What is Engineering?

Science
Analysis of things that exist.

Technology
Synthesis of things that don’t exist.

Engineers focus on modeling and designing systems!
What is Bioengineering (Biomedical Engineering)?

*Bioengineering: Biology meets Engineering*
Bioengineering Field

- Bionanotechnology
- Biomaterials
- Bioinformatics
- Medical Imaging & Bio-Optics
- Rehabilitation Engineering
- Cell & Tissue Engineering
- Bioinstrumentation
- Neural Engineering
- Biosensors & Electronics
- Genetic Engineering
- Biomechanics
- Biotransport & Drug Delivery
Why become a Bioengineer?

• High interest in Life and Physical Sciences
  • Biology, chemistry, physics

• High interest in Technology
  • Programming, CAD modeling, instrumentation
Degrees

Bachelor’s Degree
B.S. Bioengineering
~4 years
General education in Bioengineering
Improve society through engineering analysis and design

Master’s Degree
M.S. Bioengineering
~2 years
Advanced education in Bioengineering and optional research project
Advance boundaries of engineering practice, design and research

Doctorate’s Degree
PhD Bioengineering
~4 years
Advanced education in Bioengineering and major research project
Identify engineering problems important to society, create and disseminate new knowledge
Bioengineering at UIC

• One of oldest programs in US
  • Founded in 1965
  • One of first 10 to receive NIH training grant
  • Third to be ABET accredited

• Distinctions today
  • Strong diversity: 45% women, no major race/ethnicity
  • >330 UG, >75 MS, >100 PhD
  • 30 core faculty, >100 adjunct faculty
  • Strong collaboration with UIC Medicine: BioE in both colleges
Bioengineering at UIC – In the past 10 years...

• In both the COE and the COM
  • Facilitates teaching and research collaborations

• Richard and Loan Hill Endowment

• New educational programs
  • BS in Bioinformatics
  • Innovation in Medicine

• Student trends are positive
  • Enrollment: from 190 to 330 undergraduates
  • ACT of incoming freshman: from 26.8 to 29.2 (highest at UIC)
  • We continue to maintain a large PhD program

• Faculty trends are positive
  • Core Faculty size: from 14 to 30
Bioengineering at UIC – SPACE
Bioengineering at UIC – Signature Programs

• Freshman Guaranteed Paid Internship Program
  • Prepare students for real-world experiences after school
  • Paid summer internship for rising sophomores
    • Satisfy certain academic criteria
    • Industry partner
    • In-house research lab
GENERAL BIOE COURSE TRACK – Students Entering Fall 16 to Present

Note: This is a suggested course plan; individual schedules will vary based on concentration area, acceptable course load, and schedule of course offerings.

Note: Prerequisites are strictly enforced. Not all prerequisite requirements are shown—check the current catalog.

Note: BioE courses in RED boxes are offered twice a year, Fall and Spring.

Diagram showing course tracks for Fall and Spring semesters from BIOE 101 to BIOE 476.
# Pre-Med Requirements

**UIC Pre-Medicine requirements/recommendations**

### Fulfilled by Bioengineering

In addition to BioE Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS 100</td>
<td>Biology of Cells and Organisms</td>
<td>5</td>
</tr>
<tr>
<td>BIOS 101</td>
<td>Biology of Populations and Communities</td>
<td>5</td>
</tr>
</tbody>
</table>

### General Chemistry Sequences

- **One of the following general chemistry sequences:**
  - CHEM 112—General College Chemistry I (5)\(^b\)
  - CHEM 114—General College Chemistry II (5)\(^b\)
  - CHEM 116—Honors General Chemistry I (5)\(^b\)
  - CHEM 118—Honors General Chemistry II (5)\(^b\)

- **CHEM 232—Organic Chemistry I** 4
- **CHEM 233—Organic Chemistry Laboratory I** 1
- **CHEM 234—Organic Chemistry II** 4

### Organic Chemistry Sequences

- **CHEM 232—Organic Chemistry I** 4
- **CHEM 233—Organic Chemistry Laboratory I** 1
- **CHEM 234—Organic Chemistry II** 4

### Physical Chemistry Sequences

- **CHEM 116—Honors General Chemistry I (5)\(^b\)**
- **CHEM 118—Honors General Chemistry II (5)\(^b\)**

### Physics Sequences

- **One of the following physics sequences:**
  - PHYS 105—Introductory Physics I—Lecture (4)\(^b\)
  - PHYS 106—Introductory Physics I—Laboratory (4)\(^b\)
  - PHYS 107—Introductory Physics II—Lecture (4)\(^b\)
  - PHYS 108—Introductory Physics II—Laboratory (4)\(^b\)
  - PHYS 141—General Physics I (Mechanics) (4)\(^b\)
  - PHYS 142—General Physics II (Electricity and Magnetism) (4)\(^b\)

- **PHYS 141—General Physics I (Mechanics) (4)\(^b\)**
- **PHYS 142—General Physics II (Electricity and Magnetism) (4)\(^b\)**

### Behavioral/Social Sciences Courses

- Three Behavioral/Social Sciences courses (anthropology, psychology or sociology) 9–10

### Recommended Courses

- **MATH 121—Precalculus Mathematics (Recommended)** 5
- **MATH 180—Calculus I (Recommended)** 5
- **Three courses chosen from the disciplines of anthropology, psychology, and/or sociology** 9–10

### At least one of the following courses:

- 200-, 300-, or 400-level biology course—biochemistry, physiology, mammalian histology, comparative vertebrate anatomy, or molecular genetics course 3–5

### Total Hours

- **Pre-Medicine Required Hours** 49-54 hours 52-55
- **Approximate Total Recommended Hours** 60-75 hours 57-75

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**Part of Bioengineering BS degree**

**Additional coursework beyond Bioengineering BS degree (10 credit hours). Fit in 4 year program if:**

- Have AP credit for other courses
- Take a few summer courses
- **(Chem 232 taken as a Conc. Area Elec.)**
Bioengineering at UIC – Signature Programs

• Clinical Immersion Internship
  • Prepare students for designing of medical devices
  • Paid summer internship for rising seniors
    • Six week program
    • Inter-disciplinary – medical and engineering students
    • Needs identification in clinical space at UIC
    • Rudimentary concept generation
BioE 101 – *Introduction to Bioengineering*

- Guest lectures by experts in various BioE disciplines
- Technical writing
- 3D CAD and printing
- Circuit Design and programming
BioE 250 – *Clinical Problems in Bioengineering*

- Team-based problem solving course
- Three complex problems related to advancing healthcare (five weeks each)
- Work with a faculty mentor
- Solutions in written and oral reports

Heart Rate Monitor for Newborns Requiring CPR
BioE 399 – *Professional Development for Bioengineering*

- Job searching preparation seminars and workshop
- Personalized attention for job search package preparation
Bioengineering at UIC – Signature Programs (BIOE 494/CS491)

BioE 399 – Wearable Technology Laboratory

• Engineers from BIOE, CS, and ECE collaborate together to develop various wearable devices
• Engineering Interdisciplinary
Bioengineering at UIC – Signature Programs

BioE 396 – Senior Design I
• Two-semester, team-based design
• Bioengineering only
• Projects already scoped and provided
• Compete in COE design Expo against other departments

BioE 396 – Senior Design I: Interdisciplinary Medical Product Design (IMPD)
• Two-semester, team-based design
  • BioE, Medical, ID, and Business students
  • Problem statements provided by industry partners
Bioengineering at UIC – Student Orgs

- Alpha Eta Mu Beta (AEMB)
- Biomedical Engineering Society (BMES)
- IEEE Engineering in Medicine and Biology Society (EMBS)
- Engineering World Health (EWH)
Bioengineering at UIC – Our Graduates

• R&D Engineer
• Quality Engineer/Reliability Engineer
• Application Analyst
• Medical Device Sales
• Systems Engineer
• Test Engineer
• Regulatory Affairs Associate
• Risk Engineer