highly recommended. This course is suitable for fulfillment of biology major and pre-health requirements. Enrollment is limited to 16 students per section; must attend first lab to hold place. A laboratory-based introduction to cell and molecular biology. Both classic and modern approaches are used to investigate principles of heredity as well as the structure and function of cells and their molecular components. Lab exercises introduce practical techniques and data analysis.

Spring 2021: BIOL BC1503

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1503	001/00160	M 1:10pm - 4:00pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	002/00161	W 1:10pm - 4:00pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	003/00162	T 9:00am - 11:50am Online Only	Jessica Goldstein, James Casey, Henry Truong	2	17/16
BIOL 1503	004/00163	T 1:10pm - 4:00pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	005/00164	T 7:00pm - 9:50pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	17/16
BIOL 1503	006/00165	W 10:00am - 12:50pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	007/00166	W 1:10pm - 4:00pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	008/00167	Th 1:10pm - 4:00pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	009/00168	F 10:00am - 12:50pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	010/00169	F 10:00am - 12:50pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	011/00699	M 1:10pm - 4:00pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	012/00700	T 1:10pm - 4:00pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	16/16
BIOL 1503	013/00701	W 10:00am - 12:50pm Online Only	Jessica Goldstein, James Casey, Henry Truong	2	15/16
BIOL 1503	014/00720	T 9:00am - 11:50am Online Only	Jessica Goldstein, James Casey, Henry Truong	2	0/16

BIOL BC1513 BIOL BC1503 Recitation. *0 points*.
Prerequisites: BIOL BC1502 lecture is a pre- or co-requisite (preferred).
This recitation (BIOL BC1513) is a co-requisite course for enrollment in BIOL BC1503 Introductory Lab in Cell & Molecular Biology. Each individual lab section is limited to 16 students per section, however all students must enroll in one of the two recitation sections offered.
A laboratory-based introduction to cell and molecular biology. Both classic and modern approaches are used to investigate principles of heredity as well as the structure and function of cells and their molecular components. Lab exercises introduce practical techniques and data analysis.

BIOL BC1599 Science Journal Club. *1 point*.
Prerequisites:) Limited to 16 students who are participating in the Science Pathways Scholars Program.
Students in this seminar course will be introduced to the scientific literature by reading a mix of classic papers and papers that describe significant new developments in the field. Seminar periods will be devoted to oral reports, discussion of assigned reading, and student responses.

,
Section 1: Limited to students in the Science Pathways Scholars Program.
,Section 2: Limited to first-year students who received a 4 or 5 on the AP and are currently enrolled in BIOL BC1500.

Fall 2020: BIOL BC1599

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 1599	001/00090	T 3:00pm - 4:00pm Room TBA	Sedelia Rodriguez	1	15/16

BIOL BC2100 Molecular and Mendelian Genetics. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent. This course is a pre-requisite for most 3000-level courses.
Mendelian and molecular genetics of both eukaryotes and prokaryotes, with an emphasis on human genetics. Topics include segregation, recombination and linkage maps, cytogenetics, gene structure and function, mutation, molecular aspects of gene expression and regulation, genetic components of cancer, and genome studies.

Fall 2020: BIOL BC2100

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 2100	001/00091	T Th 10:10am - 11:25am Room TBA	Brian Morton	3	49/50

Spring 2021: BIOL BC2100

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 2100	001/00142	M T W Th 10:10am - 11:25am Room TBA	Jennifer Mansfield	3	19/50

BIOL BC2240 Plant Evolution and Diversity. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent.
Survey of plant biology emphasizing evolutionary and ecological perspectives on mating and reproduction, physiology, anatomy, and morphology.

BIOL BC2262 Vertebrate Biology. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, and BIOL BC1503 or the equivalent.
Systematic survey of the Phylum Chordata: fossil history, biogeography, systematics, natural history, body architecture, energetics, locomotion, feeding, and behavior.

BIOL BC2272 Ecology. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent. This course is a pre- or co-requisite for BIOL BC2873 Laboratory in Ecology.
Introduction to evolutionary ecology; life history strategies, population growth, competition, predator-prey interactions, population regulation, species diversity, community organization, and biogeography. Lectures integrate theory with empirical studies.

BIOL BC2278 Evolution. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent.
Study of the process of evolution with an emphasis on the mechanisms underlying evolutionary change. Topics include the origins of life, rates of evolutionary change, phylogenetics, molecular evolution, adaptive significance of traits, sexual selection, and human evolution.

BIOL BC2280 Animal Behavior. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, and BIOL BC1503 or the equivalent. This course is a pre-requisite for BIOL BC2281 Laboratory in Animal Behavior.
This introduction to animal behavior takes an integrative approach to understand the physiological and genetic basis of behavior, the ecological context of behavior, and the evolutionary consequences of behavior. This course focuses on the process of scientific research, including current research approaches in animal behavior and practical applications of these findings.

Spring 2021: BIOL BC2280

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 2280	001/00143	T W Th F 11:40am - 12:55pm Room TBA	Alison Pischedda	3	62

BIOL BC2281 Laboratory in Animal Behavior. *3 points*.
standard for lab courses in Biology

Prerequisites: (BIOL BC1500) and (BIOL BC1502) and (BIOL BC2280) and (BIOL BC1501) and (BIOL BC1503)
This lab provides an introduction to animal behavior research, including current research approaches and practical applications of these findings. Students will complete two main projects. The first is a group project using the fruit fly, *Drosophila melanogaster*, which will involve observing, recording, and analyzing reproductive behaviors. The second is an independent project that will be designed, conducted, and analyzed by students using publicly available animal behavior resources and/or data. Both projects will incorporate critical thinking, problem solving and experimental design, with an emphasize on scientific writing and oral presentation skills.

Fall 2020: BIOL BC2281

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 2281	001/00750	W 1:00pm - 4:00pm Room TBA	Alison Pischedda	3	3/12

BIOL BC2286 Statistics and Research Design. *3 points*.
Not offered during 2020-21 academic year.

Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent, college-level algebra or the equivalent. General Educational Requirement: Quantitative and Deductive Reasoning (QUA)
Introduction to basic principles of statistics and experimental design. Topics include common statistical procedure, analysis of data, sampling populations, power analysis, and the design of experiments. This course differs from traditional statistics courses by explicitly integrating statistics into research process.

BIOL BC2490 Coding in Biology. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503, BIOL BC2100
An introduction to the basics of Python and R coding in the context of solving basic problems in molecular biology. Python will be used to write programs that analyze various features of DNA sequence data and R will be used to analyze output from RNA-seq experiments. No prior programming experience is necessary. The work will involve modifying existing code as well as developing simple programs from the ground up.

BIOL BC2500 MATLAB for Scientists. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1502, and MATH UN1101
Introduction to MATLAB programming and numerical methods applied to the analysis of biological data. Topics range from foundational programming concepts and algorithms and an introduction to MATLAB, to more advanced concepts such as data visualization, curve fitting and data interpolation, basic statistical methods, modeling biological systems of ordinary differential equations, and image analysis.

Fall 2020: BIOL BC2500

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 2500	001/00092	T 1:00pm - 6:00pm Room TBA	Allison Lopatkin	3	13/12

BIOL BC2801 Laboratory in Genetics. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503; and pre or corequisite, BIOL BC2100 and Enrollment limited to 16 students per section.
Exercises in genetics at both the Mendelian and molecular levels. Basic principles of genetic analysis will be studied using Drosophila and bacteria. A project in molecular genetics, involving such techniques as PCR, gel electrophoresis, and cloning, will be undertaken using plant genes.

BIOL BC2841 Laboratory in Plant Evolution and Diversity. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or equivalent. Enrollment is limited to 16; must attend first lab to hold place.
Through field observations, experiments, statistical analyses and data synthesis, gain coding skills and insights into key tools and techniques for studying, managing, and conserving botanical biodiversity. Digital projects are integrated with studies of structure, ecology, biogeography, and evolution. Emphasis on plants in NYC's local environment.

BIOL BC2851 Plants and Profits: The Global Power of Botany. *4 points*.
The course is part of the Barnard Teaches program. It will have a lab that will teach science and digital skills and on Thursdays two consecutive times are scheduled to allow lecture and lab to accommodate trips to NYBG.**Not offered during 2020-21 academic year.**

Prerequisites: Strongly recommend prior enrollment in BIOL BC1001 or 1002, or in BIOL BC 1501 and 1502, or the equivalent. Students need to understand genetics and must be prepared to read professional science literature. Science students must be prepared for lengthy reading assignments.
Sustaining complex human systems requires plants, which in turn depend on soils, geology, and climate. With that reality in the foreground, this course will foster fluency and expertise in classical and cutting edge botanical science: genetics, genomics, biogeography, conservation biology, economic and ethno-botany. At the center of its investigations will be the ongoing digital revolution, recognizing that natural history has been and will continue to be essential to all of the plant sciences. The course will encourage interdisciplinary perspectives, pushing students outside of their intellectual comfort zones and aiming to comprehend plant biodiversity from a multiplicity of human perspectives.

BIOL BC2873 Laboratory in Ecology. *3 points*.
Not offered during 2020-21 academic year.

Prerequisites: BIOL BC2272 (which can be taken as a pre- or co-requisite). Enrollment is limited to 16; must attend first lab to hold place.
The definition of ecological problems in experimentally tractable ways; the design of experiments and analysis of ecological data; class projects on population ecology. Students conduct individual projects during last month of term.

BIOL BC3303 Laboratory in Molecular Biology. *3 points*.
Prerequisites: BIOL BC2100 (which can be taken as a pre- or co-requisite). Enrollment is limited to 16; must attend first lab to hold place.
Introduction to the use of molecular techniques to answer questions about subcellular biological phenomena. Techniques include isolation of genomic and plasmid DNAs, restriction enzyme analysis, DNA and protein electrophoresis, bacterial transformation, and plasmid subcloning.

Spring 2021: BIOL BC3303

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3303	001/00144	W 1:00pm - 6:00pm Room TBA	Rishita Shah	3	15/12

BIOL BC3304 Topics in Molecular Genetics. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1502, BIOL BC2100 or equivalent
Selected topics in molecular genetics and gene regulation, with a focus on examples from human evolution, physiology, and disease. The course will be organized into four modules with combined lecture and journal club-style discussion. Module topics include molecular regulation of transcription, epigenetic regulation of the genome, gene regulatory networks, and genome architecture and evolution. We will draw from examples in the current literature and explore current experimental approaches in molecular genetics of humans and model organisms.

BIOL BC3305 PROJECT LAB IN MOLECULAR GENETICS. *3.00 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503, and BIOL BC2100 or permission of instructor. Enrollment limited to 16.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503, and BIOL BC2100 or permission of instructor. Enrollment limited to 16. Laboratory course in which students conduct original research projects in molecular genetics. Students will participate in experimental design, conduct and data analysis, and work with key techniques for studying gene structure, expression and function such as nucleic acid extraction and synthesis, cloning, bioinformatics analysis, PCR and qPCR. Students will present their results orally and in writing. Enrollment in both semesters (BIOL BC3305 and BIOL BC3306) of this full-year course is required, and fulfills two upper-level lab courses for the Barnard Biology major. Must be taken in sequence, beginning in the fall. -B. Morton - J. Mansfield

Fall 2020: BIOL BC3305

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3305	001/00093	W 1:00pm - 6:00pm Room TBA	Jennifer Mansfield, Brian Morton	3.00	11/12

BIOL BC3306 Project Laboratory in Molecular Genetics. *3 points*.
Prerequisites: BIOL BC2100 or permission of the instructors. Enrollment is limited to 16; must attend first lab to hold place.
Laboratory course in which students conduct original research projects in molecular genetics. Students will participate in experimental design, conduct data analysis, and work with key techniques for studying gene structure, expression, and function including nucleic acid extraction and synthesis, cloning, bioinformatics analysis, PCR, and qPCR. Students will present their results orally and in writing. Enrollment in both semesters (BIOL BC3305 and BIOL BC3306) of this full-year course is required, and fulfills two upper-level lab courses for the Barnard Biology major. Must be taken in sequence, beginning in the fall.

Spring 2021: BIOL BC3306

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3306	001/00145	W 1:00pm - 6:00pm Room TBA	Jennifer Mansfield, Brian Morton	3	7/12

BIOL BC3308 Genomics and Bioinformatics. *3 points*.
Not offered during 2020-21 academic year.

Prerequisites: (BIOL BC1500)(BIOL BC1501)(BIOL BC1502)(BIOL BC1503) and BIOL BC2100 or the equivalent. This course is an upper-level laboratory.
Advanced topics in genetics focusing on genome-level features and methods of sequence analysis. The primary emphasis of the course will be on microbial genomic and metagenomic applications, but many of the techniques will be applicable to eukaryotic genomics and medical genomics as well. Through this course students will become comfortable with the command line interface, learn basic programming skills, be exposed to a variety of online tools, and become proficient in a number of genomic software packages.

BIOL BC3310 Cell Biology. *3 points*.
Prerequisites: (BIOL BC1500)(BIOL BC1501)(BIOL BC1502)(BIOL BC1503) and BIOL BC2100 or equivalent.
This course explores the components, systems, and regulatory mechanisms involved in eukaryotic cellular function. Topics include: signal transduction, translational and protein quality control, organellar and cytoskeletal dynamics, and some coordinated responses such as proliferation and programmed cell death. Throughout the course we will see how general cell biology can be specialized to achieve specific cellular functions through regulation of the basic machinery. We will also explore the cellular and molecular bases for a variety of human pathologies, with an emphasis on cancer. In addition to lecture, we will spend some time discussing the material, including selected articles from the primary literature, and learning through group presentations.

Fall 2020: BIOL BC3310

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3310	001/00094	M W Th F 1:10pm - 2:25pm Room TBA	Jonathan Snow	3	32/50

BIOL BC3311 Laboratory in Cell Biology. *3 points*.
Prerequisites: BIOL BC3310 (which can be taken as a pre- or co-requisite). Enrollment is limited to 16; must attend first lab to hold place.
Introduction to cell biological techniques used to investigate structural, molecular, and physiological aspects of eukaryotic cells and their organization into tissues. Techniques include light and electron microscopy, cell culture, isolation of cellular organelles, protein electrophoresis, and Western Blot analysis.

BIOL BC3320 Microbiology. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503, and BIOL BC2100 or the equivalent. This course is a pre-requisite for BIOL BC3321 Laboratory in Microbiology.
Survey of the diversity, cellular organization, physiology, and genetics of the major microbial groups. Also includes aspects of applied microbiology and biotechnology, the function of microorganisms in the environment, and the role of microbes in human diseases.

Fall 2020: BIOL BC3320

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3320	001/00096	T W Th F 2:40pm - 3:55pm Room TBA	JJ Miranda	3	27

BIOL BC3321 Laboratory in Microbiology. *3 points*.
Prerequisites: BIOL BC3320 (which can be taken as a pre- or co-requisite). Enrollment is limited to 16; must attend first lab to hold place.
Provides experience in the isolation, cultivation, and analysis of pure cultures of microorganisms. Methods used for the study of cell structure, growth, physiology, and genetics of microbes will be incorporated into laboratory exercises.

Fall 2020: BIOL BC3321

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3321	001/00332	T 1:00pm - 6:00pm Room TBA	Stephen Sturley	3	9/16

BIOL BC3352 Development. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503, and BIOL BC2100 or the equivalent.
Introduction to animal developmental biology and its applications. This course will examine the basic mechanisms through which animal bodies organize themselves, from an integrative perspective at the levels of genes and gene networks, cell properties and behaviors, coordinated interactions of cells in developing tissues, organs and organ systems, and the role of developmental processes in morphological evolution. Topics include: fertilization, cleavage and gastrulation, establishment of body axes, neural development, organ formation, tissue and organ regeneration, stem cells and medical applications, evolution of developmental programs, and teratogenesis.

Spring 2021: BIOL BC3352

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3352	001/00146	M T W Th 11:40am - 12:55pm Room TBA	Jennifer Mansfield	3	44

BIOL BC3354 LABORATORY IN EMBRYOLOGY. *3 points*.
This lab course will explore the foundational methods of vertebrate embryology. Using both classical and modern experimental approaches, we will identify and manipulate developmental processes such as gastrulation, neurulation, and organogenesis. Students will investigate molecular regulation of patterning and the importance of tissue-tissue interactions during early development. Utilizing modern genetic tools and imaging techiniques, such as digital microscopy, students will have the opportunity to visualize embyrogenesis in real-time.

Prerequisite: Two terms of introductory biology (BIOL BC1500,BC1502 or equivalent) AND one term of Genetics (BIOL BC2100 or equivalent) AND at least one upper level lab course at the cell and molecular level. OR permission from the instructor.

BIOL BC3360 Physiology. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, and BIOL BC1503 or the equivalent.
This course examines how mammals carry out basic functions like manipulating objects, sensing the external world, oxygenating tissues, and processing food. Emphasis is placed on (a) how the body regulates itself through the integrated action of multiple organ systems and (b) what goes awry in disease.

Fall 2020: BIOL BC3360

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3360	001/00097	M T W Th 11:40am - 12:55pm Room TBA	John Glendinning	3	56

BIOL BC3361 Laboratory in Physiology. *3 points*.
Prerequisites: BIOL BC3360 (or equivalent, which can be taken as a pre- or co-requisite). Enrollment is limited to 16; must attend first lab to hold place.
Provides a hands-on introduction to the different physiological systems in vertebrates and invertebrates. Emphasizes the operation of a variety of physiological monitoring devices and the collection and analysis of physiological data.

BIOL BC3362 MOLECULAR # CELLULAR NEUROSCIENCE. *3.00 points*.
Prerequisites: BIOL BC1502 BIOL BC1503, and either BIOL BC1500 BIOL BC1501 or NSBV BC1001 or permission from the instructor. Structure and function of neural membranes; ionic basis of membrane potential and action potential; synaptic transmission and neurochemistry; sensory transduction and processing; reflexes and spinal cord physiology; muscle structure and function; neuronal circuitry; and nervous system development

Fall 2020: BIOL BC3362

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3362	001/00098	M T W Th F 12:00pm - 1:00pm Room TBA	Elizabeth Bauer	3.00	74/80

BIOL BC3363 Laboratory in Molecular and Cell Neuroscience. *3 points*.
Prerequisites: BIOL BC3362 (which can be taken as a pre- or co-requisite). Enrollment is limited to 16; must attend first lab to hold place.
Introduction to techniques commonly used in current neurobiological research, including intracellular and extracellular recording of action potentials, neuroanatomical methods, and computer simulation of the action potential.

BIOL BC3367 Ecophysiology. *3 points*.
Not offered during 2020-21 academic year.

Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, and BIOL BC1503, or the equivalent. BIOL BC2280 is recommended.
Individuals, communities and ecosystems are composed of complex organism-environment interactions. We will examine these dynamic relationships in animals at the physiological level, covering basic concepts as they specifically relate to animal fitness. Course focus: how changes in stress and reproductive endocrinology and ecoimmunology relate to individual and population dynamics.

BIOL BC3380 Applied Ecology and Evolution. *3 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent.
Ecological and evolutionary models of populations (exponential and density-dependent growth; species interactions; genetic differentiation resulting from mating, random drift, and selection) applied to problems resulting from human-induced environmental change (endangered species; use of pesticides and antibiotics; escaping transgenic organisms; global climate change; emerging pathogens; other invaders; etc.)

Spring 2021: BIOL BC3380

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3380	001/00148	T Th 4:10pm - 5:25pm Room TBA	Hilary Callahan	3	14

BIOL BC3388 Tropical Ecology. *3 points*.
Not offered during 2020-21 academic year.

Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503 or the equivalent.
Focusing on tropical rain forests, the course explores the contemporary and historical ecological processes that generate and maintain species diversity in the tropics. Topics include biogeography and the latitudinal gradient of diversity, tropical climate and soils, origins of tropical ecosystems, causes and consequences of tropical deforestation, as well as unique ecological patterns and processes in specific tropical regions (Neotropics, African, and Asian tropics).

BIOL BC3400 MATHEMATICAL MODELING OF BIOLOGICAL SYSTEMS. *4.00 points*.
This course will focus on building and analyzing dynamic mathematical models (models that study how processes change in time) to understand the behavior of different biological systems. We will focus on a variety of topics in population biology, physiology and the biomedical sciences such as single and competing species models, pharmacokinetic models of drugs and toxins, enzyme reaction kinetics, epidemiology, infectious diseases and cancer. We will use mathematical tools like difference equations, differential equations, linear algebra and nonlinear analysis to study these biological processes. MATLAB programming will be used to implement these mathematical models in search of answers to biological questions

BIOL BC3590 Senior Seminar. *4 points*.
Prerequisites: BIOL BC1500, BIOL BC1501, BIOL BC1502, BIOL BC1503, and BIOL BC2100 or the equivalent. Enrollment is limited to 12; must attend first class to hold place.
Required for all majors who do not select the year-long Senior Thesis Research & Seminar (BIOL BC3593 & BC3594) to fulfill their senior capstone requirement. These seminars allow students to explore the primary literature in the Biological Sciences in greater depth than can be achieved in a lecture course. Attention will be focused on both theoretical and empirical work. Seminar periods are devoted to oral reports and discussion of assigned readings and student reports. Students will write one extensive literature review of a topic related to the central theme of the seminar section. *Topics vary per semester and include, but are not limited to:* **Plant Development**, **Animal Development & Evolution, Molecular Evolution, Microbiology & Global Change, Genomics, Comparative & Reproductive Endocrinology, and Data Intensive Approaches in Biology.**

Fall 2020: BIOL BC3590

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3590	001/00099	M 4:10pm - 6:00pm Room TBA	Rishita Shah	4	14/12

Spring 2021: BIOL BC3590

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3590	001/00150	T 4:10pm - 6:00pm Room TBA	Allison Lopatkin	4	8/12

BIOL BC3591 Guided Research and Seminar. *4 points*.
Per Semester

An independent research project in Biology under the guidance of a faculty member and suiting the needs of the individual student. A Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in this year-long course. A Project Approval Form (https://forms.gle/mDNyT5CaEJkMMWCt5/) must be submitted to the department in the fall.

,
Attendance at a weekly seminar is required. By the end of the year, students enrolled in BIOL BC3591-BIOL BC3592 will write a scientific paper and give a poster presentation of their work at the Barnard Biology Research Symposium. Completion of this year-long course fulfills two upper-level laboratory requirements for the major. Must be taken in sequence, beginning in the fall.

Fall 2020: BIOL BC3591

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3591	001/00100	M 1:10pm - 3:00pm Room TBA	Alison Pischedda, JJ Miranda	4	15

BIOL BC3592 Guided Research and Seminar. *4 points*.
Per Semester

An independent research project in Biology under the guidance of a faculty member and suiting the needs of the individual student. A Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in this year-long course. A Project Approval Form (https://forms.gle/mDNyT5CaEJkMMWCt5/) must be submitted to the department in the fall.

,
Attendance at a weekly seminar is required. By the end of the year, students enrolled in BIOL BC3591-BIOL BC3592 will write a scientific paper and give a poster presentation of their work at the Barnard Biology Research Symposium. Completion of this year-long course fulfills two upper-level laboratory requirements for the major. Must be taken in sequence, beginning in the fall.

Spring 2021: BIOL BC3592

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3592	001/00149	M 1:10pm - 3:00pm Room TBA	Alison Pischedda, JJ Miranda	4	15

BIOL BC3593 Senior Thesis Research & Seminar. *4 points*.
Per Semester

Prerequisites: Permission of a faculty sponsor and the department. Cannot be taken concurrently with BIOL BC3591 or BIOL BC3592. Same as BIOL BC3591-BIOL BC3592, including attendance at a weekly seminar. By the end of the year, students enrolled in BIOL BC3593-BIOL BC3594 will write a scientific paper and orally present their work at the Barnard Biology Research Symposium.

,
A Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in this year-long course. A Project Approval Form (https://forms.gle/mDNyT5CaEJkMMWCt5/) must be submitted to the department in the fall. Completion of this year-long course fulfills the senior capstone requirement for the major; it cannot be taken at the same time as BIOL BC3591-BIOL BC3592. Must be taken in sequence, beginning in the fall.

Fall 2020: BIOL BC3593

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3593	001/00101	M 1:10pm - 3:00pm Room TBA	Alison Pischedda, JJ Miranda	4	3

BIOL BC3594 Senior Thesis Research & Seminar. *4 points*.
Prerequisites: Permission of a faculty sponsor and the department. Cannot be taken concurrently with BIOL BC3591 or BIOL BC3592. Same as BIOL BC3591-BIOL BC3592, including attendance at a weekly seminar. By the end of the year, students enrolled in BIOL BC3593-BIOL BC3594 will write a scientific paper and orally present their work at the Barnard Biology Research Symposium.

,
A Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in this year-long course. A Project Approval Form (https://forms.gle/mDNyT5CaEJkMMWCt5/) must be submitted to the department in the fall. Completion of this year-long course fulfills the senior capstone requirement for the major; it cannot be taken at the same time as BIOL BC3591-BIOL BC3592. Must be taken in sequence, beginning in the fall.

Spring 2021: BIOL BC3594

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3594	001/00151	M 1:10pm - 3:00pm Room TBA	Alison Pischedda, JJ Miranda	4	3

BIOL BC3597 Guided Research. *4 points*.
Prerequisites: Permission of a faculty sponsor.
Similar to BIOL BC3591-BIOL BC3592, this is a one-semester course that provides students with degree credit for unpaid research *without* a seminar component. You may enroll in BIOL BC3597 for between 1-4 credits per semester. As a rule of thumb, you should be spending approximately 3 hours per week per credit on your research project.

,
A Project Approval Form (https://forms.gle/mDNyT5CaEJkMMWCt5/) must be submitted to the department each semester that you enroll in this course. Your Barnard research mentor (if your lab is at Barnard) or internal adviser in the Biology Department (if your lab is elsewhere) must approve your planned research before you enroll in BIOL BC3597. You should sign up for your mentor's section.

,
This course does not fulfill any Biology major requirements. It is open to students beginning in their first year.

Fall 2020: BIOL BC3597

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3597	001/00103		Elizabeth Bauer	4	2
BIOL 3597	002/00104		Hilary Callahan	4	1
BIOL 3597	003/00105		John Glendinning	4	6
BIOL 3597	004/00106		Paul Hertz	4	0
BIOL 3597	005/00107		Allison Lopatkin	4	1
BIOL 3597	006/00108		Jennifer Mansfield	4	2
BIOL 3597	007/00109		JJ Miranda	4	2
BIOL 3597	008/00110		Brian Morton	4	0
BIOL 3597	009/00111		Alison Pischedda	4	4
BIOL 3597	010/00112		Jonathan Snow	4	7

Spring 2021: BIOL BC3597

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
BIOL 3597	001/00152		Elizabeth Bauer	4	2
BIOL 3597	002/00153		Hilary Callahan	4	2
BIOL 3597	003/00326		John Glendinning	4	2
BIOL 3597	004/00154		Allison Lopatkin	4	1
BIOL 3597	005/00155		Jennifer Mansfield	4	0
BIOL 3597	006/00156		JJ Miranda	4	0
BIOL 3597	007/00157		Brian Morton	4	0
BIOL 3597	008/00158		Alison Pischedda	4	4
BIOL 3597	009/00159		Jonathan Snow	4	6
BIOL 3597	010/00684		Paul Hertz	4	1

Cross-Listed Courses

Anatomy (Barnard)

ANAT BC2573 Human Anatomy and Movement. *3 points*.
Corequisites: ANAT BC2574
Dancers and other movers will acquire concrete, scientific information about anatomy and integrate this knowledge into their sensed experience of movement. Through readings, lecture/discussions and movement practice, students will explore: (1) structure and function of bones and joints, (2) muscles, neuromuscular function and coordination, (3) motor cognition and learning.

Spring 2021: ANAT BC2573

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
ANAT 2573	001/00258	M W 2:40pm - 3:55pm Room TBA	Chisa Hidaka	3	18/18

ANAT BC2574 Laboratory in Human Anatomy. *3 points*.
Corequisites: ANAT BC2573
This new interdisciplinary laboratory course will introduce students to the practices of creative and scientific research in anatomy. The laboratory course will offer students "hands-on" opportunities to view cadaveric specimens, to collect, analyze and communicate scientific information/data related to anatomy and to explore the use of anatomical information to generate creative movement and choreography.

Chemistry (Barnard)

CHEM BC2900 Research Methods Seminar. *1 point*.
Instructor's Permission Required

Prerequisites: Students must be sophomores with a strong interest in pursuing research in the biological or chemical sciences
Skills to facilitate into biology and chemistry research. Students will learn to think and work like scientists and to identify, apply for and gain entry to research lab groups. Focus on writing and oral presentation skills. Additional readings and discussions on laboratory safety, women in science, and scientific ethics.

CHEM BC3282 BIOLOGICAL CHEMISTRY. *3.00 points*.
Prerequisites: (CHEM BC3230) and (CHEM BC3231) BIOL BC1502.
Lecture: MWF 9:00-9:50.
Prerequisites: (CHEM BC3230) and (CHEM BC3231) BIOL BC1502.
Introduction to biochemical building blocks, macromolecules, and metabolism. Structures of amino acids, lipids, carbohydrates, nucleic acids. Protein structure and folding. Enzyme mechanisms, kinetics, allostery. Membranes and biosignaling. Catabolism and anabolism with emphasis on chemical intermediates, metabolic energy, catalysis by specific enzymes, regulation

Fall 2020: CHEM BC3282

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
CHEM 3282	001/00318	M W 6:10pm - 7:25pm Room TBA	Jonelle White	3.00	34/40

Spring 2021: CHEM BC3282

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
CHEM 3282	001/00361	M W 11:40am - 12:55pm Room TBA	Jonelle White	3.00	29/40

CHEM BC3355 Biochemistry Laboratory Techniques. *5 points*.
Prerequisites: Organic II lab (CHEM BC3333, BC3335, or equivalent); Quantitative analysis lab (BC3338, BC3340, or equivalent); Biochemistry (CHEM BC3282y, CHEM C3501, or equivalent). Lecture: T 1:10-12:50; Laboratory two afternoons: T 2:10-6:00 / TH 1:10-5:00.
Theory and application of fundamental techniques for the isolation, synthesis and characterization of biological macromolecules including proteins, lipids, nucleotides and carbohydrates. Techniques include spectroscopic analysis, gel electrophoresis, chromatography, enzyme kinetics, immunoblotting, PCR, molecular cloning and cell culture, as well as modern laboratory instrumentation, such as UV-Vis, GC-MS and HPLC.

Spring 2021: CHEM BC3355

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
CHEM 3355	001/00374	T Th 12:00pm - 5:00pm Room TBA	Grace Lee, Jonelle White	5	7/14

CHEM BC3357 Biochemistry Laboratory Techniques. *3 points*.
Fee: $45.

Prerequisites: four terms of chemistry and biology laboratory.
Corequisites: *BIOC C3501* or *BCHM G4021*.
Lecture and lab. Same course as *BC3355,* but only one section of lab hours required.

Neuroscience and Behavior (Barnard)

NSBV BC2002 Statistics and Experimental Design. *4 points*.
This course is for students interested in learning how to conduct scientific research. They will learn how to (i) design well-controlled experiments and identify "quack" science; (ii) organize, summarize and illustrate data, (iii) analyze different types of data; and (iv) interpret the results of statistical tests.

Fall 2020: NSBV BC2002

Course Number	Section/Call Number	Times/Location	Instructor	Points	Enrollment
NSBV 2002	001/00674	M T W Th 11:40am - 12:55pm Room TBA	John Glendinning	4	10/24
NSBV 2002	001/00674	M W 1:10pm - 2:00pm Room TBA	John Glendinning	4	10/24