BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING

The true integration of the life sciences and engineering is essential in educating a substantial percentage of the next generation of biomedical engineers in order to benefit from the biological revolution and its applications to medicine. This degree program attracts outstanding students who wish to have that integration in their undergraduate education, so that they may be equipped with the tools to be leaders in this field in the 21st Century.

The curriculum includes a solid foundation in fundamental engineering, mathematics, and sciences - biology, chemistry, and physics - as well as grounding in humanities, social sciences, and communication skills. A unique aspect of the curriculum is the incorporation of problem-based learning (PBL) methodologies to foster development of both self-directed learning skills and problem-solving skills in a team-based environment.

Program Educational Objectives

The program strives to produce graduates who are expected to demonstrate the following during the first few years after graduation:

1. mathematics, science, and engineering fundamentals expertise at the interface of engineering and the life sciences which enables them to take leadership roles in the field of biomedical engineering;
2. an ability to use their multidisciplinary background to foster communication across professional and disciplinary boundaries with the highest professional and ethical standards; and
3. the ability to recognize the limits of their knowledge and initiate self-directed learning opportunities to be able to continue to identify and create professional opportunities for themselves in the field of biomedical engineering.

Code | Title | Credit Hours
--- | --- | ---
Wellness |  |  |
APPH 1040 | Scientific Foundations of Health | 2
or APPH 10 | The Science of Physical Activity and Health |
Core A - Essential Skills |  |  |
ENGL 1101 | English Composition I | 3
ENGL 1102 | English Composition II | 3
MATH 1552 | Integral Calculus | 4
Core B - Institutional Options |  |  |
CS 1371 | Computing for Engineers | 3
Core C - Humanities |  |  |
Any HUM (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-c) |  | 6
Core D - Science, Math, & Technology |  |  |
PHYS 2211 | Introductory Physics | 2,3
PHYS 2212 | Introductory Physics II | 4
MATH 1551 | Differential Calculus | 2
MATH 1553 | Introduction to Linear Algebra | 2
| or MATH 155 Linear Algebra |
or MATH 155 Linear Algebra with Abstract Vector Spaces |
Core E - Social Sciences |  |  |
Select one of the following: |  | 3

HIST 2111 | The United States to 1877 |
HIST 2112 | The United States since 1877 |
INTA 1200 | American Government in Comparative Perspective |
POL 1101 | Government of the United States |
PUBP 3000 | American Constitutional Issues |
Any SS (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-e) |  | 9

Core F - Courses Related to Major

BMED 1000 | Introduction to Biomedical Engineering | 1
BMED 2110 | Conservation Prin in Biomedical Engineering |
COE 2001 | Statics | 2
MATH 2551 | Multivariable Calculus | 4
MATH 2552 | Differential Equations | 4
CHEM 1211K | Chemical Principles | 2

Major Requirements

BMED 2250 | Problems in Biomedical Engineering | 2 | 3
BMED 2310 | Intro to Biomedical Engineering Design | 3
BMED 3100 | Systems Physiology | 3
BMED 3110 | Quantitative Engineering Physiology Laboratory I | 2
BMED 3310 | Biotransport | 3
BMED 3400 | Introduction to Biomechanics | 4
BMED 3520 | Biomedical Systems and Modeling | 3
BMED 3600 | Physiology of Cellular and Molecular Systems | 3
BMED 3610 | Quantitative Engineering Physiology Laboratory II | 2
BMED 4602 | Capstone Design | 3

Other Engineering and Science Requirements

CHEM 1315 | Survey of Organic Chemistry | 3
CEE 3770 | Statistics and Applications |
or ISYE 377 Statistics and Applications |
or BMED 24 Introduction to Bioengineering Statistics |
MSE 2001 | Principles and Applications of Engineering Materials | 3
ECE 3710 | Circuits and Electronics | 2
ECE 3741 | Instrumentation and Electronics Lab | 1
BMED Depth Electives

BMED Depth Electives | 5 | 12
BMED Breadth Electives |
BMED Breadth Electives | 6 | 15

Total Credit Hours | 131

Pass-fail only allowed for Free Electives, Humanities, and Social Sciences.

Students must average a 2.0 for all BMED coursework required by name and number (includes BMED 1000 and BMED 2110)

1. Student must earn a 2.0 average in MATH 1551, MATH 1552, MATH 1553, MATH 2551, and MATH 2552.
2. Minimum grade of C required.
3. If PHYS 2231 is taken, extra hour goes to Free Electives.
4. If PHYS 2232 is taken, extra hour goes to Free Electives.
The overarching model for the International Plan has four components:

1. International coursework: Three courses to include one from each of the following categories:
   a. International relations
   b. Global economics
   c. A course about a specific country or region

2. International experience: Two terms abroad (not less than 26 weeks) engaged in any combination of study abroad, research, or internship
3. Second language proficiency: All students in the program are expected to reach at least the proficiency level equivalent to two years of college-level language study. Students who use the language to study, conduct research, or participate in an internship during their international experience are expected to attain a higher level of proficiency. Language proficiency is determined by testing (not course credits).
4. Culminating course: A capstone course in the major designed to tie the international studies and experiences together with the student’s major. The senior design project (i.e. BMED) will be used to satisfy this requirement. The design project must incorporate a significant element of the international experience (e.g. foreign client, location of work, project customers, motivation, regulatory issues, etc).

Completion of the International Plan is recognized by a designation on the student’s diploma indicating completion of the degree with global competence.

For additional information about the International Plan visit www.oie.gatech.edu/internationalplan (http://www.internationalplan.gatech.edu).

Research Option

The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in biomedical engineering. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. Students who complete this option receive a designation on their transcript.

Students may be able to satisfy the additional requirements imposed for the Research Option designation through appropriate choices of electives without additional credit hours to complete the degree. The Research Option designation may be pursued separately, or in combination with the Cooperative Plan and/or the International Plan.

Research Option Requirements

1. Complete at least nine credit hours of undergraduate research (i.e. BMED 2698, BMED 2699, BMED 4698, or BMED 4699) spanning typically at least three terms. The research may be for either pay or credit, and at least six credit hours must be on the same research project, broadly defined.
2. Take the course LMC 4701, typically in the second semester of research. The research proposal outlining the research topic and project for the thesis will be written for this course. The proposal must be approved by a faculty advisor and one other faculty member.
3. Take the course LMC 4702 during the thesis-writing semester. The thesis documenting the results of the research will be written as part of this course. It must be approved by two faculty members and will be archived in the Georgia Tech Library.

Global economics

International Plan

The International Plan is a challenging and coherent academic program for undergraduates that develops global competence within the context of a student’s major. It is a degree-long program that integrates international studies and experiences into any participating major at Georgia Tech. It helps to prepare Georgia Tech graduates professionally and personally for successful lives in the twenty-first century.

The International Plan is not intended to replace current international programs; it supplements them. Existing study abroad opportunities continue to be offered. It is also not intended to be an add-on to the current degree programs. It is intended to be another curriculum path to earn a degree in which international competence is integrated into the program of study. The Plan can be completed within the normal timeframe of four years of undergraduate study.

The overarching model for the International Plan has four components: