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
   - IAH 201-210 and IAH 211 or >
   - Integrative Studies in Social Sciences (ISS) 8
   - ISS 2XX and ISS 3XX
   - 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
   - *College Admission Requirement

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: (38)
      - 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 377 Principles of Electronic Devices 3
      - ECE 390 Ethics, Professionalism and Contemporary Issues 1
   c. Select one of the following courses: (4)
      - ECE 480 Senior Design (W) 4
      - ECE 489 Independent Senior Design 4
   d. Major Electives: (18)
      - Complete a minimum of 18 credits including at least 12 credits from the ECE focus areas below. The 12 ECE focus credits must include at least one laboratory course ("L") and at least one 3 or 4 credit course from two different focus areas. Additional credits to meet the 18 credit requirement may be taken from any 400-level engineering course or by completing an approved 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. Note that 400-level courses outside of ECE may have restrictions or require additional prerequisites not included within this degree program.

Computing and Electronics
   - ECE 402 App of Analog Integrated Curcuits (L) 4
   - ECE 410 VLSI Design (L) 4
   - ECE 430 Embedded Cyber Physical Systems (L) 4
   - ECE 431 Smart Sensor Systems (L) 3
   - ECE 442 Introduction to Communication Networks 3
   - ECE 445 Biomedical Instrumentation (L) 3
   - ECE 456 Intro to Communication & Networks Security 3

Electrosciences
   - ECE 404 Radio Frequency Electronic Circuits (L) 4
   - ECE 405 Electromagnetic Fields & Waves II (L) 4
   - ECE 407 Electromagnetic Compatibility (L) 4
   - ECE 447 Introduction to Biomedical Imaging 3
   - ECE 449 Fundamentals of Acoustics 3
   - ECE 476 Electro-Optics (L) 4
   - ECE 477 Microelectronic Fabrication (L) 3

Systems
   - ECE 415 Computer Aided Manufacturing (L) 3
   - ECE 416 Digital Control 3
   - ECE 417 Robotics (L) 4
   - ECE 420 Machines and Power Laboratory (L) 1
   - ECE 423 Power System Analysis 3
   - ECE 425 Solid State Power Conversion 3
   - ECE 446 Biomedical Signal Processing 3
   - ECE 448 Modeling & Analysis of Bioelectrical Systems 3
   - ECE 457 Communication Systems 3
   - ECE 458 Communication Systems Laboratory (L) 1
   - ECE 466 Digital Signal Processing 3
Concentration
The department offers the following concentration to students wishing an area of specialization in their degree. 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.c above may also be used to satisfy the requirements of a concentration. NOTE: Completing the Bachelor of Science degree in Electrical Engineering with a concentration may require more than 128 credits. Upon completion of the required courses for a concentration, certification will appear on the student’s official transcript.

Biomedical Engineering (15)
This concentration is for students who plan to pursue graduate work in biomedical areas or seek employment in select medical-related fields. 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 Prof 3
   - BS 161 Cells and Molecular Biology 3
   - PSL 250 Introductory Physiology 4
   - PSL 310 Physiology for Pre-Health Professionals 4

2. Complete 9 credits from the following or a 3 or 4 credit  
   ECE 490 or ECE 491 course with biomedical engineering content as approved by the student’s advisor: (9)
   - BE 444 Biosensors for Medical Diagnostics 3
   - 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
   - ECE 449 Fundamentals of Acoustics 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 2019. 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.

NOTES:

Last revised February 2019
Electrical Engineering

Sample Program

**Freshman Year**

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<th>Fall</th>
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<th>Spring</th>
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<tr>
<td>Bioscience</td>
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<tr>
<td>CEM 141</td>
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<td>CSE 220</td>
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<td>MTH 132</td>
<td>3</td>
<td>PHY 183</td>
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<td>WRA 101</td>
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**Sophomore Year**

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<td>MTH 235</td>
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**Junior Year**

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<td>ECE 313</td>
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<td>ECE 320</td>
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<td>ECE 302 &amp; 303</td>
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<td>ECE 331</td>
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<tr>
<td>ECE 305</td>
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<td>Elective</td>
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<td>IAH 211 or &gt;</td>
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**Senior Year**

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**Program Educational 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.

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