



# Computational Biology Major

[www.biology.pitt.edu](http://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 plus the elective course 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 do 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](http://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](mailto: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](mailto: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 and cannot be in violation of [DSAS repeat rules](#). 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                    \_\_\_\_\_ CS 0445  
\_\_\_\_\_ CMPINF 0401            \_\_\_\_\_ CS 1501  
\_\_\_\_\_ CS 0441                    \_\_\_\_\_ CS 1656

### Computational Biology courses

\_\_\_\_\_ BIOSC 1540  
\_\_\_\_\_ BIOSC 1542 or BIOSC 1544  
\_\_\_\_\_ BIOSC 1640 or CS 1640

### Elective course (3 credits)

\_\_\_\_\_

### Writing Course

\_\_\_\_\_ BIOSC 1630

### Electives (3 credits)

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

### Co-requisite courses

#### Chemistry

\_\_\_\_\_ CHEM 0110 or 0710  
\_\_\_\_\_ CHEM 0120 or 0720  
\_\_\_\_\_ CHEM 0310 or 0730

#### Mathematics and Statistics courses

\_\_\_\_\_ MATH 0220  
\_\_\_\_\_ STAT 1000