Our mission is to graduate students who are immediately prepared for professional practice.
Bioengineering

About Bioengineering

Bioengineering is an interdisciplinary field that applies engineering principles and quantitative methods to the development of new and novel biologicals, materials, devices, and processes. In practice, bioengineers address issues surrounding the broad areas of bioprocess, biomedical, and bioenvironmental technology.

About the OSU Bioengineering Undergraduate Program

The Bioengineering Undergraduate Program provides a solid background in biology, chemistry, physics and math, in addition to the engineering sciences. Upper-level course work in bioengineering includes analysis and design of processes involving suspension and immobilized microbial cultures and the recovery of therapeutic products from bioreactors, as well as selection courses in biomedical materials engineering, metabolic engineering, and cell engineering. All students complete course work in drug and medical device regulation as well as a capstone-design experience.

Bioengineering graduates are prepared to contribute to the rapidly growing bioscience-based industries with the ability to formulate and solve problems pertaining to enzyme and microbial process technologies, mammalian cell culture, and downstream processing in biotechnology. They also generate solutions to problems with medical relevance, including the design of devices and systems to replace lost organ function, deliver therapeutic agents, and otherwise improve human health. The excellence of the program is evident in that a large majority of the students have either received offers of employment or decided to pursue graduate education. Graduates of the BIOE Program work in design, production, research and development, sales, and management positions. A few of the employers of OSU BIOE Alumni are:

- Acumen
- AECOM
- Bend Research
- Biotronik
- CH2M
- Columbia Winery
- E&J Gallo Winery
- Epic Healthcare Systems
- Essia Health
- Genentech
- Gilead Sciences
- Grace Bio-Labs
- Haylard Health
- Hewlett Packard
- IBA Dosimetry
- Intel
- Mazama Brewing Co.
- Melvin Brewing
- Oso BioPharmaceuticals
- Regeneron
- Sarepta Therapeutics
- ScribeX
- State of Hawaii DOT
- TE Connectivity
- US Peace Corps
- Veritox
- IBA Dosimetry
- US Peace Corps
- Veritox

For those students whose professional goals include higher level engineering positions, engineering research, or engineering education, the bioengineering curriculum provides an excellent background for graduate school. Many OSU BIOE graduates have been offered admission to and have gone on to study at such institutions as Cornell University, Duke University, Georgia Institute of Technology / Emory, Massachusetts Institute of Technology, University of California - San Diego, University of Utah, University of Washington, and University of Wisconsin, just to name a few. Several alumni are pursuing medical degrees at institutions such as Creighton University, Johns Hopkins University, Ohio State University, Oregon Health and Sciences University, and Stanford University.
The School's undergraduate educational mission is to provide a high quality engineering program that prepares students for successful careers, lifelong learning, and service to their profession and society. In particular, the department seeks to provide the biotech and biomedical industries, as well as clinical institutions, government agencies and universities, with highly qualified professionals whose unique expertise will foster the continued viability and growth of these entities.

**About the OSU Bioengineering Undergraduate Program (BIOE)**

The Bioengineering Undergraduate Program provides a solid background in biology, chemistry, physics and math, in addition to the engineering sciences. Upper-level course work in bioengineering includes analysis and design of processes involving suspension and immobilized microbial cultures and the recovery of therapeutic products from bioreactors, as well as selection courses in biomedical materials engineering, metabolic engineering, and cell engineering. All students complete course work in drug and medical device regulation as well as a capstone-design experience.

Bioengineering graduates are prepared to contribute to the rapidly growing bioscience-based industries with the ability to formulate and solve problems pertaining to enzyme and microbial process technologies, mammalian cell culture, and downstream processing in biotechnology. They also generate solutions to problems with medical relevance, including the design of devices and systems to replace lost organ function, deliver therapeutic agents, and otherwise improve human health.

Alumni of the Bioengineering program will be work-ready engineers, problem solvers, responsible professionals, and interdisciplinary collaborators. Specifically, within a few years after graduation, they will have:

1. obtained employment in the bioprocess and biotechnology industries and/or entered graduate studies in bioengineering, chemical, environmental, or biomedical engineering and/or gained admission to professional schools including health-professional programs and law programs;
2. created value through solving problems at the interface of engineering and biology, whether in a manufacturing, research, or clinical environment;
3. pursued professional development in order to fulfill their professional and ethical responsibilities, and they will have recognized and responded to evolving contemporary questions at the interface of biosciences, technology, and society; and
4. created value through effectively communicating with a diverse set of professionals, and facilitating meaningful collaboration between bioscientists and other engineers.

The Bioengineering undergraduate curriculum is designed to meet these objectives through relevant course content, hands-on laboratory and design experiences at the first year through the senior levels, and structured, collaborative learning experiences. The school has a core curriculum where students from all three programs housed within the school (CHE, BIOE, ENVE) take common courses in the areas of first-year engineering, materials and energy balances, thermodynamics, transport phenomena and senior laboratory.

**Curriculum**

The requirements for the BS degree in Bioengineering reflect the knowledge and skills necessary for the new engineer to take his or her place in society. General requirements are established by the College of Engineering (COE) and Oregon State University. The School of Chemical, Biological, and Environmental Engineering determines the specific requirements for graduation and audits those courses to ensure that the standards of the Accreditation Board for Engineering and Technology (ABET) are met by every student who receives a degree.

ABET is the national organization that accredits—or certifies—engineering and technology degree programs. ABET’s Engineering Accreditation Commission (EAC) applies standards set by practicing engineers and engineering educators to specify the general form and content of engineering programs. The School of Chemical, Biological and Environmental Engineering, with the advice of the bioenvironmental, biotech and biomedical device industries, determines the courses needed to help the student develop the knowledge and skills required of the modern bioengineer. In several situations the School’s regulations are more restrictive than the University’s regulation.

The University (OSU) establishes a set of core requirements - called the Baccalaureate Core - which all undergraduate degree programs at OSU must incorporate. These requirements help the student develop the values, knowledge, and skills that all university graduates should possess. The current requirements are published each quarter in the Schedule of Classes for that quarter.

The following pages list the Bioengineering curriculum by the categories that are used for ABET accreditation. In the Oregon State University General Catalog you will find the same curriculum. Copies of the Curriculum Check Sheet for the bioengineering curriculum and the Curriculum Block Diagram are included in this guide. The official checklist is maintained in the main office. Please note that just because a course is required or recommended in the curriculum does not mean that it will be offered every term. Also, most courses have prerequisites, courses that must be completed satisfactorily before the course can be taken. Always consult the Oregon State University General Catalog or the OSU Schedule of Classes, or check with the appropriate department for availability and prerequisites before registering for a course.

**Before registering for any restricted elective course, even a recommended course, consult with your advisor.**
Explanations of BIOE Curriculum

Mathematics and statistics. Mathematics provides an important base for bioengineering. Required mathematics courses cover calculus through differential equations. Process Data Analysis (CBEE 213) includes material on probability and statistics, two important tools used by bioengineers in the analysis of process data. Students having completed a strong high school program in mathematics typically begin at the level of differential calculus (MTH 251). Students with a limited background in math should first complete preparatory coursework prior to taking MTH 251, such as MTH 111 College Algebra or MTH 112 Elementary Functions. Unfortunately credit earned in such preparatory courses cannot be used to fulfill the math credit requirements for the bioengineering program. NO mathematics course may be taken S/U.

Basic Science. BIOE students are expected to have had a strong chemistry background in high school and are required to take CH 221, 222 and 223, which are 5-credit courses offered by the Chemistry department specifically for chemistry and some engineering majors during their first year of study. In some cases transfer students may have prior credit for CH 121-123, CH 201-202, or some combination of these courses, but not CH 221-223. These students may fulfill the CH 221-223 requirement by ensuring they have completed 15 credits of general chemistry or a combination of general chemistry and upper-division chemistry. This combination must be articulated and sent through the formal petition process. BIOE students are also required to take two terms of organic chemistry (CH 331-332).

All engineering majors are required to take PH 211, PH 212 and PH 213 calculus-based physics courses. These courses are part of the pre-engineering core and must be completed before entering the professional engineering program.

BIOE students are required to take anatomy and physiology, Z 331 and Z 333, and one of the following lab classes: MB 230, Z 341, Z 342, or Z 343. The BIOE program does not require completion of the introductory biology series (BI 211-213). However, students who are interested in a pre-med, pre-dental or pre-vet track, should complete the introductory biology sequence. In addition, those with a limited background in biology are encouraged to complete the introductory series or at least BI 212. Note that bioengineering majors are waived from the biological science baccalaureate core requirement. BIOE students are required to take biochemistry lecture and laboratory courses (BB 450, 451, 493, 494). NO science course, required or selection, may be taken S/U.

Engineering Topics: Engineering Science & Design. These courses cover concepts and techniques that are essential to engineering analysis and design. More importantly they cover the philosophy and process of engineering problem solving. In particular, students develop a comprehensive understanding of engineering fundamentals and applications by taking a minimum of 73-credit hours of engineering coursework, including courses that cover:

- design practices, policy and regulations, emerging areas in bioengineering, computer tools, technical communications, engineering economics and project management (CBEE 101, CBEE 102, CBEE 414, BIOE 340, 390, 470 and 490);
- electrical engineering fundamentals and statics (ENGR 201 and 211);
- material and energy balances, fundamentals of thermal sciences, fluid, mass and heat transfer, (CBEE 211, CBEE 212, CHE 311, CHE 331, CHE 332, CHE 333, and transport lab CHE 334);
- professional engineering ethics as well as social ethics in engineering (CBEE 320 and BIOE 420); and
- Bioengineering process, product and capstone design (BIOE 490, 491, and 492), with 6 credits of selected upper division bioengineering coursework available in biomaterials, cell engineering, metabolic engineering, and bioconjugation (BIOE 451, 459, 485, 499 respectively).

Students are offered a menu of engineering courses from which to choose an additional 9 credits of engineering topics. Students may judiciously choose the coursework to emphasize an area of application within bioengineering which interests them. For example, students interested in biomechanics may elect to enroll in dynamics, strength of materials, engineering graphics and 3-D modeling, and biomechanics (ENGR 212, 213 and 248, EXSS 323). Acceptable engineering topics courses from which students may select are listed on page 6 and 8 of this advising guide.

Note that credits used to satisfy the 6 credits of Upper-Division BIOE selection requirement cannot be used to satisfy the engineering topics credit requirement. A petition to the Head Advisor of Bioengineering is required to use a class outside of the list. NO engineering topics course may be taken S/U.
Communication Skills. The best technical work is worthless if it cannot be communicated to others for evaluation and implementation. Many engineers find that they spend more time communicating – meeting and working with colleagues, writing memos and reports, and giving presentations – than they do in technical problem solving. For that reason, the bioengineering curriculum requires courses in basic writing, technical report writing, and public speaking. Every undergraduate at OSU must complete an upper-division course (in their discipline), which meets the requirements for “writing-intensive” status. BIOE 490, Bioengineering Design, serves as the writing-intensive course for bioengineering students. NO communication skills course may be taken S/U.

Humanities and Social Sciences. It is the University’s role to prepare students to take an active, constructive part in society. To fulfill that role, it must provide engineering students with the technical knowledge and skill that they will need to function as engineers. But engineers must have more than just technical skills. Like any citizen, engineers have a great responsibility to society. To meet that responsibility, they must have a basic understanding of individual and social behavior and values and cultures of the society. For that reason, each engineering curriculum requires courses in humanities and social sciences.

The baccalaureate core is part of every undergraduate program at OSU, and emphasizes writing, creative thinking, cultural diversity, the arts, sciences, literature, lifelong fitness and global awareness. Substantial coursework within this core deals with humanities and social sciences, and is identified within one of three categories: “Perspectives,” “Difference, Power, and Discrimination” and “Synthesis.” The nature of these requirements, along with a listing of acceptable courses in each category, can be found in the OSU General Catalog. Note that the BIOE program uses a more restrictive course list under the Difference, Power and Discrimination category, as detailed below.

Perspectives Courses: A total of 4 Perspectives courses, totaling at least 12 credits, must be taken. This includes a minimum of 1 course in each of the following categories: Western Culture, Cultural Diversity, Literature and the Arts, and Social Processes and Institutions. In fulfilling the Humanities and Social Sciences requirements, a maximum of two courses may be selected from the same department.

Difference, Power, and Discrimination Course (DPD): Students must complete, with a grade of “C” or better one DPD course from the Bioengineering-specific DPD list found on page 10 of this advising guide.

Synthesis Courses: Two Synthesis courses must be taken: one course in Contemporary Global Issues and one course in Science, Technology, and Society. NO COURSE listed as an OSU “synthesis” course can be used as an Upper-Division Bioscience selection or an Engineering Topic selection.

Except for the DPD course, Humanities and Social Sciences courses may be taken S/U. An absolute maximum of 36 credits of S/U may be taken if a student has four years of full-time study at OSU. For transfer students the maximum is 3 times the number of quarters of full-time residency at OSU.

Fitness. The OSU Baccalaureate Core requires that all OSU students take HHS 231 and HHS 24x, Lifetime Fitness Lab. HHS 231 and 24x maybe taken S/U.

Curriculum Block Diagram for BS Program. The 192 course credits required for the B.S. degree in bioengineering are listed in Table 1. A block diagram (Figure 1) following this table provides an example of how a program might be constructed, term by term. Each column represents one academic quarter. The first two years in the program are the pre-engineering program. The blue shaded courses comprise the “core” courses used to calculate a GPA used for admission to the professional program. The sequence of courses in the third and fourth years represents the professional program. This flowchart represents an idealized schedule, and most students’ actual schedules will differ in sequence and number of quarters required to satisfy all requirements. In particular, students interested in the MECOP program, (and/or other work opportunities) must carefully plan their schedules with the MECOP advisor to ensure timely graduation.

Grade Requirements:
Students must achieve a ‘C’ or better in all required courses (exceptions are HHS, PAC, perspectives, synthesis classes), or the course will be considered ‘missing’ for a prerequisite or graduation requirement.
Pre-core GPA calculation for professional program admission: Both OSU and transfer grades are included, and in the case of repeated classes, the grade from the second take, no matter where the class was taken, will be used in the pre-core GPA calculation.
# Bioengineering

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## Additional Courses

- **Engineering Core**: ENGR 201, CBEE 211, CBEE 212, CHE 311, CHE 331.
- **BIOE - Pre-Engineering Core**: MTH 251, MTH 252, MTH 254, CHE 311, CHE 331.

**Notes:**
- Courses numbered 2 or 3 credits are available for students with approved substitutions.
- Courses numbered 4 credits are available for students with approved substitutions.
- Courses numbered 5 credits are available for students with approved substitutions.
- Courses numbered 6 credits are available for students with approved substitutions.
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- Courses numbered 99 credits are available for students with approved substitutions.
- Courses numbered 100 credits are available for students with approved substitutions.

**Requirements:**
- **Technical Electives**: 3 credits (number can vary)
- **Univ & College Core (bac-core)**
  - Engineering courses from which students may select (at least 9 credits).
  - Biology courses from which students may select (one course only)
  - Professional-Technical Electives: 15 credits (number can vary)

**Additional Notes:**
- **Pre-engineering Core**: MTH 253, MTH 306, CBEE 211, CBEE 212.
- **BIOE-DPD must be taken with A/F grading. Only Perspective, Synthesis, HHS 231/24*, PAC and FREE can be taken with S/U grading.
- **Upper Division BIOE courses from which students may select (at least 6 credits).**
- **Course substitutions are not allowed for CHE 311 and CHE 331.**
Difference, power and discrimination courses from which students may select (at least 3 credits). Must obtain ‘C’ or better in one of the following classes:

- Ecosystem science of Pacific NW Indians (AG 301) 3 credits
- Language in the USA (ANTH 251) 3 credits
- Biological and cultural constructions of race (ANTH 345) 3 credits
- Biological and cultural constructions of race (ANTH 345H) 3 credits
- Sociolinguistics (ANTH 451) 3 credits
- The economics of discrimination (ECON 383) 4 credits
- Purpose, Structure & Function of Education in a Democracy (ED 216) 3 credits
- Studies in difference, power, and discrimination (ENG 420) 3 credits
- Survey of Chicano/a-Latino/a studies (ES 212) 3 credits
- Survey of Chicano/a-Latino/a studies (ES 213) 3 credits
- Las presencia Mexicana en los Estados Unidos (ES 216) 3 credits
- Survey of African American studies I (ES 221) 3 credits
- Survey of African American studies III (ES 223) 3 credits
- Asian American Studies II: Activism & Empowerment (ES 233) 3 credits
- Native American studies I: Civilization & Empowerment (ES 233) 3 credits
- Survey of Native American studies I (ES 222) 3 credits
- Survey of Native American studies II (ES 223) 3 credits
- La presencia Mexicana en los Estados Unidos (ES 216) 3 credits
- Multicultural perspectives in natural resources (FW 340) 3 credits
- Multicultural American theatre (TA 360) 3 credits
- Introduction to Queer Studies (WGSS 322) 3 credits
- Dance: gender, race, empire (WGSS 323) 3 credits
- Greece, Rome, and Reconquista (WGSS 420) 3 credits
- Systems of oppression in women’s lives (WGSS 424) 3 credits
- Twentieth century theatre: the U.S. (TCS 200) 3 credits
- Social inequality (SOC 426) 3 credits
- Sociology of the family (SOC 412 & SOC 412H) 3 credits
- The civil rights movement and political (PS 375) 4 credits
- Center and margin in American political thought (PS 395) 4 credits
- The body, medicine and culture (PHL 380) 3 credits
- Ethics of diversity (PHL 380) 4 credits
- Language of Oregon (LING 231) 3 credits
- Lesbian and gay minorities in modern America (HST 368) 3 credits
- Religion in the United States (HST 210) 4 credits
- Public health and women: social and political issues (HST 465) 3 credits
- Multicultural perspectives in natural resources (FW 340) 3 credits
- Ethnicities in film (ES 452) 3 credits
- Multicultural American theatre (TA 360) 3 credits
- The economics of discrimination (ECON 383) 4 credits
- The economics of discrimination (ECON 383) 4 credits
- Multicultural American theatre (TA 360) 3 credits
- Sociolinguistics (ANTH 451) 3 credits
- Biological and cultural constructions of race (ANTH 345H) 3 credits
- Biological and cultural constructions of race (ANTH 345) 3 credits
- Language in the USA (ANTH 251) 3 credits
- Multicultural American theatre (TA 360) 3 credits
- Ecology science of Parks NW Indians (AG 301) 3 credits

(cannot be taken for S/U grading:)}
## B.S. in Bioengineering - Course Requirements

### Baccalaureate Core (33 credit hours)

**Perspectives, DPD, and Synthesis**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR 121 English Composition*</td>
<td>3</td>
</tr>
<tr>
<td>WR 327 Technical Writing</td>
<td>3</td>
</tr>
</tbody>
</table>

**Speech:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 111 Public Speaking*; or</td>
<td>3</td>
</tr>
<tr>
<td>COMM 114 Argument and Critical Discourse*</td>
<td>3</td>
</tr>
</tbody>
</table>

**Lifetime Fitness:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHS 231, 24X</td>
<td>3</td>
</tr>
</tbody>
</table>

### Mathematics and Statistics (24 credit hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 251, 252 Differential Calculus*; Integral Calculus*</td>
<td>8</td>
</tr>
<tr>
<td>MTH 254, 306 Vector Calculus I*; Matrix and Power Series methods*;</td>
<td>8</td>
</tr>
<tr>
<td>MTH 256 Applied Differential Equations*</td>
<td>4</td>
</tr>
<tr>
<td>CBEE 213 Process Data Analysis</td>
<td>4</td>
</tr>
</tbody>
</table>

### Chemistry and Physics (35 credit hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH 231/261-233/263 General Chemistry (* 221 only)</td>
<td>15</td>
</tr>
<tr>
<td>CH 331-332 Organic Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>PH 211-213 General Physics with Calculus*</td>
<td>12</td>
</tr>
</tbody>
</table>

### Biological Sciences (21 credit hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI 241 Anatomy &amp; Physiology Lab OR</td>
<td>2</td>
</tr>
<tr>
<td>MB 230 Introduction Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>BB 450-451 General Biochemistry</td>
<td>7</td>
</tr>
<tr>
<td>BB 493-494 Biochemistry Laboratory</td>
<td>6</td>
</tr>
<tr>
<td>BI 231 Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BI 233 Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
</tbody>
</table>

### Engineering Sciences (46 credit hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBEE 101 Chemical, Biological and Environmental Engineering Orientation</td>
<td>3</td>
</tr>
<tr>
<td>CBEE 102 Engineering Problem Solving and Computation</td>
<td>3</td>
</tr>
<tr>
<td>CBEE 211 Material Balances and Stoichiometry</td>
<td>3</td>
</tr>
<tr>
<td>CBEE 212 Energy Balances</td>
<td>3</td>
</tr>
<tr>
<td>CBEE 320 Bioengineering Ethics and Professionalism</td>
<td>3</td>
</tr>
<tr>
<td>CHE 311 Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>CHE 331 Transport I Fluids</td>
<td>4</td>
</tr>
<tr>
<td>CHE 332,333 Transport II Heat &amp; Mass</td>
<td>6</td>
</tr>
<tr>
<td>CBEE 414 Process Engineering Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 201 Electrical Engineering Fundamentals*</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 211 Statics*</td>
<td>3</td>
</tr>
</tbody>
</table>

**ENGR electives**

Select 9 credits from the following:

- BIOE 451, BIOE 459, CBEE 416, CHE 312, CHE 451, CHE 361, CHE 445, CHE 461, CHE 499, CBEE 416, ENGR 212, ENGR 213, ENGR 248, ENVE 322, ENVE 421, ENVE 422, ENVE 425, ENVE 431, BEE 320, BEE 468

### Bioengineering Core Courses (33 credit hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOE 340 Biomedical Engineering Principles</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 451 Biomaterials and Biointerfaces</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 415 Bioengineering Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 420 Social Ethics in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 457 Bioreactors</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 490 Bioengineering Process Design</td>
<td>4</td>
</tr>
<tr>
<td>BIOE 491 Bioengineering Product Design</td>
<td>4</td>
</tr>
<tr>
<td>BIOE 492 Bioengineering Capstone Design</td>
<td>4</td>
</tr>
</tbody>
</table>

**BIOE electives**

Select 6 credits from the following:

- BIOE 459, BIOE 499, CBEE 416, CS 446

**TOTAL CREDIT HOURS – 192**

* Required by the College of Engineering for admission to the professional program

*# Note that credits used to satisfy this requirement cannot be used to satisfy the ENGR elective requirement
# Curriculum Check Sheet
## Bioengineering Courses

<table>
<thead>
<tr>
<th>Student’s Name:</th>
<th>__________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student ID #:</td>
<td>__________________________</td>
</tr>
<tr>
<td>Form Completed By:</td>
<td>__________________________</td>
</tr>
<tr>
<td>Date:</td>
<td>__________________________</td>
</tr>
</tbody>
</table>

### Required BIOE Courses (25 credits)
- BIOE 340 (3)
- BIOE 351 (3)
- BIOE 415 (3)
- BIOE 420 (3)
- BIOE 457 (3)
- BIOE 490 (4)
- BIOE 491 (4)
- BIOE 492 (4)

### Engineering Topics (43 credits)
- CBEE 101 (3)
- CBEE 102 (3)
- CBEE 211 (3)
- CBEE 212 (3)
- CBEE 213 (4)
- CBEE 320 (3)
- CHE 311 (3)
- CHE 331 (4)
- CHE 332 (3)
- CHE 333 (3)
- CHE 334 (2)
- CBEE 414 (3)
- ENGR 201 (3)
- ENGR 211 (3)

### BIOE Courses – Restricted Elective (6 credits)
- BIO 451, BIOE 459, BIOE 499, CBEE 416, CS 446

### Engineering Topics – Restricted Elective (9 credits)
- BIO 451, BIOE 459, BEE 459,
- CBEE 416, CHE 312, CHE 361, CHE 417, CHE 445, CHE 461
- ENGR 212, ENGR 213, ENGR 248, CHE 499,
- ENVE 322, ENVE 421, ENVE 422, ENVE 425, ENVE 431

### Mathematics (20 credits)
- MTH 251 (4)
- MTH 252 (4)
- MTH 254 (4)
- MTH 256 (4)
- MTH 306 (4)

### Fitness (3 credits)
- HHS 231 (2)
- HHS 24x (1)

### Basic Science (29 credits)
- CH 231/261 (5)
- CH 232/262 (5)
- CH 233/263 (5)
- PH 211 (4)
- PH 212 (4)
- PH 213 (4)
- BI 241 (2) OR
- MB 230 (4)

### Advanced Biosciences (19 credits)
- BB 450 (4)
- BB 451 (3)
- BB 493 (3)
- BB 494 (3)
- BI 231 (3)
- BI 233 (3)

### Advanced Chemistry (8 credits)
- CH 331-CH 332 or CH 334-CH 336

### Communication Skills (6 credits)
- WR 121 (3)
- WR 327 (3)

### Communication Skills – Restricted Elective (3 credits)
- COMM 111/114(3)

### Humanities and Social Sciences (21 credits)

#### Perspectives
- Cultural Diversity
- Literature & Arts
- Soc. Proc. & Inst
- Western Culture
- Diff., Power, Disc.

#### Synthesis
- Cont. Global Issues
- Sci., Tech. & Soc.
The bioengineering undergraduate program is rigorous, but does provide some flexibility. In particular, the bioengineering curriculum was designed such that transfer between departments within the College of Engineering during the first two years (the "pre-engineering program") can be made with minimal loss of time. This is true of all undergraduate degree programs in the College of Engineering at OSU. In addition, many students find they can tailor their programs to their own particular interests simply by judicious use of restricted elective credits, while others elect to take additional credit hours to fulfill requirements of a second degree or minor.