BACHELOR OF SCIENCE IN CHEMICAL AND BIOMOLECULAR ENGINEERING

The Bachelor of Science in Chemical and Biomolecular Engineering provides the basics of biomolecular engineering but allows flexibility for the student to pursue other areas of chemical engineering such as microelectronics, materials, and the environment.

The curriculum has two options. The Biotechnology Option is for students who wish to focus their education on the biomolecular aspects of chemical and biomolecular engineering. This option includes the core chemical engineering courses, specialized biomolecular engineering courses, biochemistry, and technical electives focused in the biotechnology area. The Standard Option provides the basics of biomolecular engineering but allows much more flexibility for the student to pursue other areas of chemical engineering such as microelectronics, materials, and the environment. Special opportunities exist for students wishing to pursue minors or certificates in fields of particular interest, and students are encouraged to explore the frontiers of knowledge through involvement in faculty-directed research.

Program Objectives

The mission of the School of Chemical and Biomolecular Engineering is to provide students with the intellectual basis to be educated citizens, to prepare them for successful professional careers, and to advance the science and technology that form the basis of chemical and biomolecular engineering. In pursuit of this mission, the School has adopted the following:

Program Educational Objectives

1. Graduates will demonstrate proficiency in the principles and methods essential to modern chemical and biomolecular engineering.
2. Graduates will demonstrate broadened perspectives regarding social issues and responsibilities, ethics, and professionalism.
3. Graduates will be recognized for excellence and leadership and selected for high-quality industrial, academic, government, and other professional positions.
4. Graduates will demonstrate an understanding of the global nature of engineering practice and business activities.
5. Graduates will understand the importance of further professional growth through continuing education and research.

Program Outcomes

In pursuit of its educational objectives, the School has adopted the following program outcomes:

1. Students will demonstrate the ability to apply knowledge of mathematics, science, and engineering.
2. Students will demonstrate the ability to design and conduct experiments, as well as to analyze and interpret data.
3. Students will demonstrate the ability to design a system, component, product, and/or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Students will demonstrate an ability to lead and function on multidisciplinary teams.
5. Students will demonstrate an ability to identify, formulate, and solve engineering problems.
6. Students will demonstrate an understanding of professional and ethical responsibility.
7. Students will demonstrate the ability to communicate effectively.
8. Students will demonstrate a breadth in education that facilitates understanding the impact of engineering solutions in a global, economic, environmental, and societal context.
9. Students will demonstrate recognition of the need for and an ability to engage in lifelong learning.
10. Students will demonstrate knowledge of contemporary issues, especially as related to chemical engineering practice.
11. Students will demonstrate the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
12. Students will have an understanding of the chemical engineering profession as obtained through professional organizations, cooperative education, internships, undergraduate research, and/or required laboratory courses.
13. Students will have a thorough grounding in the basic sciences including chemistry, physics, and biology appropriate to the program objectives.
14. Students will demonstrate knowledge in the applications of these basic sciences to enable graduates to design, analyze, and control physical, chemical, and biological processes consistent with the program's educational objectives.

Code	Title	Credit Hours
Wellness		
APPH 1040	Sci Foundation of Health	2
or APPH 10	Sci of Phys Act & Health	
Core A - Essential Skills		
ENGL 1101	English Composition I	3
ENGL 1102	English Composition II	3
MATH 1552	Integral Calculus [3]	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	Intro Physics I [1]	4
PHYS 2212	Intro Physics II [2]	4
MATH 1551	Differential Calculus [3]	2
MATH 1553	Intro to Linear Algebra [3]	2
or MATH 1554	Linear Algebra	
or MATH 1564	Lin Alg w Abstract Vec Sp	
Core E - Social Sciences		
Select one of the following:		3
HIST 2111	United States to 1877	
HIST 2112	United States since 1877	
INTA 1200	American Government	
POL 1101	Government of the U.S.	

PUBP 3000	US Constitutional Issues	
ECON 2100	Economics and Policy	3
Any SS (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-e)		6
Core F - Courses Related to Major		
BIOL 1510	Biological Principles	4
CHEM 1211K	Chemical Principles I	4
CHEM 2380	Synthesis Lab I	2
MATH 2551	Multivariable Calculus [3]	4
MATH 2552	Differential Equations [3]	4
Major Requirements		
CHBE 2100	Chem Process Principles [3]	3
CHBE 2120	ChE Numerical Mthods [3]	3
CHBE 2130	Chem Eng Thermo I [3]	2
CHBE 3130	Chem Eng Thermo II [3]	3
CHBE 3200	Transport Processes I [3]	3
CHBE 3210	Transport Processes II [3]	3
CHBE 3225	Separations Processes [3]	3
CHBE 4200	Unit Operations Lab [3]	3
CHBE 4300	Kinetics&Reactor Dsgn [3]	3
CHBE 4411	Process Control [3]	3
CHBE 4412	Process Control Lab [3]	1
CHBE 4510	Proc& Prod Design& Econ [3]	2
CHBE 4515	Chemical Process Safety [3]	1
CHBE 4520	Capstone CHBE Design [3]	2
CHBE Electives		
CHBE Electives [3,4]		6
CHBE Technical Electives		
2000-level Technical Elective or higher [5]		3
3000-level Technical Elective or higher [5]		3
Other Engineering and Science Requirements		
CHEM 1212K	Chemical Principles II	4
CHEM 2311	Organic Chemistry I	3
CHEM 2312	Organic Chemistry II	3
Select two of the following:		6
CHEM 3111	Inorganic Chemistry	
CHEM 3281	Instrumental Analysis	
CHEM 3412	Physical Chemistry II	
CHEM 3511	Survey of Biochemistry	
CHEM 4311	Adv Organic Chem	
CHEM 4341	Applied Spectroscopy	
CHEM 4511	Biochemistry I	
MSE 2001	Prin&Appl-Engr Materials	3
Free Electives		
Free Electives [6]		3
Total Credit Hours		132

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

1 If PHYS 2231 is taken, extra hour goes to Free Electives.

2 If PHYS 2232 is taken, extra hour goes to Free Electives.

3 Minimum grade of C required

4 CHBE Electives must be chosen from the following list: CHBE 4020, CHBE 4310, CHBE 4535, CHBE 4752, CHBE 4757, CHBE 4760, CHBE 4763, CHBE 4764, CHBE 4765, CHBE 4770, CHBE 4775, CHBE 4776, CHBE 4791, CHBE 4793, CHBE 4794, CHBE 4803 (must be titled "Microfluidics and NanoFluidics," "Surfaces and Calloids," or "Data-Driven Modeling and Analysis for Chemical and Biomolecular Systems."), or any 6000-level CHBE course or higher.

5 Students should consult with their advisor regarding Technical Elective options. Technical Electives must be chosen from the following list:AE 4451, AE 4461, AE 4883, BMED 2400, BMED 3400, BMED 3510, BMED 4477, BMED 4751, BMED 4784, CEE 2040, CEE 2300,CEE 4300, CEE 4330, CEE 4620, CHBE 4020, CHBE 4310, CHBE 4535, CHBE 4752, CHBE 4757, CHBE 4763, CHBE 4764, CHBE 4765, CHBE 4770, CHBE 4775,CHBE 4776, CHBE 4791, CHBE 4793 CHBE 4794, CHBE 4803 (must include title of "Data-Driven Modeling & Anal. for Ch," "Microfluidics/BioMEMS," "Surface & Colloid Chemistry & Engineering"), CHBE 6120, CHBE 6794, COE 2001, COE 3001, COE 3002, ECE 2025, ECE 2030, ECE 2040, ECE 3025, ECE 3040, ECE 3065, ECE 3071, ECE 3080, ECE 3710, ECE 3741, ISYE 2027, ISYE 2028, ISYE 3025, ISYE 3039, ISYE 3133, ISYE 3232, ISYE 4803 (must include title of "EDA Supply Chain Econom.," or "Regression/Forecasting"), ME 2202, ME 3057, ME 4011, MSE 2021, MSE 3002, MSE 4751, MSE 4803 (must include title of "Biologically Inspired Design," or "Fund. of Nanomater. & Struct."), NRE 3301, NRE 4328, NRE 4610, NRE 4803 (must include title of "Nuclear & Radiation Technol.," "Probabilistic Risk Assessment"), or NRE 6501.

6 PHYS 2XXX (AP credit) not allowed.

Cooperative Option

Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. The program is the fourth oldest of its kind in the world and the largest optional co-op program in the country. Traditionally, 35 to 40 percent of chemical and biomolecular engineering students participate in the program each year at Georgia Tech.

Students alternate between industrial assignments and classroom studies until they complete four or five semesters of work. Co-op students with chemical and biomolecular engineering majors complete the same coursework on campus that is completed by regular four-year students. Most co-op students begin the program as sophomores and are classified as full-time students regardless of whether they are attending classes on campus or are working full time at an employer's location.

Students who participate in the program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor's degree with a Cooperative Plan designation.

International Plan

The International Plan is a challenging and coherent academic program for undergraduates emphasizing global competence within the context of the aerospace engineering major. This program has specific language requirements. There are also coursework requirements related to history, global economy, international culture, and residential foreign experience. Refer to www.internationalplan.gatech.edu (http://www.internationalplan.gatech.edu) for the general requirements of the International Plan. These requirements may be satisfied by carefully

selecting the humanities, social sciences, and free elective hours available in the program, in consultation with a faculty advisor.

Research Option

The Chemical and Biomolecular Engineering undergraduate program offers an undergraduate Research Option that allows students to participate in undergraduate research and complete an undergraduate thesis. The words "Research Option" will appear on the transcript of each student completing the requirements to indicate that the student has had substantial, in-depth research experience.

BS/MS Chemical and Biomolecular Engineering

The program seeks to engage undergraduate students at Georgia Tech who indicate an interest in, and ability for, additional education beyond the BS degree. Students with significant AP credit will be especially well positioned to take full advantage of this opportunity.

Students in the BS/MS Program will remain undergraduates until they meet the requirements for the BS degree; after which, their status will change to graduate student.

Students are eligible to apply for the program after completion of thirty semester credit hours at Georgia Tech (i.e., at the end of freshman year). As a practical matter, it is recommended that students apply to the program immediately after completion of CHBE 3110. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the program.

Admission into the program will be based on academic performance at Georgia Tech, as well as the potential for advanced study and/or research as assessed from the essay and recommendation letter.

Continuation in the program will require the student to maintain a GPA of 3.0 or higher. This GPA requirement should not deter students from taking challenging courses. The program will not penalize students who opt out after receiving the BS degree. Additionally, students participating in the program will be eligible for the six credit hour Graduate Course Option (http://www.catalog.gatech.edu/academics/graduate/masters-degrees/graduate-course-option).

Additional Information (http://www.chbe.gatech.edu/programs/bs-ms)