

BIOTECHNOLOGY, MBIOT

The Master of Biotechnology Program prepares students, both full- and part-time, for leadership in the critically important and dynamic industries of biotechnology and pharmaceuticals. Strongly interdisciplinary, this innovative professional master's program draws its faculty and courses from the School of Arts and Sciences and the School of Engineering and Applied Science. Penn's world-class biomedical research centers, renowned science departments and position at the hub of the largest pharmaceutical/biotechnology corridor in the United States, place this program at the vanguard of biotechnology education. There are three parallel curriculum tracks: molecular biotechnology, pharmaceutical engineering biotechnology, and biomedical technologies. These tracks, in combination with core courses, insure that students get a uniquely broad exposure to the entire field of biotechnology and give students flexibility to tailor their degree to their background, interests, and current career or career goals.

For more information: <http://biotech.seas.upenn.edu/>

Master's Program Curriculum

A minimum of 11.0 course units are required to obtain the Masters of Biotechnology degree.¹

Core Curriculum

| Code | Title | Course Units |
|--|--|--------------|
| Core Curriculum | | |
| <i>Biochemistry</i> | | |
| Select one of the following: | | 1 |
| BE 5120 | Bioengineering III: Biomaterials | |
| BE 5580 | Principles of Biological Fabrication | |
| BIOL 4004 | Immunobiology | |
| BIOL 4007 | Cancer Cell Biology | |
| BIOL 4210 | Molecular Genetics | |
| BIOL 4536 | Introduction to Computational Biology & Biological Modeling | |
| BIOL 4048 | Principles of Drug Action | |
| BIOL 4010 | Advanced Cell Biology | |
| BIOL 4022 | Cell Signaling | |
| BIOL 4235 | The RNA World: A functional and computational analysis | |
| BIOL 4026 | Chromosomes and the Cell Cycle | |
| BIOL 5710 | Microbial Diversity and Pathogenesis | |
| BIOM 6000 | Cell Biology | |
| CAMB 6090 | Vaccines and Immune Therapeutics | |
| CIS 5350 | Introduction to Bioinformatics | |
| GCB 5850 | Wistar Institute Cancer Biology Course: Signaling Pathways in Cancer | |
| <i>Biotechnology I: Cellular/Molecular Biology</i> | | |
| Select one of the following: | | 1 |
| BE 5530 | Principles, Methods, and Applications of Tissue Engineering | |
| BE 5610 | Musculoskeletal Biology and Bioengineering | |

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|--|---|-----------|
| BE 5670 | Mathematical Computation Methods for Modeling Biological Systems | |
| BIOL 4142 | Neurobiology of Learning and Memory | |
| BIOL 4231 | Genome Science and Genomic Medicine | |
| BIOL 4048 | Principles of Drug Action | |
| BIOL 4077 | The Science and Art of Biotechnology | |
| BIOL 4234 | Epigenetics | |
| BIOL 5210 | Molecular Biology and Genetics | |
| CBE 5400 | Principles of Molecular and Cellular Bioengineering | |
| CBE 5550 | Nanoscale Systems Biology | |
| CBE 5570 | Stem Cells, Proteomics and Drug Delivery - Soft Matter Fundamentals | |
| BIOM 5020 | Molecular Basis of Disease | |
| BIOM 6000 | Cell Biology | |
| CAMB 6170 | Emerging Infectious Diseases | |
| CAMB 7520 | Genomics | |
| PHRM 6230 | Fundamentals of Pharmacology | |
| <i>Biotechnology II: Engineering Biotechnology</i> | | 1 |
| CBE 5540 | Engineering Biotechnology or CBE 5620 Drug Discovery and Development | |
| <i>Laboratory in Biotechnology and Genetic Engineering</i> | | |
| Select 1 of the following: | | 1 |
| CBE 5800 | Masters Biotechnology Lab or BIOL 4825 Biochemistry and Molecular Genetics Superlab | |
| <i>Biotechnology II: Engineering Biotechnology II</i> | | |
| Select 1 of the following: | | 1 |
| CBE 5620 | Drug Discovery and Development or CBE 5540 Engineering Biotechnology | |
| CBE 5640 | Drug Delivery Systems: Targeted Therapeutics and Translational Nanomedicine | |
| CBE 5170 | Principles of Genome Engineering | |
| <i>Free Elective</i> | | |
| Select 1 free elective ^{2,3} | | 1 |
| <i>Track Electives</i> | | 5 |
| Total Course Units | | 11 |

1

The core courses represent 6 credit units and the track electives represent 5 credit units. Students must take at least 7 credit units—between the core and electives—within SEAS courses.

2

5000+ level Engineering; most Wharton Business 5000+ level including 'STAT'; most School of Arts & Sciences 5000+ level; and most Perelman School of Medicine 5000+ including 'BIOE' course.

3

The course must have a technology, science, engineering focus and must be approved by the program prior to registration.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2022 and later. Students should

consult with their academic program regarding final certifications and requirements for graduation.
