**Elective Schedule and Descriptions**

**Instructions**

1) You must select 9 total credits of mechanical engineering electives. The elective schedule and course descriptions are provided below.

2) Select your first elective choice. You can either choose a 3 credit course for this choice or 3 one credit courses. If you choose 3 one credit courses, select 3 courses that you want. You are guaranteed the ability to register for your first choice.

3) Select your second elective choice. You can either choose a 3 credit course for this choice or 3 one credit courses. If you choose 3 one credit courses, select 3 courses that you want. You are guaranteed the ability to register for your second choice.

4) Select your third elective choice. You can either choose a 3 credit course for this choice or 3 one credit courses. If you choose 3 one credit courses, select 3 courses that you want. An effort will be made such that you can register for your third choice but the course is not guaranteed.

5) Once you have selected your first, second, and third choices in the spring semester of your sophomore year, you cannot change your selections at a later date. However, you will be able to register for any course that has open availability.

6) If you do not inform your advisor of your elective choices, you will have no priority and are not guaranteed space in any elective.

**Proposed Schedule**

<table>
<thead>
<tr>
<th>Fall 2016</th>
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<tbody>
<tr>
<td>ME 475 Internal Combustion Engines (3 Credits) Pre-requisite: ME 270 Co-requisite: ME 373</td>
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<tr>
<td>ME 490-CG Biomechanics (3 Credits) Prerequisites: ME 125, ME 209, MATH 260</td>
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<tr>
<td>ME 457 Advanced Manufacturing Laboratory (1 Credit) Coreq: ME 353</td>
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<tr>
<td>ME 490-RJ Biomedical Engineering (3 Credits) Prerequisite: ME 333</td>
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<tr>
<td>ME 377 Introduction to Renewable Energy (1 Credit) Prereq: Instructor Approval</td>
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<tr>
<td>ME 467 Robotics, Vibrations, Controls, and Electromach Laboratory (1 Credit) Coreq: ME 261 or ECE 261</td>
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<tr>
<td>ME 490* Bioengineering Topics (1 Credit) Prerequisite ME 201 Prerequisites: ME201</td>
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<td>ME 490-SN Mechatronics (3 Credits) Prerequisite: ME 261 and ME 125</td>
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<td>ME 455 Production Systems and Automation (3 Credits) Coreq: ME 353</td>
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<td>ME 476 Advanced Thermal Science Topics: Fuel Cells/Radiation (3 Credits) Prereq: ME 470 Coreq ME 376 or instr. approval.</td>
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<td>ME 477</td>
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<td>Prerequisite: ME270 Corequisite: ME 376</td>
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<td>Robotics, Vibrations, Controls, and Electromach Laboratory</td>
<td>1</td>
<td>Coreq: ME 261 or ECE 261</td>
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<td>Advanced Manufacturing Laboratory</td>
<td>1</td>
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### Elective Descriptions

**ME 377 Introduction to Renewable Energy (1 Credit)**

A study of the global energy crisis. Students will identify the challenges of the current energy system and investigate alternative energy systems including renewables and their associated technologies. As a focus of their studies, students will evaluate the role that alternative energy systems can play in solving the energy crisis based on their availability and sustainability. Prerequisite: Instructor Approval.

**ME 455 Production Systems and Automation (3 Credits)**

A study of production system theory including Lean Manufacturing, Theory of Constraints, Six Sigma, and Group Technology and a study of automation implementation in manufacturing and distribution facilities including material handling systems, automatic data capture systems, and machine tools. Prerequisite or Coreq: ME 353.

**ME 456 Non-Traditional Manufacturing (3 Credits)**

A study of non-traditional manufacturing technologies that utilize photonic, electrical, chemical, ultrasonic, and magnetic energy sources to process materials. This course provides an introduction to the machine tools that utilize these energy sources, examines the physics driving the processes, and discusses possible applications for each technology. Prerequisite or Corequisite: ME 353.

**ME 457 Advanced Manufacturing Laboratory (1 Credit)**

A laboratory experience in CAM programming, CNC machining, welding, and nontraditional manufacturing including 3D printing, plasma cutting, and laser etching and cutting. Prerequisite or Corequisite: ME 353.

**ME 467 Robotics, Vibrations, Controls, and Electromachinery Laboratory (1 Credit)**

A laboratory experience in robotic programming, modal testing techniques, system modeling and control design algorithms, and DC/AC motor systems. Prerequisite or Corequisite: ME 261 or ECE 261.

**ME 475 Internal Combustion Engines (3 Credits)**

To develop an understanding of internal combustion engines through thermodynamic analysis of the processes and components involved extending from the air and fuel intake through the treatment of the exhaust components. Prerequisite: ME 270. Co-requisite: ME 373.

**ME 476 Advanced Thermal Science Topics: Fuel Cells or Radiation (3 Credits)**

The fundamentals of either radiation heat transfer or those of electrochemistry are developed with the intent of enabling students to participate as members of an interdisciplinary design team focused on creating advanced novel energy systems technology. Targeted applications include the following: high temperature solar and high temperature combustion technology, or fuel cells, batteries, and industrial electrolysis technology. Prerequisite: ME 470 or instructor approval. Corequisite ME 376 or instructor approval.
ME 477 Solar Thermal Technology (3 Credits)

The fundamentals and applications of solar thermal energy systems are developed and discussed. Topics include residential water heating, residential and commercial space heating, and solar concentrating systems. The subject is an application of thermodynamics, fluid mechanics, and heat transfer. Prerequisite: ME 270. Prerequisite or Corequisite: ME 376.

ME 490-CG Biomechanics (3 Credits)

An application of linear algebra, engineering principles, and anatomical knowledge to study the motion of human bodies. The course will examine how the nervous system stimulates various muscles which in turn actuates the skeletal system in a desired movement based on the complex, three-dimensional kinematic and kinetic descriptions of human anatomy. Prerequisites: ME 125, ME 209, MATH 260.

ME 490* Bioengineering Topics (1 Credit)

An examination of the various industries that belong to the field of bioengineering. Topics will include prosthetics, implants, biosignals, bioethics, musculoskeletal modeling, and other areas reflected in current industrial trends. Prerequisites: ME201.

ME 490-RJ Biomedical Engineering: Human-Machine Interfaces (3 Credits)

The study of human-machine interfaces, with a focus on rehabilitation applications. Human movement and sensory capabilities are described using models from control theory. The human and machine are analyzed together as a closed-loop system. Communication between rehabilitation patients, machines, engineers, clinicians, and the media is discussed. Prerequisite: ME 333.

ME 490-SN Mechatronics (3 Credits)

A study of the integration of mechanics and electronics including microcontrollers, programmable logic controllers, sensors, motors, and pneumatics. Prerequisite: ME 261 and ME 125.