University of Pittsburgh | Dietrich School

# Computational Biology Major

www.biology.pitt.edu
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Computational biology is a growing field of study in the life sciences. This major trains students in computer programming, laboratory techniques, and other skills they will need to succeed in graduate school and in the workforce. This program is administered by the Department of Biological Sciences in the Dietrich School and the Department of Computer Science in the School of Computing and Information.

## Requirements for the Computational Biology major

**Biological Science courses**
BIOSC 0150 Foundations of Biology 1
BIOSC 0160 Foundations of Biology 2
BIOSC 0350 Genetics
BIOSC 1000 Biochemistry*

*Note: Students may alternately choose BIOSC 1810 (Macromolecular Structure and Function) **and** BIOSC 1820 (Metabolic Pathways) in lieu of BIOSC 1000. In this case, BIOSC 1820 becomes the elective course.

**Computer Science courses**
CS 0011 Introduction to Computing for Scientists[%]
CMPINF 0401 Intermediate Programming
CS 0441 Discrete Structures
CS 0445 Algorithms Data Structures 1
CS 1501 Algorithm Data Structures 2
CS 1656 Introduction to Data Science
[%]Note: or equivalent or placement assessment exemption

**Computational Biology courses**
BIOSC 1540 Computational Biology
BIOSC 1542 Computational Genomics **OR** BIOSC 1544 Simulation and Modeling
BIOSC 1630 Computational Biology Seminar
BIOSC 1640 Computational Biology Research Course **OR** CS 1640 Bioinformatics Software Design

**Elective courses; 3 credits**
Students must complete at least three credits in elective courses by choosing from the following list.

BIOSC 0351 Genetics Lab
BIOSC 0370 Ecology
BIOSC 1005 Introduction to Biochemistry Lab
BIOSC 1130 Evolution
BIOSC 1285 Genomics Lab
BIOSC 1320 Population Biology
BIOSC 1500 Cell Biology
BIOSC 1520 Developmental Biology
BIOSC 1545 Mathematics of Biology
BIOSC 1760 Immunology
BIOSC 1820 Metabolic Pathways and Regulation (with 1810) *
BIOSC 1850 Microbiology
BIOSC 1940 Molecular Biology
CHEM 0250 Analytical Chemistry
CHEM 0320 Organic Chemistry 2
CHEM 1460 Introduction to Modern Computational Science
CHEM 1830 Synthetic Biology
CS 1502 Formal Methods in Computer Science
CS 1520 Programming Languages for Web Applications
CS 1555 Database Management Systems
CS 1566 Introduction to Computer Graphics
CS 1675 Introduction to Machine Learning
MATH 0230 Analytical Geometry and Calculus 2
MATH 0280 Introduction to Matrices and Linear Algebra
NROSCI 1000 Introduction to Neuroscience
PHYS 0174 Basic Physics for Science and Engineering 1
STAT 1221 Applied Regression
*Note: This course must be taken in conjunction with BIOSC 1810; the pair of courses are in lieu of BIOSC 1000.

## Co-requisite courses

**Chemistry courses**
CHEM 0110 General Chemistry 1
CHEM 0120 General Chemistry 2
CHEM 0310 Organic Chemistry 2

**Mathematics and Statistics courses**
MATH 0220 Analytic Geometry and Calculus 1
STAT 1000 Applied Statistical Methods

Frederick Honors College equivalent courses may be substituted for required or elective courses.

## Writing (W) requirement

Students must complete at least one W-course in the major. BIOSC 1630 meets this requirement.

## Grade requirements

**BIOSC/CS courses:** All courses offered by Biological Sciences and Computer Science must be completed with a letter grade of C or better.

**Co-requisite courses**: Students must earn a minimum GPA of 2.0 in their co-requisite courses. A passing grade of C- or lower in a co-requisite course can be accepted if balanced by a higher grade in another co-requisite course so that the co-requisite GPA is 2.0 or higher.

**Exceptions:** CHEM 0110 and CHEM 0120 must be C or better to declare the major; PHYS 0110/0174 has to be C or better to enroll in PHYS 0111/0175; MATH 0220 has to be C or better to enroll in MATH 0230.

### Satisfactory/No Credit option

One core course required for the major may be taken on an S/NC basis.

### Restrictions

All BIOSC courses at the 0800-level are designed for non-majors. These courses to not count toward the major. Undergraduate teaching assistant (BIOSC 1690), independent study (BIOSC 1901), and undergraduate research credits (e.g., BIOSC 1903) do not count toward the major, though the department encourages students to pursue these opportunities.

Note about biochemistry options: BIOSC 1000 and 1810 are considered course repeats, and you cannot take both for credit.

### Honors

A Dietrich School student may achieve honors in the Department of Biological Sciences by meeting academic and research requirements specified here: www.biology.pitt.edu/undergraduate/advising-and-support/honors

### Advising – DSAS Students

The Biological Sciences Departmental Advisors are happy to meet with undeclared students, please make an appointment using Navigate Student. Students will officially be advised by the Bio Advising Team after declaring a major offered in the department. After declaring you will receive a welcome email with instructions by either late September or late January (depending on declaration date). Advising e-mail: BioAdv@Pitt.edu

The Bio Advising Team supports and enriches the academic experience of students by helping with curricular decisions, as well as providing information and guidance on extracurricular options, career paths, and post-graduate plans. Information about our advising team can be found: https://www.biology.pitt.edu/undergraduate/advising-and-support/advisors.

### Advising – SCI Students

Students completing the Computational Biology major through the School of Computing and Information need to contact SCIAdvising@Pitt.edu.

**Declaring the major:** Before students officially declare the Computational Biology major, they must have completed BIOSC 0150, BIOSC 0160, CHEM 0110, CHEM 0120, and CS 0011 with a grade of C (not C-) or better. Transfer students who have finished these requirements prior to admission to the University of Pittsburgh are asked to complete one term of course work, including at least one BIOSC course that counts toward the major, before declaring.

### Other Biological Sciences Department major options

Biological Sciences
Biochemistry
Ecology and Evolution
Microbiology
Molecular Biology

## Checklist for the Computational Biology major

**Biological Science courses**

_____ BIOSC 0150 **or** 0155 (UHC)
_____ BIOSC 0160 **or** 0165 (UHC)
_____ BIOSC 0350
_____ BIOSC 1000 **or** (1810 **and** 1820)

**Computer Science courses**

_____ CS 0011
_____ CMPINF 0401
_____ CS 0441
_____ CS 0445
_____ CS 1501
_____ CS 1656

**Computational Biology courses**

_____ BIOSC 1540
_____ BIOSC 1542 **or** BIOSC 1544
_____ BIOSC 1640 **or** CS 1640

**Elective course (3 credits)**

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**Writing Course**

_____ BIOSC 1630

**Electives (3 credits)**

_____ BIOSC 0351
_____ BIOSC 0370
_____ BIOSC 1005
_____ BIOSC 1130
_____ BIOSC 1285
_____ BIOSC 1320
_____ BIOSC 1500
_____ BIOSC 1520
_____ BIOSC 1545
_____ BIOSC 1760
_____ BIOSC 1820
_____ BIOSC 1850
_____ BIOSC 1940
_____ CHEM 0250
_____ CHEM 0320
_____ CHEM 1460
_____ CHEM 1830
_____ CS 1502
_____ CS 1520
_____ CS 1555
_____ CS 1566
_____ CS 1675
_____ MATH 0230
_____ MATH 0280
_____ NROSCI 1000
_____ PHYS 0174
_____ STAT 1221

**Co-requisite courses**

**Chemistry**

_____ CHEM 0110 **or** 0710
_____ CHEM 0120 **or** 0720
_____ CHEM 0310 **or** 0730

**Mathematics and Statistics courses**

_____ MATH 0220
_____ STAT 1000