

Program Planning Packet | Spring 2019



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REQUIREMENTS FOR BIOLOGY MAJORS

There are four ways to complete a major in Biology. A student can obtain a general Biology Major or may complete one of the three majors that concentrate on a specific level of biological organization: Cellular and Molecular; Physiology and Organismal; or Ecology and Evolutionary.

❖ Introductory Biology and Genetics

All Biology majors must complete the 1500-level introductory sequence followed by a course in Genetics:

- BIOL BC1500x Introduction to Organismal and Evolutionary Biology
- BIOL BC1501x Introductory Lab in Organismal and Evolutionary Biology
- BIOL BC1502y Introduction to Cell and Molecular Biology
- BIOL BC1503y Introductory Lab in Cell and Molecular Biology
- BIOL BC 2100 Molecular and Mendelian Genetics

It is recommended, but not required, that Genetics be taken immediately after completing the 1500-level introductory sequence. You may begin the introductory sequence with BIOL BC1002x 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.

❖ Five Upper-level Courses

All Biology majors must complete five upper-level courses, with category distribution requirements listed in the table on the following page followed by courses that fulfill each category.

- To complete the Biology Major *without* a concentration, the five courses must include at least one course from each of the three categories.
- To complete one of the three concentrations, at least four courses must be from the appropriate category and at least one must be from another category.

Although some courses are listed in multiple categories, a student can only use a course towards one of the categories. Additional Columbia courses that can be used to fulfill the major requirements are provided on the Biology website. If a student completes courses that make her eligible for more than one of the four majors, then she may select which one is reflected on her transcript.

| Major | Course Selection |
|---------------------------------|--|
| Biology | Five courses with at least one course from each of the three categories. |
| Cell & Molecular Biology | Four courses from the Cell & Molecular Biology category, one from another category. |
| Physiology & Organismal Biology | Four courses from the Physiology & Organismal Biology category, one from another category. |
| Ecology & Evolutionary Biology | Four courses from the Ecology & Evolutionary Biology category, one from another category. |

Categories of Upper-level Courses in the Biology Major

(See the last page of this packet for courses offered in Spring 2019)

Cell & Molecular Biology:

| | |
|-------------|-------------------------------------|
| BIOL BC2278 | Evolution |
| BIOL BC3308 | Genomics and Bioinformatics |
| BIOL BC3310 | Cell Biology |
| BIOL BC3320 | Microbiology |
| BIOL BC3352 | Development |
| BIOL BC3362 | Molecular and Cellular Neuroscience |
| CHEM BC3282 | Biochemistry I |
| BIOL W3034 | Biotechnology |
| BIOL W3073 | Cellular and Molecular Immunology |
| BIOL W3310 | Virology |

Physiology & Organismal Biology:

| | |
|-------------|---------------------------------------|
| BIOL BC2262 | Vertebrate Biology |
| BIOL BC2280 | Animal Behavior |
| BIOL BC2286 | Statistics and Research Design |
| BIOL BC3320 | Microbiology |
| BIOL BC3360 | Physiology |
| BIOL BC3367 | Ecophysiology |
| EEEE W3011 | Behavioral Biology of Living Primates |
| EEEE W3208 | Explorations in Primate Anatomy |
| EEEE W4112 | Ichthyology |
| BIOL W3005 | Neurobiology: Development & Systems |

Ecology & Evolutionary Biology

| | |
|-------------|--|
| BIOL BC2240 | Plant Evolution and Diversity |
| BIOL BC2262 | Vertebrate Biology |
| BIOL BC2272 | Ecology |
| BIOL BC2278 | Evolution |
| BIOL BC2280 | Animal Behavior |
| BIOL BC2286 | Statistics and Research Design |
| BIOL BC2851 | Plants & Profits: The Global Power of Botany |
| BIOL BC3280 | Applied Ecology and Evolution |
| BIOL BC3367 | Ecophysiology |
| BIOL BC3388 | Tropical Ecology |
| EEEE W3087 | Conservation Biology |
| EEEE W4110 | Coastal Estuarine Ecology |

❖ Three Upper-level Laboratory Courses

Students may take any upper-level Biology lab courses for which they have the pre- or co-requisite. A year-long research-seminar course may substitute for lab courses, as described below. Students may also take laboratory courses at Columbia (or other institutions) to satisfy the lab requirement, with permission from the Associate Chair.

➤ **Guided Research and Seminar (BIOL BC3591x & 3592y)**

Enrollment in the year-long sequence of Guided Research and Seminar can be used to fulfill two upper-level labs. This course is only available as a Fall-Spring sequence.

❖ Senior Capstone Experience

All Biology majors must complete the Senior Capstone Experience with either of the following two options:

1. One semester of **Senior Seminar (BIOL BC3590)**

In Senior Seminar, enrolled students participate in a seminar focusing on primary literature and compose, and give a presentation on, a senior thesis in the format of a literature review.

2. The year-long **Senior Thesis Research and Seminar (BIOL BC3593x & 3594y)**

In Senior Thesis Research and Seminar, students complete an original research project in a lab and compose, and give a presentation on, a senior thesis in the format of a primary research paper.

❖ Chemistry Requirement

All majors, regardless of their track, must complete at least one semester of General Chemistry (with laboratory) and at least one semester of Organic Chemistry (with laboratory).

REQUIREMENTS FOR BIOLOGY MINORS

A minor in biology includes:

- One year of introductory biology (BIOL BC1500, BC1501, BC1502, BC1503).
- Three biology lecture courses at the 2100 level or higher.
- Two biology laboratory courses. One of the lab courses may be replaced by two semesters of Guided Research and Seminar (BIOL BC3591x followed by BIOL BC3592y).

Please note: Chemistry, environmental science, physics, and psychology majors need to take only one advanced laboratory instead of two. Check with your major advisor in order to determine whether a guided research course is a suitable selection for your major's requirements.

MAJOR ADVISING POLICY

In the biology department, students select their advisors rather than having them assigned. Students should contact prospective advisors *directly*. After contacting them, a student's choice must be approved and their major declaration form signed by the Associate Chair. Any biology faculty member can serve as an advisor. There are also two interdepartmental majors (below).

RELATED DEPARTMENTS AND MAJORS

Environmental Biology

(Potential advisors in the Biology Department are Profs. Callahan and Hertz)

This major is run jointly by faculty in the Departments of Biology and Environmental Science. It examines the interactions between living and non-living components of the environment, and how human activities alter these interactions. For more information, visit: envsci.barnard.edu

Neuroscience and Behavior

(Potential advisors in the Biology Department are Profs. Bauer, Glendinning, and Hertz)

This major is run jointly by faculty in the Departments of Biology and Psychology. It provides a strong background in the biological underpinnings of behavior and cognition. There are two concentrations within this major: Molecular & Cellular Neuroscience and Behavioral Neuroscience. For more information, visit: neuroscience.barnard.edu

RESEARCH OPPORTUNITIES

We strongly encourage students to get involved in research during the summer, academic year, or both. For many students, research is one of the most intellectually rewarding experiences at Barnard. When research is conducted during the academic year, students can receive credit for working in a laboratory at Barnard or anywhere else in New York City. Research can be conducted during any (or all) semesters of the major.

Three courses provide credit for research during the academic year. Before signing up for any of these courses, you should examine the associated [Checklists for Enrollment](#) located on the Biology website:

1. **Guided Research (BIOL BC3597)**: This is a variable-credit one-semester course, which can be taken during any Fall or Spring semester.
2. **Guided Research & Seminar (BIOL BC3591-2)**: This is a year-long course that begins in the Fall. It can fulfill two laboratory course requirements for the Biology major.
3. **Senior Thesis Research (BIOL BC3593-4)**: This is a year-long course, beginning in the Fall of your senior year. It can serve as either the senior requirement or fulfill two laboratory course requirements for the Biology major (but not both).

Please Note: You cannot get credit for doing research during the summer. However, for more information on available funding sources, see p. 7 of this packet.

BIOLOGY MAJORS-LEVEL COURSES OFFERED SPRING 2019

| COURSE NO. | COURSE TITLE | PROFESSOR | TIME OFFERED |
|-------------------|---|---|--|
| BIOL BC1502 | Intro Cellular & Molecular Biology | Jonathan Snow | MWF 9:00am-9:50am |
| BIOL BC1503 | Intro Lab in Cellular & Molecular Biology | Jessica Goldstein & James Casey | Consult the directory |
| BIOL BC1513 | Biology BC 1503 Recitation | Jessica Goldstein | M 10:00am-10:50am <u>or</u> F 1:10pm-2:00pm |
| BIOL BC2100 | Molecular & Mendelian Genetics | Jennifer Mansfield | T TH 10:10am-11:25am |
| BIOL BC2262 | Vertebrate Biology | Paul Hertz | MW 10:10am-11:25am |
| BIOL BC2280 | Animal Behavior | Alison Pischedda | T TH 11:40am-12:55pm |
| BIOL BC2851 | Plants & Profits: The Global Power of Botany | Hilary Callahan | W 1:10pm-2:25pm <u>and</u> F 11:30am-3:00pm |
| BIOL BC2873 | Laboratory in Ecology | Paul Hertz | W 1:10pm-6:00pm |
| BIOL BC3303 | Laboratory in Molecular Biology | Stephen Sturley | W 1:10pm-6:00pm |
| BIOL BC3306* | Project Lab in Molecular Genetics | Jennifer Mansfield & Brian Morton | W 1:10pm-6:00pm |
| BIOL BC3321 | Laboratory in Microbiology | JJ Miranda | TH 1:10pm-6:00pm |
| BIOL BC3360 | Physiology | John Glendinning | T TH 10:10am-11:25am |
| BIOL BC3361 | Laboratory in Physiology | John Glendinning | W 1:10pm-6:00pm |
| BIOL BC3363 | Laboratory in Molecular & Cellular Neuroscience | Elizabeth Bauer | TH 1:10pm-6:00pm <u>or</u> F 1:10pm-6:00pm |
| BIOL BC3590 | Senior Seminar in Biology: Genomics | Brian Morton | M 4:10pm-6:00pm |
| BIOL BC3592* | Guided Research & Seminar | Jessica Goldstein, Alison Pischedda, & JJ Miranda | M 1:10pm-3:00pm |
| BIOL BC3594* | Senior Thesis Research Seminar | Jessica Goldstein, Alison Pischedda, & JJ Miranda | M 1:10pm-3:00pm |
| BIOL BC3597 | Guided Research | Barnard Faculty Advisor/Internal Mentor | |

*Denotes a full year course; BC3592, BC3594, and BC3306 can only be taken in a Fall to Spring sequence – enrollment in BC3591, 3593, and BC3305 are required in Fall 2018

Biology Department Announcements & Events | Fall 2018

Student Employment

The department is seeking teaching and/or lab assistants for the following courses:

- Intro Lab in Cell & Molecular Biology
- Lab in Molecular & Cellular Neuroscience
- Lab in Microbiology
- Lab in Molecular Biology
- Lab in Ecology

Listings will be available through BarnardWorks on Monday, November 19th.

Upcoming Departmental Events

SRI Open House Informational Session | Fri, Dec. 7th at 12 pm | James Room (4th Floor, Barnard Hall)

Honey extraction with Professor Snow | Fri, Dec. 7th at 1-2pm | 12th floor Altschul

Summer Research, Grants, & Scholarships

All Barnard students have access to subsidized summer housing in a Barnard dormitory, assuming they are working full-time in a scientific laboratory. Below are some programs that offer stipends for summer research.

Lucyle Hook Travel Grants

Eligibility: Lucyle Hook Travel Grants are available to seniors to support thesis research that requires travel, often done during winter break.

Process: To apply, you must submit a proposal, budget, and a letter of support from a Barnard or Columbia faculty member by November 5, 2018. Proposals will be reviewed and assessed by the Faculty Committee on Honors at their November 2018 meeting. Bear in mind that although some members of the Committee may be experts in your field, most will not be; it would be wise to tailor your proposal accordingly. You may email attachments to madiram@barnard.edu or deliver hard copies to the Dean of Studies Office, Milbank 105. For a more thorough description of the application requirements, contact Dean Christina Kuan Tsu by email (ckuantsu@barnard.edu).

Beckman Scholars Program

Beckman Scholars competitions will be held in Spring 2019 and 2020. We encourage interested students, especially sophomores, to explore the Beckman Scholars Program. Scholars and mentors participate in a 15-month experience and scholars are provided continuous and generous stipend-support over two summers and publication costs, and travel to conferences. Faculty mentors furnish hands-on guidance and support throughout.

Eligibility: The Beckman Scholars Program specifically targets students who are mentored by select faculty in Biology, Chemistry, or Neuroscience & Behavior. All applicants must be full-time undergraduate students who have declared majors in biology, chemistry, or neuroscience, as well as U.S. citizens or permanent residents. Top candidates will demonstrate evidence of critical traits such as leadership, maturity, perseverance, and dedication to scientific research. They will have a grade point average of 3.5 or higher, research interests or experience aligned with a participating mentor, particularly compelling goals for independent research and post-graduate pursuits, superior communication skills, and a commitment to meeting the participation requirements for two summers and the intermediate academic year. Students planning to graduate in 2019 are not eligible to apply for an award during the cycle beginning in 2019.

Process: Preliminary applications are due January 28th. For more information, visit: <https://barnard.edu/beckman-scholars>

Amgen Scholars Summer Research Program

Eligibility: Students at Barnard, CU, or elsewhere must work full-time with an established Amgen mentor

Process: Submit application by 5pm on February 1st. Visit <http://www.columbia.edu/cu/biology/ug/amgen/> for more info.

Summer Undergraduate Research Fellowships

Eligibility: Students from Barnard or CU must work with established SURF mentor

Process: Submit application by 5pm on February 1st. Visit <http://www.columbia.edu/cu/biology/ug/surf/> for more info.

Tow Summer Research Fellowship

Eligibility: The Tow Summer Research Fellowship supports senior thesis-related summer research projects that require travel, either domestic or international.

Process: To apply for funding, you must submit a proposal, budget, and letter of recommendation from a Barnard or Columbia faculty member by March 1, 2019. Proposals will be reviewed and assessed by the Faculty Committee on Honors at their March 2019 meeting. Bear in mind that although some members of the Committee may be experts in your field, most will not be; it would be wise to tailor your proposal accordingly. Email attachments to madiram@barnard.edu or deliver hard copies to the Dean of Studies Office, Milbank 105. For a more thorough description of the application requirements, contact Dean Christina Kuan Tsu by email (ckuantsu@barnard.edu).

Small Grants from the Barnard Biology Department

There are several funds (Donald and Nancy Ritchie, Edna Henry Bennett, Maura Shannon Barrett, and Herbert Maule Richards) that we use to support small summer grants.

Process: If you have a project in mind, then please submit a 1-2 page proposal to the Biology Office (1203 Altschul) on or before March 22, 2019. This proposal should include:

A brief description of your plans and their importance to your studies.

A detailed budget which indicates the minimum amount of money that you will need.

Summer Research Institute (SRI)

Eligibility: Barnard students working full-time with Barnard faculty

Process: See the [SRI website](#) for more information