# Bioproducts and Biosystems Engineering - Food Engineering

## Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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</thead>
<tbody>
<tr>
<td><strong>Math 1371 Calculus I</strong>&lt;br&gt;(placement into course or pre-req)</td>
<td><strong>Math 1372 Calculus II</strong>&lt;br&gt;(1371)</td>
</tr>
<tr>
<td><strong>Phys 1301W Intro Physics I</strong>&lt;br&gt;(&amp;Math 1371)</td>
<td><strong>Phys 1302W Intro Physics II</strong>&lt;br&gt;(1301, &amp;Math 1372)</td>
</tr>
<tr>
<td>Chem 1065 Chem Princ I Lab&lt;br&gt;(&amp;1061)</td>
<td>Chem 1066 Chem Princ II Lab&lt;br&gt;(1061/1065, &amp;1062)</td>
</tr>
<tr>
<td>Chem 1061 Chem Princ I&lt;br&gt;(placement into course or 1015, &amp;1065)</td>
<td>Chem 1062 Chem Princ II&lt;br&gt;(1061/1065, &amp;1066)</td>
</tr>
<tr>
<td>BBE 1001 BBE Orientation</td>
<td>Liberal Education course or Writ 1301</td>
</tr>
<tr>
<td>CSE 1001 1st Yr Experience</td>
<td>3/4</td>
</tr>
<tr>
<td>Liberal Education course or Writ 1301</td>
<td>3/4</td>
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</tbody>
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### Junior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tbody>
<tr>
<td><strong>BBE 3013 Engr Prin Cell Proc</strong>&lt;br&gt;(Biol 1009, Math 1372, BioC 2011 or Chem 2301)</td>
<td><strong>BBE 4013 Transport in Biol Sys</strong>&lt;br&gt;(UD, 3013, 3043, 3012)</td>
</tr>
<tr>
<td><strong>BBE 3012 Transport Biol I</strong>&lt;br&gt;(2001, 3033, Math 2373, 2374, Phys 1302)</td>
<td><strong>BBE 4713 Biol Process Eng</strong>&lt;br&gt;(4013 or &amp;4013)</td>
</tr>
<tr>
<td><strong>BBE 3002 Intro to Eng Design</strong>&lt;br&gt;(previously 2002 Math 1371, Chem 1061/65, Writ 1301)</td>
<td><strong>BBE 4303 Intr Bio-bsed MatSci</strong>&lt;br&gt;(UD, 2001)</td>
</tr>
<tr>
<td>BioC 3021 Biochemistry&lt;br&gt;(Chem 2301, Biol 1009)</td>
<td>VBS 2032 Gen Microbio W/Lab&lt;br&gt;(UD, 3002)</td>
</tr>
<tr>
<td>Liberal Education course</td>
<td>Technical Elective&lt;br&gt;(UD, 3002)</td>
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<tr>
<td>3/4</td>
<td>3/4</td>
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### Senior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tbody>
<tr>
<td><strong>BBE 4023W Proc Cont &amp; Instr</strong>&lt;br&gt;(UD)</td>
<td><strong>BBE 4502W Capstone Design</strong>&lt;br&gt;(UD, 3002)</td>
</tr>
<tr>
<td><strong>BBE 4402 BP Engineering Lab II</strong>&lt;br&gt;(UD, Chem 2301)</td>
<td>Technical Elective&lt;br&gt;(UD)</td>
</tr>
<tr>
<td><strong>BBE 4723 Food Proc Eng</strong>&lt;br&gt;(4013 or &amp;4013)</td>
<td>Emphasis Elective&lt;br&gt;(UD)</td>
</tr>
<tr>
<td>Technical Elective</td>
<td>Emphasis Elective&lt;br&gt;(UD)</td>
</tr>
<tr>
<td>Emphasis Elective</td>
<td>Liberal Education course&lt;br&gt;(UD)</td>
</tr>
<tr>
<td>3/4</td>
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## 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 course (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 a 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: 125

## Department Contact Information
- Website: [www.bbe.umn.edu](http://www.bbe.umn.edu)
- Main Phone: 612-625-5200
- Main Office: 203 Kaufert Lab & 213 BioAgEng Bldg (St. Paul)
- Director of Undergraduate Studies: Professor Ulrike Tschirner
- Email: tschi007@umn.edu

## 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.

### Liberal Education:

<table>
<thead>
<tr>
<th>CORES:</th>
<th>THEMES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio*</td>
<td>4 of 5:</td>
</tr>
<tr>
<td>Phy*</td>
<td>Civ</td>
</tr>
<tr>
<td>SocS</td>
<td>DSJ</td>
</tr>
<tr>
<td>Ltr</td>
<td>Env</td>
</tr>
<tr>
<td>AH</td>
<td>GP</td>
</tr>
<tr>
<td>Mth*</td>
<td>TS</td>
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</tbody>
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*Students admitted prior to Fall 2017 may use STAT 3021 to satisfy requirement.
Bioproducts and Biosystems Engineering

POSSIBLE POSITIONS

- **Alternative energy specialist:** Designs and installs systems that use renewable energy sources.
- **Bioprocessing/food engineer:** Integrates biology and engineering to design sustainable systems that produce high quality food, renewable energy, and biomaterials for consumers while protecting the environment.
- **Bioproducts engineer:** Develops sustainable biomass conversion solutions to meet the world’s growing materials and energy demand.
- **Environmental consultant:** Offers expert advice to local, state, and federal government agencies and private sector clients who need to adopt environmentally sound practices or clean up contaminated sites.
- **Environmental engineer:** Addresses the many environmental and natural resource challenges that affect air, soil, and water quality.
- **Process engineer:** Develops the series of actions that efficiently and economically make products (plastics, chemicals, fuel, pharmaceuticals, etc.)
- **Product engineer:** Plans and develops the tools, processes, machines, and equipment necessary to produce or manufacture products.
- **Research engineer:** Conducts basic, systematic investigations leading to new knowledge for a specific application that influences the design and construction of prototypes.

**INDUSTRIES**

- Agriculture
- Alternative energy
- Building products/materials
- Consulting
- Ecological restoration
- Ecology/environmental research
- Environmental consulting
- Food processing
- Food safety and security
- Government agencies
- Institutes
- Laboratories
- Law
- Manufacturing
- Marketing
- Public health
- Pulp and paper products
- Quality control
- Renewable plastics
- Research
- University laboratories
- Wood products

**EMPLOYERS**

- 3M
- Andersen Corporation
- Appvion, Inc.
- Barr Engineering
- Cargill
- CHS Inc.
- Domtar Paper Company
- Donaldson
- Ecolab
- General Mills
- Kellogg’s
- Minnehaha Creek Watershed Dist.
- MN Pollution Control Agency
- Natureworks
- POET
- Renewable Energy Group
- The Schwan Food Company
- Virent
- Verso Paper
- Westwood Professional Services
- WSB/Water Resources Group

**CSE Career Outcomes**

**Average Starting Salary:**

$59,077*

**Post-graduation Outcomes:**

Grad School: 5.6%

Employed: 94.4%

*Some of these positions may require an advanced degree.

**Post-graduation outcomes reflect the percentage of students who were employed full-time in their field or were enrolled in a graduate program.**

More Information on Undergraduate Majors: cse.umn.edu/majors

Please visit the Career Center to continue exploring this major.

*Salary and Career Outcomes gathered from the 2016-2017 CSE Graduation Survey

Salary Information: z.umn.edu/csesalary

Career Center: cse.umn.edu/career