COMPUTER SCIENCE + BIOENGINEERING, BS

for the degree of Bachelor of Science in Computer Science + Bioengineering

Students in the Computer Science + Bioengineering (CS+BioE) Bachelor of Science degree program will develop an integrative understanding of computational and bioengineering principles in order to analyze biomedical data, construct models of biological systems, and design and implement advanced diagnostic and therapeutic techniques to improve human health. As a joint offering through the Departments of Bioengineering and Computer Science, CS+BioE students will receive a rigorous engineering education that prepares graduates to:

- recognition as skilled engineers in biotechnology, life sciences, medical technology, and health care industries;
- advanced degrees through graduate studies in computer science and bioengineering-related fields, or professional degrees in the health sciences, law, and business; and
- recognition for fostering an inclusive and collaborative environment while demonstrating leadership and effective teamwork within diverse professional and community organizations.

In the first and second years, the curriculum provides students with thorough foundations in scientific computing practices as well as introductory bioengineering concepts. In the third and fourth years, technical and free electives facilitate the study of diverse modern applications of computing in medicine and the life sciences so that students are prepared to address emerging problems throughout their careers.

for the degree of Bachelor of Science in Computer Science + Bioengineering

Graduation Requirements

Minimum hours required for graduation: 128 hours.
Minimum Overall GPA: 2.0
Minimum Technical GPA: 2.0
TGPA is required for CS, BIOE, and Math courses. See Technical GPA (https://go.grainger.illinois.edu/TechnicalGPA/) to clarify requirements.

University Requirements

Minimum of 40 hours of upper-division coursework, generally at the 300- or 400-level. These hours can be drawn from all elements of the degree. Students should consult their academic advisor for additional guidance in fulfilling this requirement.

The university and residency requirements can be found in the Student Code (https://studentcode.illinois.edu/article3/part8/3-801/) (§ 3-801) and in the Academic Catalog (http://catalog.illinois.edu/general-information/degree-general-education-requirements/).

General Education Requirements

Follows the campus General Education (Gen Ed) requirements (https://courses.illinois.edu/gened/DEFAULT/DEFAULT/). Some Gen Ed requirements may be met by courses required and/or electives in the program.

Code	Title	Hours
Composition I		4-6
Advanced Composition		3
Humanities & the Arts (6 hours)		6
Natural Sciences & Technology (6 hours)		6
fulfilled by CHEM 102 or MCB 150; and PHYS 211, PHYS 212		
Social & Behavioral Sciences (6 hours)		6
Cultural Studies: Non-Western Cultures (1 course)		3
Cultural Studies: US Minority Cultures (1 course)		3
Cultural Studies: Western/Comparative Cultures (1 course)		3
Quantitative Reasoning (2 courses, at least one course must be Quantitative Reasoning I)		6-10
fulfilled by MATH 220 or MATH 221; and MATH 231, MATH 241, MATH 285, PHYS 211, PHYS 212; and CS 124; and CS 128 and CS 225		
Language Requirement (Completion of the third semester or equivalent of a language other than English is required)		0-15

Major Requirements:
Orientation and Professional Development

Code	Title	Hours
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)	1
BIOE 100	Bioengineering Seminar	1
BIOE 120	Introduction to Bioengineering	1
Highly recommended, optional 1 credit hour course, CS 100 Freshman Orientation. Credit hour counts toward free electives.		
Total Hours		**3**

Foundational Mathematics and Science

Code	Title	Hours
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
or BIOE 210	Linear Algebra for Biomedical Data Science	
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
Choose one of the following:		4
CHEM 102 & CHEM 103	General Chemistry I and General Chemistry Lab I	
OR		
MCB 150	Molecular & Cellular Basis of Life	
BIOE 310	Computational Tools for Biological Data	3
Total Hours		**32**

Computer Science Core

Code	Title	Hours
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 222	Software Design Lab	1
CS 225	Data Structures	4
Choose one of the following options:		8-9
CS 233 & CS 341	Computer Architecture and System Programming	
OR		
CS 340 & Two CS 400-level courses	Introduction to Computer Systems Any two (2) 400-level CS courses above CS 403, excluding CS 491 and distinct from any 400-level courses taken to satisfy other requirements. If either or both of the courses are chosen for 4 credits, the extra credit hours will count towards free electives.	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 357 or CS 421	Numerical Methods I Programming Languages & Compilers	3
CS Technical Elective	Any 400-level CS course above CS 403, excluding CS 491 and distinct from any 400-level courses taken to satisfy other requirements.	3
Total Hours		**32-33**

Bioengineering Core

Code	Title	Hours
BIOE 205	Signals & Systems in Bioengrg	3
BIOE 206 or BIOE 302	Cellular Bioengineering Modeling Human Physiology	3
BIOE 404	CS+BIOE Senior Design	4
Total Hours		**10**

Bioengineering Technical Electives

Code	Title	Hours
Select 15 hours of technical elective credit from the below list:		**15**
BIOE 303	Quantitative Physiology Lab	2
BIOE 360	Transport & Flow in Bioengrg	3
BIOE 414	Biomedical Instrumentation	3
BIOE 415	Biomedical Instrumentation Lab	2
BIOE 430	Intro Synthetic Biology	3 or 4
BIOE 461	Cellular Biomechanics	4
BIOE 467	Biophotonics	3
BIOE 476	Tissue Engineering	3
BIOE 479	Cancer Nanotechnology	3
BIOE 483	Biomedical Computed Imaging Systems	3 or 4
BIOE 484	Statistical Analysis of Biomedical Images	3 or 4
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4
BIOE 486	Applied Deep Learning for Biomedical Imaging	3 or 4
BIOE 487	Stem Cell Bioengineering	3 or 4
BIOE 488	Applied High-Performance Computing for Imaging Science	3
BIOE 489	Regulations, Ethics and Logistics in Biomedical Applications of Machine Learning	3 or 4
BIOE 498	Special Topics (courses as approved by the department)	1 to 4

Upper Division Technical Electives

Code	Title	Hours
Students should select 6 hours of 300-400 level general technical elective coursework from the following rubrics: AE, ABE, BIOE, CHBE, CHEM, CS, CEE, ECE, IE, MCB, MATH, ME, NE, NEUR, NPRE, PHYS, SE, STAT, and TAM.		6
Total Hours		**6**

Free Electives

Code	Title	Hours
Additional coursework, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree. (https://go.grainger.illinois.edu/FreeElectives/)		13-14
Total Minimum Hours of Curriculum to Graduate		**128**

for the degree of Bachelor of Science in Computer Science + Bioengineering

Sample Sequence

This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence.

Students must fulfill their Language Other Than English requirement by successfully completing a third level of a language other than English. For more information see the corresponding section on the Degree and General Education Requirements page *(http://catalog.illinois.edu/general-information/degree-general-education-requirements/).*

Free Electives: Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree.

First Year

First Semester	Hours	Second Semester	Hours
ENG 100	1	MATH 231	3
BIOE 100	1	BIOE 120	1
MATH 221 (MATH 220 may be substituted)	4	PHYS 211	4
CS 124	3	CS 128	3

Information listed in this catalog is current as of 03/2026

First Semester	Hours	Second Semester	Hours
Composition I or General Education (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	4	CS 173	3
CHEM 102 (& CHEM 103) or (MCB 150)	3	General Education (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation) or Composition I	3
	16		**17**

Total Hours 33

Second Year

First Semester	Hours	Second Semester	Hours
MATH 241	4	MATH 285	3
PHYS 212	4	MATH 257 or BIOE 210	3
CS 222	1	CS 233 or 340	4
CS 225	4	BIOE 205	3
General Education (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3	General Education (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3
	16		**16**

Total Hours 32

Third Year

First Semester	Hours	Second Semester	Hours
CS 341 (or CS Technical Elective course)	4	CS 374	4
BIOE 206	3	BIOE 310	3
BIOE Technical Elective course	3	BIOE Technical Elective course	3
Free Elective course	2	CS Technical Elective course	3
Language Other than English (3rd level)	4	Upper Division Technical Elective course	3
	16		**16**

Total Hours 32

Fourth Year

First Semester	Hours	Second Semester	Hours
CS 357 or 421	3	BIOE 404 (or General Education - choose a Humanities or Social/Behavioral Science course that is also Advanced Composition))	4
BIOE Technical Elective course	3	BIOE Technical Elective course	3
BIOE Technical Elective course	3	Upper Division Technical Elective course	3
Free Elective course	3	Free Elective course or CS Technical Elective course	3
General Education (choose a Humanities or Social/Behavioral Science course that is also Advanced Composition) or BIOE 404	3	Free Elective course	3
	15		**16**

Total Hours 31

Total Hours: 128

for the degree of Bachelor of Science in Computer Science + Bioengineering

The Computer Science + Bioengineering Program prepares graduates to achieve the following seven outcomes by the time of graduation:

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 computational bioengineering 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, analysis and interpretation of data, and to use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

for the degree of Bachelor of Science in Computer Science + Bioengineering

---

B.S. in CS + BIOE (https://bioengineering.illinois.edu/academics/undergraduate/CS+BIOE/)
Bioengineering Faculty (https://bioengineering.illinois.edu/people/faculty/)

The Grainger College of Engineering Admissions (https://grainger.illinois.edu/admissions/)
The Grainger College of Engineering (https://grainger.illinois.edu/)