

Biology is one of the most important disciplines today, with research at the frontiers of biotechnology, medicine and engineering. A degree in Biology is an excellent entry point into many professions. The Biology undergraduate program offers a wide range of courses, an emphasis on lab research, and three degree options. In addition, the Biology Department offers a series of recommended tracks that allow a student to gain depth and breadth in a particular area.

The Department of Biology houses more than 70 research groups located in the Koch Biology Building, the David H. Koch Institute for Integrative Cancer Research, the Whitehead Institute for Biomedical Research, the Picower Institute for Learning and Memory, the McGovern Institute for Brain Research and the Broad Institute. The present Biology Department faculty includes four Nobel laureates and 28 members of the prestigious National Academy of Sciences.

These studies use theoretical and computational approaches as well as experimental model systems including human, mouse, frog, fish, fruit fly, worm, plant, yeast, bacteria and in vitro cell culture.

Biology Department undergraduates benefit from these broad research areas through an extensive course curriculum that leads to sophisticated understanding of fundamental principles

and current approaches to Biology. Emphasis is given to Molecular and Cell Biology. All Course 7 majors participate in laboratory research, with focus on experimental design, data evaluation and scientific presentation. Many research opportunities are provided.

This training provides excellent preparation for careers in the biomedical and many other professions, particularly research in academia or industry, medicine, management or finance in the pharmaceutical and biotech industries, intellectual property law, high school- or college-level teaching, forensics and bioethics.

Research programs in the Department include:

- Biochemistry
- Biophysics
- Bioengineering
- Cancer
- Genetics
- Developmental Biology
- Cell Biology
- The Human Genome
- Immunology
- Microbiology
- Neurobiology
- Plant Molecular Genetics
- Protein Engineering
- Computational and Systems Biology
- Protein Structure and Drug Design
- Stem Cells
- Cloning
- Virology

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MIT DEPARTMENT OF BIOLOGY

Undergraduate Program Requirements

2011-2012

Biology Undergraduate Course Offerings 2011–2012

Lecture Courses:

7.012	Fall	Introductory Biology
7.013	Spring	Introductory Biology
7.014	Spring	Introductory Biology
7.03	Fall	Genetics
7.05	Spring	General Biochemistry
7.06	Fall/Spring	Cell Biology
7.10J	Spring	Physical Chemistry of Biomolecular Systems

Laboratory Courses:

7.02J	Fall/Spring	Introduction to Experimental Biology and Communication
7.13	Fall	Experimental Microbial Genetics
7.16	Spring	Experimental Molecular Biology: Biotechnology II
7.18	Fall/Spring	Topics in Experimental Biology

Biology Restricted Electives:

7.08J	Spring	Biological Chemistry II
7.20J	Fall	Human Physiology
7.21	Fall	Microbial Physiology
7.22	Fall	Development and Evolution
7.23	Spring	General Immunology
7.25*	Spring	Biological Regulatory Mechanisms
7.26	Spring	Molecular Basis of Infectious Disease
7.27	Spring	Principles of Human Disease
7.28	Spring	Molecular Biology
7.29J	Spring	Cellular Neurobiology
7.30J	Fall	Ecology I: The Earth System
7.31*	Fall	Current Topics in Mammalian Biology: Medical Implications
7.32	Fall	Systems Biology
7.33J	Spring	Evolutionary Biology
7.35	Fall	Topics in Metabolic Biochemistry
7.36*	Spring	Foundations of Computational and Systems Biology
7.37J	Spring	Molecular and Engineering Aspects of Biotechnology

Additional Biology Courses:

7.19	Fall/Spring	Communication in Experimental Biology
7.34X	Fall/Spring	Advanced Undergraduate Seminars

*Not offered 2011–2012

The Biology Curriculum leading to a Bachelor of Science degree in Biology (7, 7A or Computer Science and Molecular Biology, 6-7) or to a minor in Biology includes the General Institute Requirements, as well as the specific subjects listed.

SB in Biology/Course 7

Required lecture subjects:

7.012 or 7.013 or 7.014	Introductory Biology
7.03	Genetics
7.05 or 5.07J	General Biochemistry
7.06	Cell Biology
5.111 or 5.112 or 3.091	Introductory Chemistry
5.12	Organic Chemistry
7.10J or 20.110J or 5.60	Thermodynamics
(2.005, 3.012, 8.044, or 10.213 will also substitute)	

Required restricted electives:

Three restricted electives from the following courses are required: 7.08J, 7.20J, 7.21, 7.22, 7.23, 7.25, 7.26, 7.27, 7.28, 7.29J, 7.30J, 7.31, 7.32, 7.33J, 7.35, 7.36, 7.37J.

Required laboratory subjects:

7.02J	Introduction to Experimental Biology and Communication (10.702J or 20.109 will substitute) <i>and one of the following Project Labs:</i>
7.13	Experimental Microbial Genetics
7.16	Experimental Molecular Biology: Biotechnology II
7.18	Topics in Experimental Biology

SB in Biology/Course 7A

The 7A program provides flexibility for students wishing to include extensive course work from other Departments. The 7A curriculum is identical to the Course 7 curriculum except that it does not require Project Laboratory and the corresponding credit can be taken from any Institute subjects.

Undergraduate Research in Biology

Participating in cutting-edge research is a vital component of the MIT Biology education. Undergraduates have a large variety of research opportunities available through the Project Laboratories and Undergraduate Research Opportunities Program (UROP). Students who demonstrate outstanding research effort may also be nominated by faculty to participate in the annual Undergraduate Research Symposium.

Cambridge-MIT Exchange Program

The junior year can be a wonderful time for a student to study abroad, and to experience a different culture and educational style. The Biology Department participates in the CME Junior year study abroad program at the University of Cambridge. Department guidelines are on the website at: <http://web.mit.edu/biology/www/undergrad/CMEexchange.html>.

SB in Computer Science and Molecular Bio/Course 6-7

The Course 6-7 program offered by the Departments of Biology and Electrical Engineering and Computer Science focuses on the emerging field of computational and molecular biology.

Required lecture subjects:

Same as Course 7 PLUS the following:

6.01, 6.042, 18.03, 18.06	Differential Equations
6.005, 6.006, 6.046	Software & Algorithms

Required restricted electives (one from each):

Biology: 7.20J, 7.23, 7.27, 7.28 or 7.33J

Computer Science: 6.047, 6.58J, 6.874, 6.877J, or 7.36

Required laboratory subject: 7.02J

Undergraduate Advanced Project: 6.UAT and 6.UAP

Minor in Biology

5.12	Organic Chemistry
7.03	Genetics
7.05	Biochemistry

and two additional subjects from the following: 7.02J/10.702J or 20.109; 7.06, 7.08J, 7.20J, 7.21, 7.22, 7.23, 7.25, 7.26, 7.27, 7.28, 7.29J, 7.31, 7.32, 7.33J, 7.35, 7.36, 7.37J

CI-M Requirement (Communication Intensive in the Major)

All Biology majors must complete two CI-M courses, generally by their Junior or Senior year.

CI-M subjects for the Course 7 degree are: 7.02J/10.702J or 20.109 and one of: 7.13, 7.16, or 7.18.

CI-M subjects for Course 7A are: 7.02J/10.702J or 20.109 and one of: 3.014, 5.36, 5.38, 7.19, 8.13, 9.02, 9.12, 9.18, 9.63, 10.26, 10.28, 10.29, 20.380 or 2.791J/6.021J/20.370J.

CI-M subjects for Course 6-7 are: 7.02J and 6.UAP

More information is available at <http://mit.edu/commreq>.

Advising in the Biology Department

Each Biology student meets with his/her faculty advisor at least twice per semester, once on Registration Day and again at mid-term. These meetings allow discussion of academic progress and provide excellent mentoring opportunities. Students are encouraged to set up additional meetings. Students are able to change advisors, and are invited to provide feedback to the Department.

Biology Undergraduate Student Association (BUSA)

The Biology Undergraduate Student Association (BUSA) is open to all Biology majors and students who are interested in Biology. BUSA organizes student events, the Departmental Tutoring Program and informal luncheons and dinner lectures between Biology faculty members and undergraduates. For more information visit the website at: <http://mit.edu/busa>.

Biology Graduation Checklist

Suggested Timeline for Course 7 Majors

- ☐ Sophomore year: 7.02J, 7.03, 7.05 and possibly 7.06. 7.03 and 7.012/7.013/7.014 can be taken concurrently. 5.12 is a pre-requisite for 7.05.
- ☐ Junior year: 7.06, 1 or more restricted electives, project lab, UROP.
- ☐ Senior year: Complete restricted electives, project lab, UROP.

7.10J/20.110J or 5.60 can be taken at any time. Courses can also be started beginning in the junior year. This is useful for students changing majors or completing double degrees/majors. Note that restricted electives must be in the list approved for undergraduates.

Biology Degree Requirements

Required Lecture Subjects:

- ☐ 7.012 or 7.013 or 7.014
- ☐ 7.03
- ☐ 7.05 or 5.07J
- ☐ 7.06
- ☐ 5.111 or 5.112 or 3.091
- ☐ 5.12
- ☐ 7.10J/20.110J or 5.60 (2.005, 3.012, 8.044 or 10.213)
- ☐ Three biology restricted electives from approved list under course offerings.

Required Laboratory Courses

- ☐ 7.02J (10.702J or 20.109 will substitute)
 - ☐ Project lab (7.13, 7.16, or 7.18)
- No project lab required for Course 7A

Communication Requirements

- ☐ Two CI-M subjects in the Major
 - ☐ For Course 7: 7.02J/10.702J or 20.109 and one of: 7.13, 7.16, or 7.18
 - ☐ For Course 7A: 7.02J/10.702J or 20.109 and one of: 3.014, 5.36, 5.38, 7.19, 8.13, 9.02, 9.12, 9.18, 9.63, 10.26, 10.28, 10.29, 20.380 or 2.791J/6.021J/20.370J.

General Institute Requirements

- ☐ Science requirements in Biology, Chemistry, Math, Physics
- ☐ Laboratory (LAB) Requirement
- ☐ Restricted Electives in Science and Technology (REST)
- ☐ Humanities, Arts, and Social Sciences Requirement, includes 2 Communication Requirement subjects (CI-H)
- ☐ Communication Requirement
 - ☐ 2 CI-H
 - ☐ 2 CI-M
- ☐ Physical Education Requirement
 - ☐ Pass swim test
 - ☐ 4 PE subjects or equivalent

Course 7 Q and A

Why should I consider a degree in Biology?

Biology is one of the most important disciplines today, with research at the frontiers of engineering, biotechnology and medicine.

What careers will a Biology degree prepare me for?

Biology is an excellent entry point for many professions, particularly academic or industrial research in Biology, Bioengineering and related fields, medicine, management, finance, intellectual property law, teaching, forensics and bioethics.

Can I do research in the Biology Department?

Yes! Original laboratory research is a key part of the Biology major.

Does the Biology Department do any applied research?

Yes, research in almost all laboratories is relevant to human health. Examples include drug design, genomics and disease diagnosis, cancer, neurological disorders, virology and microbiology.

How many different Biology degrees are offered?

There are two major degrees, 7, and 7A (which requires less research) and 6-7. A minor in Biology is also offered.

As a Biology major, will I have time to study other subjects?

Yes, the curriculum is designed to allow flexibility, and exploration of other subjects is encouraged.

Can I focus on a particular area of Biology?

Yes. There are many possibilities. The BioTracks program recommends groups of courses that allow a student to gain depth and breadth in Biochemistry, Biophysics, Bioengineering, Cell, Developmental and Molecular Biology, Computational Biology, Human Biology, Microbiology or Neurobiology.

Is it reasonable to do a double degree/major with Biology?

Sometimes. Bioengineering, Chemistry and Chemical Engineering share many requirements with Biology, which makes a double degree/major with these courses feasible. A 7A degree can be a good, less intense option.

As a premed, I'm told my choice of major doesn't matter. Is there a reason I should consider Biology?

The Biology Department is committed to educating premeds in aspects of Biology relevant to the molecular basis of disease. Your training will include formulating and testing hypotheses, a skill at the heart of diagnosis. We suggest a major, double degree/major or minor in Biology for all premeds.

How do Biology and Bioengineering differ?

The Biology curriculum builds a broad understanding of biological principles, focusing on current approaches and issues. In BE and related subjects, emphasis is placed on aspects of biological processes relevant to engineering.

How much will I interact with Biology Department faculty?

As extensively as you want to! You will have opportunities through classes, advising, UROP, class meetings and informal events.

How does advising work in the Biology Department?

You are assigned a faculty advisor. There are two required meetings per semester (Reg Day and mid-term), and other meetings may be set up as necessary.