Fundamentals of Engineering Program

Nature of the Program

The Benjamin M. Statler College of Engineering and Mineral Resources’ Fundamentals of Engineering Program (FEP) is designed to support engineering students as they build foundational engineering skills and discern their career interests within engineering and computing fields. The mission of this student-oriented program is to advise, prepare, and retain qualified students for degree programs in the Statler College. The FEP provides the academic and co-curricular support students need for their success in their: transition to college life; development of academic discipline and skills necessary for entering and succeeding in an academically challenging major; foundational courses (mathematics, chemistry, physics, and basic engineering); and selection of an engineering or computing discipline major. The FEP focuses on:

- communication between students, faculty, advisors, and others;
- academic support services to support students in the fundamental mathematics, science, and engineering courses;
- provision of a co-curricular environment that facilitates successful transition to the college environment, provides career exploration opportunities, and supports students’ academic endeavors;
- quality and engaging fundamental engineering instruction.

The FEP provides a vibrant and supportive community for beginning engineering students centered in the Eugene V. Cilento Learning Center (ELC). Students have a “one-stop” place to get the answers they need as they navigate through the transition from high school to college. In the ELC, students receive free tutoring, find information about upcoming guest speakers and other College events, and spend a significant amount of time studying, doing homework, and working on team projects for their engineering courses. Academic support is provided to all FEP students in the following subjects: mathematics, chemistry, physics, and engineering.

To facilitate engagement with the engineering community and development as engineering and computing professionals, FEP students participate in and reflect upon “Out of Class Experiences” (OCEs). Typical OCE opportunities include: EngineerFEST, an engineering student organization fair held each year to encourage students to learn about and become involved in one or more of the College's many student chapters of professional engineering societies; Department Visits, in which each department hosts FEP students in an informational seminar describing their majors, relevant research opportunities, and the career paths of graduates; Panels of Practicing Engineers; and other seminars, presentations, panels, workshops and experiences in which students learn academic success skills and strategies, are introduced to important professional expectations and life skills, and explore a variety of engineering and computing-related careers.

All policies, procedures, events and activities, and academic resources are listed on the FEP website. These curricular and co-curricular activities create a coherent program designed to facilitate student success in engineering and computing fields.

Additionally, students successfully completing the WVU Statler College Fundamentals of Engineering Program will select and enter an engineering or computing discipline major within the Statler College.

Program Objectives

The educational objective of the Fundamentals of Engineering Program (FEP) in the Statler College is to prepare students to be academically successful in the engineering or computing major of their choice. Students who complete the FEP successfully:

- Transition to college life;
- Develop the academic discipline and skills necessary for entering and succeeding in an academically challenging major;
- Complete foundational courses (mathematics, chemistry, physics, and basic engineering); and
- Select an engineering or computing discipline major.

Student Outcomes

Recognizing that the Fundamentals of Engineering Program (FEP) is the first step toward completing an engineering or computing discipline degree, students completing the FEP are introduced to the engineering and computing program educational outcomes listed below. Each of these outcomes are developed in the program in which the student completes a degree. Students who successfully complete the requirements of the WVU Fundamentals of Engineering Program begin to:

1. identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. 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. communicate effectively with a range of audiences
4. recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
Fundamentals of Engineering Program

5. function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. acquire and apply new knowledge as needed, using appropriate learning strategies

FACULTY

DIRECTOR
- Lizzie Y. Santiago - Ph.D. (The Pennsylvania State University)
  Bioengineering, Engineering education, Curriculum development, STEM education, Retention

TEACHING PROFESSOR
- Todd R. Hamrick - Ph.D. (West Virginia University)
  STEM education, Robotics, Industrial applications, Curriculum development
- Robin A. M. Hensel - Ed.D. (West Virginia University)
  STEM education K-16, Student success and retention, Diversity and inclusion in STEM fields, Curriculum Development

TEACHING ASSISTANT PROFESSORS
- Atheer Almasri - Ph.D. (Virginia Commonwealth University)
  Mechanical Engineering, STEM Education
- Carter Hulcher - Ph.D. (West Virginia University)
  Civil Engineering, Geomechanics, Student retention
- Xinyu (Catherine) Zhang - Ph.D. (University of Illinois at Urbana-Champaign)
  STEM education, Chemical and biomedical engineering, Sustainability of biomanufacturing

TEACHING INSTRUCTORS
- Michael K. Brewster - M.A. (West Virginia University)
  Mathematics, Statistics, STEM education K-16

Matriculation into Engineering or Computing Majors

ENGINEERING DEGREES
Students can matriculate into the engineering discipline of their choice once they have successfully completed the following classes with a C- or better, and have a cumulative 2.00 GPA.

- MATH 154 or MATH 155
- CHEM 115 and CHEM 115L
- ENGL 101 or 103
- ENGR 101
- ENGR 102
- ENGR 191

COMPUTING DEGREES
Students can matriculate to the computing discipline of their choice (computer science or cybersecurity) once they have successfully completed the following classes with a C- or better, and have a cumulative 2.00 GPA.

- CS 110 and CS 110L
- MATH 154 or MATH 155
- ENGL 101 or 103
- ENGR 101
- ENGR 191
- One of the following lab science sequences
  - BIOL 115 & BIOL 115L, CHEM 115 & CHEM 115L, CHEM 117 & CHEM 117L, PHYS 111 & PHYS 111L, or SUST101 & SUST 101L
EARLY MATRICULATION INTO MAJOR

Freshman students with initial placement into Calculus I (MATH 155) or higher can be eligible to move into the engineering or computing discipline of their choice early based on the following criteria:

- Students who have at least 7 AP credits with at least 4 of those credits including CHEM 115 and 115L, PHYS 111 and 111L, or PHYS 112 and 112L; pass all their first semester math and science classes with at least a C-; and have a cumulative 3.50 or higher GPA

Or

- Students who pass all their first semester math and science courses with at least a C-; and have a cumulative 3.50 or higher GPA.

ADMISSIONS REQUIREMENTS 2023-2024

The Admissions Requirements above will be the same for the 2023-2024 Academic Year.

Curriculum

Students in the Fundamentals of Engineering Program will complete a minimum of 17 credit hours while completing the requirements to matriculate into their choice of engineering or computing discipline. The amount of credit hours and the time in the Fundamentals of Engineering Program is based on math readiness.

- Students who start in Calculus I (MATH 155) or higher can matriculate into their specific major in 1 year
- Students who start in two-semester Calculus I with Review (MATH 153) can matriculate into their specific major in 1.5 years or 1 year and 1 summer
- Students who start in College Algebra (MATH 126) can matriculate into the specific major within 2.5 years

SUGGESTED PLAN OF STUDY FOR ENGINEERING MAJORS

This curriculum is based on starting in Calculus I (MATH 155). Students who place into a different math class when they start at WVU should work with their advisor to determine their specific curriculum.

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 155</td>
<td>4 MATH 156</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGR 101</td>
<td>2 ENGR 102, MAE 102, or CHE 102</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGR 191</td>
<td>1 PHYS 111 &amp; 111L</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 115 &amp; 115L</td>
<td>4 GEF Elective **</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 101 or 103</td>
<td>3 Choose one of the following:***</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choose one of the following: *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEF Elective</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUST 101 &amp; 101L</td>
<td>CS 111 &amp; 111L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 110 &amp; 110L</td>
<td>CHEM 116 &amp; 116L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 115 &amp; 115L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total credit hours: 31

* Students intending to pursue a mining engineering degree should take SUST 101 and SUST 101L; Students intending to pursue a petroleum and natural gas engineering degree should take SUST 101; Students intending to pursue a biometric systems engineering degree should take CS 110 and CS 110L; Student intending to pursue a biomedical engineering degree should take BIOL 115 and BIOL 115L; all rest should take GEF Elective 5

** Students should select from GEF area 5, 6, or 7
***

Students intending to pursue a biometric systems engineering degree should take CS 111 and CS 111L; Students intending to pursue a biomedical engineering degree should take CHEM 116 and CHEM 116L; Students intending to pursue a chemical engineering degree should take CHEM 116 and CHEM 116L; all rest should take GEF Elective 6 or 7

SUGGESTED PLAN OF STUDY FOR COMPUTING MAJORS

This curriculum is based on starting in Calculus I (MATH 155). Students who place into a different math class when they start at WVU should work with their advisor to determine their specific curriculum.

**First Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 110 &amp; 110L</td>
<td>4</td>
<td>4 CS 111 &amp; 111L</td>
<td>4</td>
</tr>
<tr>
<td>COMM 112</td>
<td>3</td>
<td>3 ENGL 101 or 103</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 101</td>
<td>2</td>
<td>2 MATH 156</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 191</td>
<td>1</td>
<td>1 GEF Elective 5</td>
<td>3</td>
</tr>
<tr>
<td>MATH 155</td>
<td>4</td>
<td>4 Lab Science II</td>
<td>4</td>
</tr>
<tr>
<td>Lab Science I*</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>

Total credit hours: 36

* Lab Science courses are BIOL 115/115L and BIOL 117/117L; CHEM 115/115L and CHEM 116/116L; CHEM 117/117L and CHEM 118/118L; PHYS 111/111L and PHYS 112/112L; or SUST 101/101L and GEOL 103/103L

NOTE: Students who place into math courses other than MATH 155, Calculus 1, must work with their academic advisor to create an appropriate plan to graduation.