

Majoring in Computational Biology at Barnard

The following slides are meant to help guide newly declared and prospective majors in navigating a major in Biology at Barnard with a specialization in Computational Biology. Courses are organized by their pre-requisites and whether the course is offered in the fall, spring, or either semester. Whether a course is offered in the spring or fall is provided as a general guideline; these are subject to change at the discretion of the instructor. Questions can be directed to the department administrator, Melissa Flores (mflores@barnard.edu) or the chair, Hilary Callahan (hcallaha@barnard.edu).

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Introductory Biology Requirement

Notes: Those considering a major in the computational biology track should begin with BIOL BC1500 or BIOL BC1002 in their freshman fall.

For students without a strong high school background in Biology (such as AP Biology)

BIOL BC1002
Global Health & Ecology
(Fall Only)

Co-Requisite:
BIOL BC1012
BIOL BC1002 Lab
(Fall Only)

Co-Requisites:

BIOL BC1510 **BIOL BC1501**
BIOL BC1500 Introductory Lab in
Discussion + Organismal &
Section Evolutionary Biology
(Fall Only) (Fall Only)

Co-Requisite for **BIOL BC1501:**

BIOL BC1511
BIOL BC1501 Recitation
(Fall Only; Asynchronous)

BIOL BC1500
Introduction to Organismal & Evolutionary Biology
(Fall Only)

For students with a strong high school background in Biology (such as AP Biology)

BIOL BC1502
Introduction to Cellular & Molecular Biology
(Spring Only)

Full-year sequence; can be taken in either order.

Recommended: begin in your first year

Co-Requisite for **BIOL BC1503:**

BIOL BC1513
BIOL BC1503 Recitation
(Spring Only; Asynchronous)

Co-Requisites:

BIOL BC1512 **BIOL BC1503**
BIOL BC1502 Introductory Lab
Discussion + in Cell &
Section Molecular Biology
(Spring Only) (Spring Only)

Recommended: once a student has completed the full-year introductory 1500-level sequence, they are encouraged but not required to take BIOL BC2100 Molecular & Mendelian Genetics

Introductory Computing & Statistics Course Requirements

Notes: Those considering a major specializing in the computational biology track must take one introductory course to learn a coding language and one introductory course in statistics. To balance these additional requirements, students in this track are exempt from the chemistry requirements expected for students in the other four tracks.

Introductory Computing Course Options

- COMS W1004 Introduction to Computer Science and Programming in Java
- COMS BC1016 Introduction to Computational Thinking and Data Science
- ENGI E1006 Introduction to Computing for Engineers and Applied Scientists (taught in Python)

Introductory Statistics Course Options

- STAT UN1010 Statistical Thinking for Data Science with Python Labs
- STAT UN1101 Introduction to Statistics
- STAT UN2102 Applied Statistical Computing
- NSBV BC2002 Statistics and Experimental Design
- EEEB UN3005 Introduction to Statistics for Evology and Evolutionary Biology

Upper-Level Biology Lectures
WITHOUT A Genetics Pre-Requisite

- BIOL BC3360 Physiology
- BIOL BC3362 Molecular and Cellular Neuroscience
- BIOL BC3380 Applied Evolution and Evolution

BIOL BC2100 Molecular &
Mendelian Genetics

OR

BIOL UN3031 Genetics

- BIOL BC3304 Topics in Molecular Genetics
- BIOL BC3310 Cell Biology
- BIOL BC3320 Microbiology
- BIOL BC3352 Development

**Genetics & Upper-Level Biology
Elective Requirement**

Notes: Recommended, but not required to complete in your sophomore year following the 1500-level series.

Students pursuing a major in the Computational Biology track are expected to take one Upper-Level Biology Elective from either of these two lists, which are divided by whether they require Genetics or not. Though Genetics is a pre-requisite for many courses, and can be taken as early as your sophomore year upon completion of the 1500-level introductory biology sequence, it is not a pre-requisite for all upper-level biology courses.

To see a list of Columbia Biological Sciences course equivalents, [click here](#).

Upper-Level Computing Course Requirements

Those pursuing a major specializing in the Computational Biology track must take four upper-level computing course electives.

Note: Be sure to look up any pre-requisite courses needed in order to take the courses on this list (e.g. BIOL BC2100)

Upper-Level Computing Course Options

- EESC BC3050 Big Data with Python: Python for Environmental Analysis & Visualization
- EESC GU4050 Remote Sensing
- COMS W3134 Data Structures in Java
- CBMF W4761 Computational Genomics
- BIOL BC2490 Coding in Biology
- BIOL BC2500 MATLAB for Scientists
- BIOL BC2841 Laboratory in Plant Evolution and Diversity
- BIOL BC2851 Plants and Profits: The Global Power of Botany
- BIOL BC3308 Microbial Genomics (formerly called Genomics & Bioinformatics)
- BIOL BC3590 Senior Seminar: Bacteria by Design (ONLY)

Upper-Level Biology Laboratories
WITHOUT A Genetics Pre-Requisite

- BIOL BC3361 Laboratory in Physiology
- BIOL BC3363 Laboratory in Molecular and Cellular Neuroscience

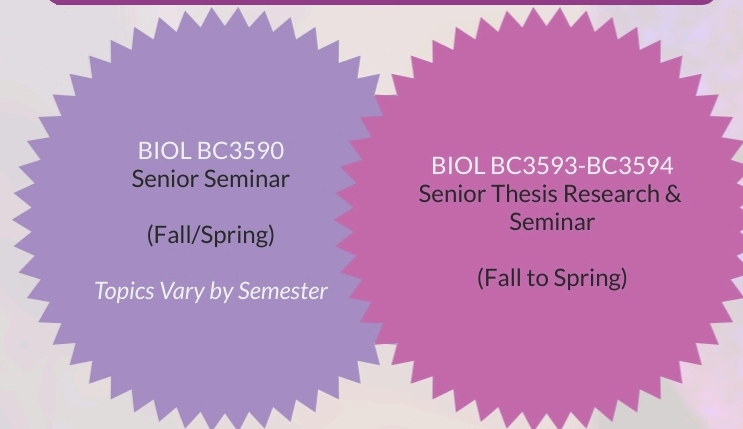
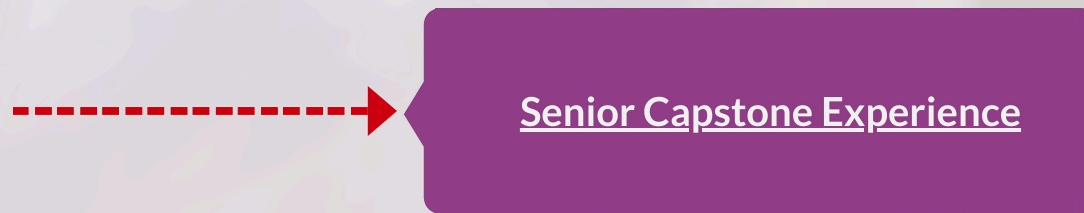
Upper-Level Biology Laboratories
WITH A Genetics Pre-Requisite

- BIOL BC3303 Laboratory in Molecular Biology
- BIOL BC3305-BC3306 Project Laboratory in Molecular Genetics (yearlong course)
- BIOL BC3311 Laboratory in Cell Biology
- BIOL BC3321 Laboratory in Microbiology

**Upper-Level Biology Lab
Requirement**

Students pursuing a major in the Computational Biology track are expected to take one Upper-Level Biology Lab from either of these two lists, which are divided by whether they require Genetics or not.

Note: Please note that BIOL BC3591 & BIOL BC3592 Guided Research & Seminar may be used to fulfill this requirement, but it does require that you enroll in the full-year sequence from fall to spring.



Senior Capstone Experience

Notes: Students complete the Senior Capstone Experience with either of these two options.

Notes: 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. Genetics is a pre-requisite. Only the Bacteria by Design topic (taught by Professor Lopatkin) can be used by Computational Biology majors.

Notes: 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. Students may not be enrolled in both Senior Thesis Research and Seminar AND Guided Research and Seminar. They may, however, continue a project begun in their sophomore or junior year while enrolled in Guided Research and Seminar.

Columbia Biological Sciences Upper-Level Elective Course Equivalents

BIOL UN3006

General
Physiology*

(Fall Only)

*Equivalent to BIOL
BC3360 Physiology

BIOL UN3022

Developmental
Biology*

(Fall Only)

*Equivalent to BIOL
BC3352 Development

BIOL UN3041

Cell
Biology*

(Fall/Spring)

*Equivalent to BIOL
BC3310 Cell Biology

To go back to the
Barnard Biology
upper-level
courses, [click here](#).

Note: These courses in the Columbia Biological Sciences Department are equivalent to courses taught at Barnard that can be taken to fulfill the one Upper-Level Biology Course requirement.

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