Molecular biology emphasizes the study of molecules that make up an organism and the forces operating among these molecules. Increasingly, molecular biologists can explore the genetic control of these molecules and thus define the developmental, cellular, and sub-cellular changes that occur during the dynamic processes of life. Virtually every question, whether in biochemistry, cell biology, developmental biology, or some other biological discipline, applies molecular biology, often as the prime approach, in its solution. Biochemical and molecular developments have revolutionized biological research, fueling the explosive growth in the biotechnology industry and rapid increase of molecular medicine.

The molecular biology major, with its two tracks, provides a strong background for many science careers. Both the biochemistry and the cell and developmental biology track incorporate the requirements expected for admission to medical, dental, and other health professional schools, and to graduate schools in biochemistry, cell and molecular biology, and related disciplines. Positions for molecular biologists at the BS, MS, and PhD levels are available in the biotechnology industries as well as in universities, medical schools, hospitals, government laboratories, research institutes, and public health institutions.

**Required courses for the Molecular Biology major**

**Biological Science courses**
- BIOSC 0150 Foundations of Biology 1
- BIOSC 0050 Foundations of Biology Lab 1
- BIOSC 0160 Foundations of Biology 2
- BIOSC 0060 Foundations of Biology Lab 2
- BIOSC 0350 Genetics
- BIOSC 0370 Ecology or any BIOSC course > 1010
- BIOSC 1810 Macromolecular Structure and Function
- BIOSC 1820 Metabolic Pathways
- BIOSC 1940 Molecular Biology
- BIOSC 1581 or 1831 or 1951 (W) – Biochemistry
- BIOSC 1511 or 1531 or 1561 or 1831 or 1951 (W) - Cell/Dev.

**Chemistry courses**
- CHEM 0110 General Chemistry 1
- CHEM 0120 General Chemistry 2
- CHEM 0310 Organic Chemistry 1
- CHEM 0320 Organic Chemistry 2
- CHEM 0330 Organic Chemistry Lab 1
- CHEM 0340 Organic Chemistry Lab 2

**Mathematics courses**
- MATH 0220 Analytic Geometry and Calculus 1
- MATH 0230 Analytic Geometry and Calculus 2

**Optional**
- MATH 0240 Analytic Geometry and Calculus 3 *
  * MATH 0240 is not required, but is necessary to take CHEM 1410/1420 (Physical Chemistry 1 and 2).

**Physics courses**
- Choose one of the following pairs
  - PHYS 0110, PHYS 0111 Introduction to Physics 1, 2 or
  - PHYS 0174, PHYS 0175 Basic Physics for Science & Engineering 1, 2

**Note:** While not required for the major, PHYS 0212 Introduction to Laboratory Physics or PHYS 0219 Basic Laboratory Physics for Science & Engineering is useful for graduate study in certain sciences and is required for admission to many medical and dental schools.

**Specialization courses**
- Students must choose either the Biochemistry track or the Cell and Developmental Biology track, as follows:

**Biochemistry track**
- BIOSC 1470 Biophysical Chemistry *
- BIOSC 1580 Biochemistry Seminar
- BIOSC 1830 Biochemistry Lab
- BIOSC 1950 Molecular Genetics Lab
* Students may choose the alternate sequence CHEM 1410 and CHEM 1420 Physical Chemistry 1 and 2 in lieu of BIOSC 1470.

**OR**

**Cell and Developmental Biology track**
- BIOSC 1500 Cell Biology
- BIOSC 1520 Developmental Biology
- BIOSC 1560 Cell and Developmental Biology Seminar
  + Two of the following
  - BIOSC 1510 Cell Biology Lab
  - BIOSC 1530 Developmental Biology Lab
  - BIOSC 1830 Biochemistry Lab
  - BIOSC 1950 Molecular Genetics Lab

**Note:** Any University Honors College (UHC) equivalents to required courses or elective courses are acceptable.

**Course requirements**

**Higher Level course requirement**
- Students who declared after September 14, 2009
  - MUST take one higher level BIOSC elective course as part of their BIOSC electives. The higher level course is automatically satisfied in this major by BIOSC 1820 and 1940.
Lab requirement: Students must complete at least two BIOSC labs for the major and at least one of them must be taken at the Pittsburgh Campus.

Writing (W) requirement: Students must complete at least one W-course in the major.

Grade requirements
BIOSC courses: Each required BIOSC course for the major must be completed with a grade of C or better. The elective courses for the major must also be completed with a grade of C or better. A minimum GPA of 2.0 in all departmental courses taken is required for graduation. If a C- or lower is earned in an elective course for the major but is not repeated, the course will be used to calculate the departmental GPA but will not be counted toward the 32 credits required for the major.

Co-Requisite courses: Students must also earn a minimum GPA of 2.0 in the co-requisite Chemistry, Mathematics, and Physics courses. A passing grade of C- or lower in a co-requisite course can be accepted, except for CHEM 0110 and CHEM 0120, if balanced by a higher grade in another co-requisite course so that the co-requisite GPA is 2.0 or higher. Students must pass CHEM 0110 and CHEM 0120 with a grade of C (not C-) or better for the major.

Satisfactory/No Credit option: One BIOSC course can be taken on an S/NC basis.

Related area: The chemistry requirements satisfy the related area requirement for the molecular biology major and the chemistry minor as long as half of the chemistry credits are from the Univ. of Pittsburgh.

Advising: The biological sciences advisors are available to discuss the major and answer your questions. You are welcome and encouraged to stop by the biological sciences advising office, A258 Langley Hall, to peruse the handouts or meet with an advisor even before declaring a major. They love visitors! After declaring a major in molecular biology, students will be officially advised by and register for classes with the biological sciences advising office.

Advisors
Christine Berliner  Ellen Kelsey  Kevin Wu
LANGY A258  LANGY A258  LANGY A258
412-624-4819  412-624-0421  412-624-4273
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Declaring the major: Before students can declare the molecular biology major, they must complete BIOSC 0150, BIOSC 0160, CHEM 0110, and CHEM 0120 with a grade of C (not C-) or better. Transfer students who finish 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 major options
Bioinformatics  Ecology and Evolution
Biological Sciences  Microbiology

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Checklist for the Molecular Biology major

**Biological Science courses**
- BIOSC 0150 or 0715 (UHC) or BIOSC 0190
- BIOSC 0050 or 0057
- BIOSC 0160 or BIOSC 0716 (UHC) or BIOSC 0191
- BIOSC 0060 or 0067
- BIOSC 0350 or BIOSC 0355 (UHC)
- BIOSC 0370 or any BIOSC course > 1010
- BIOSC 1810
- BIOSC 1820
- BIOSC 1940

**Chemistry courses**
- CHEM 0110 or 0710 (UHC)
- CHEM 0120 or 0720 (UHC)
- CHEM 0310 or 0730 (UHC)
- CHEM 0330
- CHEM 0320 or 0740 (UHC)
- CHEM 0340 or 0750 (UHC)

**Mathematics courses**
- MATH 0220
- MATH 0230 or MATH 0235
- MATH 0240 *
* Required only if taking CHEM 1410 and CHEM 1420

**Physics courses**
- PHYS 0110 or 0174 or 0475
- PHYS 0111 or 0175 or 0476

**Specialization courses**

**Biochemistry track**
- BIOSC 1470*
- BIOSC 1580
- BIOSC 1830
- BIOSC 1950
- BIOSC Writ
* Students may choose the alternate sequence CHEM 1410 and CHEM 1420 Physical Chemistry 1 and 2 in lieu of BIOSC 1470.

**Cell and Developmental Biology track**
- BIOSC 1500
- BIOSC 1520
- BIOSC 1560
- BIOSC Writ

Two of the following
- BIOSC 1510
- BIOSC 1530
- BIOSC 1830
- BIOSC 1950