BIOENGINEERING MAJOR

Program Director: Ian White, Ph.D.

The Bachelor of Science in Bioengineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Program Criteria for Bioengineering and Biomedical and Similarly Named Engineering Programs.

Bioengineering is a field rooted in physics, chemistry, mathematics, and the life sciences. These areas are applied in quantitative and integrative ways to approach problems in the biological systems, medical research, and clinical practice. The objective is to advance fundamental concepts, create knowledge from the molecular to organ to system levels, and develop innovative processes for the prevention, diagnosis, and treatment of disease. In short, bioengineering seeks to improve the health and life of humankind on many levels.

Bioengineers specialize in those products and processes made from, used with, or applied to biological organisms. In addition to engineering science and design, bioengineers study cell biology, physiology, bioinformatics, bioimaging, and biomechanics. The synthesis of engineering and biology gives bioengineers unique capabilities in our modern world.

For more information about the Bioengineering major, please visit http://bioe.umd.edu/undergraduate/.

Program Educational Objectives

The undergraduate program in the Fischell Department of Bioengineering provides students with a broad and fundamental education relating engineering with the biological sciences. The program has focuses in biomedical devices, human health, and biotechnology. These focuses all contain components of fundamental sciences, design, and communications skills. The students' educational achievements all contribute to enabling a wide range of career paths after graduation.

Our graduates are grounded in fundamentals that will serve them throughout their professional careers. They will have an understanding of human behavior, societal needs and forces, the dynamics of human efforts, and the impact of those efforts on human health and our environment. With these underpinnings and abilities, we have defined three Program Educational Objectives we expect our graduates to attain. In 3-5 years after graduation, our graduates will:

1. Be successful in Bioengineering careers or post-graduate educational pursuits by applying scientific depth, technical skills, and knowledge gained through practical experiences.
2. Address the biomedical and biotechnological challenges facing society in both the near and long term by demonstrating an awareness of their field and an ability for lifelong learning.
3. Serve their profession, promote equity and justice through technology, and positively impact society by drawing upon a foundation of professional ethics.

Student Learning Outcomes

Maryland bioengineers gain a broad-based education in which engineering approaches are used to understand and improve living systems and their environments. We educate students to excel in the field of bioengineering and carry out research, development, and commercialization of bioscience systems and tools that will improve the lives of people throughout the world. The specific student outcomes detailed by the Bioengineering Program are detailed below.

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
8. Applying principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations), and statistics.
9. Solving bio/biomedical engineering problems, including those associated with the interaction between living and non-living systems.
10. Analyzing, modeling, designing and realizing bio/biomedical engineering devices, systems, components, or processes.
11. Making measurements on and interpreting data from living systems.

REQUIREMENTS

Following is the list of the course requirements for the Bioengineering Undergraduate Program. Students following the course template should be able to graduate in four years. Students will meet with their Faculty Advisors every semester to plan the schedule of courses for the subsequent semester.

Freshman Year	Credits
ENES100	3
MATH140	4
CHEM135	3
CHEM136	1
BIOE120	3
BIOE121	1
MATH141	4
PHYS161	3
ENGL101	3
General Education I	3
BIOE241	3
	31

Sophomore Year	Credits
CHEM231	3
CHEM232	1

MATH241	4
PHYS260	3
PHYS261	1
BIOE221	1
BIOE232	3
Biological Science Elective I[1]	3
ENES200	3
ENES102	3
MATH243	4
BIOE246	3
	32

Junior Year	**Credits**
BIOE331	3
BIOE372	3
BSCI330	4
BIOE Foundational I[1]	3
BIOE Elective I[1]	3
BIOE340	4
BIOE457	4
BIOE Foundational II	3
General Education Requirement III	3
General Education Requirement IV	3
	33

Senior Year	**Credits**
BIOE485	3
BIOE Elective II	3
BIOE Elective III	3
General Education Requirement V	3
Professional Writing Requirement	3
BIOE486	3
BIOE Elective IV	3
Breadth Elective	3
Biological Science Elective II	3
General Education Requirement VI	3
	30

Total Credits 126

[1] See http://bioe.umd.edu/undergraduate/electives/ for details on courses approved for BIOE Foundational courses and for BIOE, Biological Science, and Breadth electives.

Students pursuing the major should review the academic benchmarks established for this program. See http://4yearplans.umd.edu. Students will be periodically reviewed to ensure they are meeting benchmarks and progressing to the degree. Students who fall behind program benchmarks are subject to special advising requirements and other interventions.

GRADUATION PLANS

Click here (https://eng.umd.edu/advising/four-year-plans/) for roadmaps for graduation plans in the A. James Clark School of Engineering.

Additional information on developing a graduation plan can be found on the following pages:

- http://4yearplans.umd.edu
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising/#success) section of this catalog