## Biomedical Engineering

### Freshman Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
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</table>
| Fall           | Math 1371 Calculus I  
(placement into course, or pre-req)                            |
|                | Phys 1301W Intro Physics I  
(&Math 1371)                                       |
|                | Chem 1065 Chem Princ I Lab  
(&1061)                                           |
|                | Chem 1061 Chem Princ I  
(placement into course or 1015, &1065)            |
|                | BMEn 1601 UG Seminar I                                                |
|                | CSE 1001 1st Yr Experience                                            |
|                | Liberal Education course or Writ 1301                                 |
| Spring         | Math 1372 Calculus II  
(1371)                                     |
|                | Phys 1302W Intro Physics II  
(1301, &Math 1372)                               |
|                | Chem 1066 Chem Princ II Lab  
(1061/1065, &1062)                                 |
|                | Chem 1062 Chem Princ II                                               |
|                | BMEn 1602 UG Seminar II                                               |
|                | Liberal Education course or Writ 1301                                 |

### Sophomore Year

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</table>
| Fall           | Math 2373 Lin Alg/Diff Eq  
(1372)                                     |
|                | Chem 2301 Organic Chem I  
(1062/66)                                   |
|                | BMEn 2501 Molec/Cell Biol w/lab  
(CSE, Phys 1302, &Math 2373 or &Math 2374) |
|                | BMEn 2401 Pyrming for BME  
(CSE, Phys 1302, &Math 2373 or &Math 2374) |
|                | BMEn 2101 Biomed Thermo  
(2401, 2501, Chem 2301, &Math 2373 or &Math 2374) |
|                | Stat 3021 Applied Statistics  
(Math 1372)                                   |
|                | Liberal Education course*                                              |
| Spring         | Math 2374 Multivariable Calc                                           |
|                | Liberal Education course                                               |
|                | Liberal Education course                                               |

### Junior Year

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| Fall           | Phsl 3061 Prin of Physiology  
(UD, 1 yr college Math/Phys/Chem) |
|                | Phsl 3701 Physiology Lab                                               |
|                | BMEn 3011+15 Biomechanics  
(UD)                                         |
|                | BMEn 3211+15 Bioelec/Bioinstr  
(UD)                                        |
| Spring         | BMEn 3311+15 Biomaterials  
(UD, &2101)                                   |
|                | BMEn 3111+15 Biomed Tnspt  
(UD, 3011/15)                                  |
|                | BMEn 3411+15 Biomed Sys An  
(UD, 3211/15)                                   |
|                | Technical Elective                                                     |
|                | Technical Elective                                                     |
|                | Technical Elective                                                     |
|                | Technical Elective                                                     |

### Senior Year

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</table>
| Fall           | BMEn 4001W Design I  
(UD, &1601, 2101, 3111, 3411) | BMEn 4002W Design II  
(UD, &1602) |
|                | Technical Elective                                                     |
|                | Technical Elective                                                     |
|                | Technical Elective                                                     |
|                | Technical Elective                                                     |

### About This Plan

- This plan is not a contract. Curriculum can change. The APAS is the official method for tracking completion of University degree requirements.
- Shaded courses are only offered in the indicated semester.
- Course pre-requisites and co-requisites (designated by &) are listed below the course number and title. Upper Division (UD) requires admission to the major prior to enrollment.
- Students can take either the CSE-only or University-wide versions of the math courses (Math 1371/1271, 1372/1272, 2373/2243, 2374/2263).
- This plan is not a contract. Curriculum can change. The APAS is the official method for tracking completion of University degree requirements.
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- Course pre-requisites and co-requisites (designated by &) are listed below the course number and title. Upper Division (UD) requires admission to the major prior to enrollment.
- Students can take either the CSE-only or University-wide versions of the math courses (Math 1371/1271, 1372/1272, 2373/2243, 2374/2263).

### Applying to your Major

Students who have completed the required courses for admission to this major (double-boxed and one with dashed outline on plan) and have a 3.2 UM-TC technical GPA at the end of the fall semester will be guaranteed admission. All other students who have completed the required courses will be considered for admission on a space-available basis. Admission following the spring semester is only based on space availability. The major application database is available at z.umn.edu/csemajorapp.

### Total Credits Needed for Degree: 124

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### University Degree Requirements

All students must complete the following Writing & Liberal Education requirements, as noted on their APAS report. See link for full Core & Theme names: z.umn.edu/liberaleducation

#### Writing Requirements:

**University Writing:**
Writ 1301/1401 or equivalent

**Writing Intensive (WI):**
Two: 1xxx or 2xxx level **
One: 3/4/5xxx level (in major)*
One: 3/4/5xxx level (any dept.)*

Requirements with an (*) will be fulfilled by taking courses at UM-TC required for this major.

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### Department Contact Information

- Website: [http://bme.umn.edu/undergrad/](http://bme.umn.edu/undergrad/)
- Main Phone: 612-626-3446
- Main Office: 7-105 Hasselmo Hall
- Director of Undergraduate Studies: Professor Chun Wang
- Departmental Contact: Ashlee Haluptzok; bmedus@umn.edu

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### Revision Date: 5/2018
Biomedical Engineering

POSSIBLE POSITIONS

- **Biomechanical engineer**: Develops mechanical devices such as the artificial hip, heart, and kidney.
- **Medical device designer**: Uses technology and research to design new medical devices.
- **Prosthesis designer**: Designs, creates, and fits prosthetic devices such as artificial limbs for patients who have lost limbs or hands.
- **Quality engineer**: Ensures that medical devices meet FDA standards for safety and efficacy.
- **Rehabilitation engineer**: Designs, develops, adapts, tests, evaluates, applies, and distributes technological solutions to problems confronted by individuals with disabilities.
- **Research and development engineer**: Develops new products and improves existing products for groundbreaking medical device equipment.
- **Field clinical representative**: Uses technical expertise to sell products, write technical support documents, and interface between sales staff and design engineers (works directly with scientists, doctors, and engineers).
- **Regulatory affairs specialist**: Coordinates and documents internal regulatory processes, such as internal audits, inspections, license renewals, or registrations. Prepare submissions and obtain approval for products and therapies to markets worldwide.
- **Product development engineer**: Design, develop, and test processes for producing prototype and long-term production of products.

**INDUSTRIES**

- Bio-Instrumentation
- Biomaterials
- Biomechanics
- Biotechnology
- Diagnostics
- Healthcare
- Institutes
- Invasive Devices
- Laboratories
- Medical Imaging
- Medical software companies
- Orthopedics
- Pharmaceuticals
- Tissue and cellular Engineering
- Universities

**EMPLOYERS**

- Abbott
- Accenture
- American Medical Systems
- AUM Cardiovascular
- Baxter Healthcare
- Boston Scientific
- Edwards Lifesciences
- Epic Systems
- InSitu Technologies
- Medtronic
- Minneapolis VA Healthcare System
- Minnetronix
- Miromatrix Medical
- Smiths Medical
- Vascular Solutions
- Ximedica
- Zimmer Spine
- Zurich Medical

**CSE Career Outcomes**

Average Starting Salary: $60,769*

Post-graduation Outcomes:*  

**More Information**

Career Center: cse.umn.edu/career  
Salary Information: z.umn.edu/csesalary  
More Information on Undergraduate Majors: cse.umn.edu/majors  

*Salary and Career Outcomes gathered from the 2016-2017 CSE Graduation Survey  
Post-graduation outcomes reflect the percentage of students who were employed full-time in their field or were enrolled in a graduate program.