### Electrical Engineering

Accredited by the Engineering Accreditation Commission of ABET, www.abet.org

1. **University Requirements: (23-24)**
   - Writing, Rhetoric and American Cultures (WRA) 4
   - Integrative Studies in Humanities (IAH) 8
   - Integrative Studies in Social Sciences (ISS) 8
   - Bioscience (one of the following):
     - BS 161, ENT 205, IBIO 150, MMG 141, MMG 201, PLB 105, PSL 250 3-4

2. **College Requirements: (31)**
   - CEM 141 General Chemistry 4
   - EGR 100 Introduction to Engineering Design 2
   - CSE 220 Programming in C 3
   - MTH 132 Calculus I 3
   - MTH 133 Calculus II 4
   - MTH 234 Multivariable Calculus 4
   - MTH 235 Differential Equations 3
   - PHY 183 Physics for Scientists & Engineers I 4
   - PHY 184 Physics for Scientists & Engineers II 4

3. **Major Requirements: (61)**

   **A. Complete one of the following courses: (1)**
   - CEM 161 Chemistry Laboratory I 1
   - PHY 191 Physics Laboratory for Scientists I 1

   **B. Complete all of the following courses: (39)**
   - ECE 201 Circuits and Systems I 3
   - ECE 202 Circuits and Systems II 3
   - ECE 203 Electronic Circuits and Systems Lab 1
   - ECE 230 Digital Logic Fundamentals 3
   - ECE 280 Electrical Engineering Analysis 3
   - ECE 302 Electronic Circuits 3
   - ECE 303 Electronics Laboratory 1
   - ECE 305 Electromagnetic Fields & Waves I 4
   - ECE 313 Control Systems 3
   - ECE 320 Energy Conversion & Pwr Electronics 3
   - ECE 331 Microprocessors & Digital Systems 4
   - ECE 366 Introduction to Signal Processing 3
   - ECE 390 Ethics, Professionalism and Contemporary Issues 1
   - ECE 480 Senior Design (W) 4

   **C. Select one of the following courses: (3)**
   - CE 221 Statics 3
   - ME 201 Thermodynamics 3

   **D. Major Electives (18)**
   A minimum of six courses totaling a minimum of 18 credits, of 3- or 4-credits each, selected from at least four different areas. A laboratory course (“L”) must be included. Students may substitute, for one of the six required courses, a 3- or 4-credit experiential education experience obtained in a minimum of three out-of-classroom experiences through engineering cooperative education or independent study. Students interested in the experiential education experience must contact the department for approval.

   **Electromagnetics**
   - ECE 405 Electromagnetic Fields and Waves II (L) 4
   - ECE 407 Electromagnetic Compatibility (L) 4

   **Power**
   - ECE 420 Machines and Power Laboratory 1
   - ECE 423 Power System Analysis 3
   - ECE 425 Solid State Power Conversion 3

   **Integrated Circuits / VLSI**
   - ECE 402 Applications of Analog Integrated Circuits (L) 4
   - ECE 404 Radio Frequency Electronic Circuits (L) 4
   - ECE 410 VLSI Design (L) 4
   - ECE 411 Electronic Design Automation (L) 4
   - ECE 412 Intro to Mixed-Signal Integrated Circuits (L) 4

   **Solid-State Electronics / Electro-optics**
   - ECE 474 Principles of Electronic Devices 3
   - ECE 476 Electro-Optics (L) 4
   - ECE 477 Microelectronic Fabrication (L) 3

   **Communications / Signal Processing**
   - ECE 442 Introduction to Communication Networks 3
   - ECE 457 Communication Systems 3
   - ECE 458 Communication Systems Laboratory 1
   - ECE 466 Digital Signal Processing and Filter Design 3

   **Control / Robotics**
   - ECE 415 Computer Aided Manufacturing (L) 3
   - ECE 416 Digital Control (L) 3

   **Biomedical Engineering**
   - ECE 445 Biomedical Instrumentation (L) 3
   - ECE 446 Biomedical Signal Processing 3
   - ECE 447 Intro to Biomedical Imaging 3
   - ECE 448 Modeling & Analys of Bioelectrical Systems 3
Biomedical Engineering Concentration: (15)
The department offers a concentration for students who plan to pursue graduate work in biomedical areas or seek employment in selected medical-related areas. The concentration is available to, but not required of, any student enrolled in the Bachelor of Science degree program in Electrical Engineering. Courses completed to satisfy requirement 3. above may also be used to satisfy the requirements of the concentration. The concentration will be noted on the student’s transcript.

To earn a Bachelor of Science degree in Electrical Engineering with a biomedical engineering concentration, students must complete requirements 1., 2., and 3. above and the following.

1. Complete 6 credits from the following: (6)
   - ANTR 350 Human Gross Anatomy for Pre-Health 3
   - BS 161 Cells and Molecular Biology 3
   - PSL 250 Introductory Physiology 4
   - PSL 310 Physiology for Pre-Health Professionals 4

2. Complete 6 credits from the following: (6)
   - ECE 445 Biomedical Instrumentation 3
   - ECE 446 Biomedical Signal Processing 3
   - ECE 447 Intro to Biomedical Imaging 3
   - ECE 448 Modeling & Analys of Bioelectrical Systems 3

3. Complete at least 3 credits from 1) the list below or 2) any 400-level course listed above but not otherwise counted toward the concentration, or 3) other approved course such as ECE 490 or ECE 491 with biomedical engineering content. (3)
   - BE 444 Biosensors for Medical Diagnostics 3
   - ME 494 Biofluid Mechanics and Heat Transfer 3
   - ME 495 Tissue Mechanics 3
   - MSE 425 Biomaterials and Biocompatibility 3

Other Electives (Variable)

Total Credits Required for Degree 128

The requirements listed above apply to students admitted to the major of Electrical Engineering beginning Fall, 2013. The Department of Electrical and Computer Engineering (ECE) constantly reviews program requirements and reserves the right to make changes as necessary. Students are encouraged to consult with their advisor to obtain assistance in planning an appropriate schedule. Students who have questions about Computer Engineering should contact the Electrical and Computer Engineering Department Advising Office, 2212 Engineering Building, phone (517) 355-5242.

Program Objectives

The bachelor’s degree in electrical/computer engineering provides its graduates with a solid foundation on which they can build successful and sustainable careers in the ever-changing global work environment. The program prepares its graduates for a variety of career paths including engineering positions directly after program completion, entry to engineering graduate school, and entry to other professional graduate-level schools, and eventual leadership in technical, organizational, and entrepreneurial arenas.

Specifically, the electrical/computer engineering program prepares its graduates to become successful in:

- maintaining and increasing their technical and/or broad expertise through lifelong learning;
- using/applying their continual improving expertise in the practice of electrical/computer engineering or a related career; and
- sharing their expertise to the benefit of the larger community.

Electrical Engineering

Sample Program

<table>
<thead>
<tr>
<th>Fall Credits</th>
<th>Spring Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioscience 3/4</td>
<td>ECE 101 or 1/4</td>
</tr>
<tr>
<td>CEM 141 4</td>
<td>CSE 220 3</td>
</tr>
<tr>
<td>EGR 100 2</td>
<td>MTH 133 4</td>
</tr>
<tr>
<td>MTH 132 3</td>
<td>PHY 183 4</td>
</tr>
<tr>
<td>WRA XXX 4</td>
<td>IAH 201-210 4</td>
</tr>
<tr>
<td>Total 16/17</td>
<td>Total 16/18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall Credits</th>
<th>Spring Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Elective 3/4</td>
<td>Elective 1/4</td>
</tr>
<tr>
<td>Major Elective 3/4</td>
<td>Elective 1/4</td>
</tr>
<tr>
<td>Major Elective 3/4</td>
<td>Elective 1/4</td>
</tr>
<tr>
<td>Major Elective 3/4</td>
<td>Elective 1/4</td>
</tr>
<tr>
<td>Major Elective 3/4</td>
<td>Elective 1/4</td>
</tr>
<tr>
<td>ECE 390 1</td>
<td>ECE 201 3</td>
</tr>
<tr>
<td>Total 13/17</td>
<td>Total 10/16</td>
</tr>
</tbody>
</table>

Last revised May 2016