Electrical Engineering

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): 3-4
   BS 110, BS 111, ENT 205, MMG 201,
   MMG 301, PLB 105, PSL 250, ZOL 141

College Requirements (30)
CEM 141 General Chemistry 4
*EGR 100 Introduction to Engineering Design 2
*EGR 102 Introduction to Engineering Modeling 2
MTH 132 Calculus I 3
MTH 133 Calculus II 4
MTH 234 Multivariable Calculus 4
MTH 235 Differential Equations 4
PHY 183 Physics for Scientists & Engineers I 4
PHY 184 Physics for Scientists & Engineers II 4

Major Requirements (44)
CEM 161 Chemistry Laboratory I 1
OR
PHY 191 Physics Laboratory for Scientists I 1
CSE 251 Programming in C 1
ECE 201 Circuits and Systems I 3
ECE 202 Circuits and Systems II 3
ECE 203 Circuits and Systems Laboratory 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 & Power Electronics 3
ECE 331 Microprocessors & Digital Systems 4
ECE 366 Introduction to Signal Processing 3
ECE 390 Ethics, Professionalism and Cont. Issues 1
ECE 480 Senior Design 4

Select one of the following courses:
CE 221 Statics 3
ME 201 Thermodynamics 3

*EGR 100 and EGR 102 are required for all students matriculating at MSU beginning Fall Semester, 2008. Students who matriculate before Fall 2008 must complete CSE 231 in place of EGR 102.

Major Electives (18-24)
A minimum of six 3-4 credit courses totaling 18-24 credits, selected from at least four different areas. A minimum of one laboratory must be completed. (L) indicates a laboratory included in the course.

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

Power
ECE 423 / 420 Power System Analysis & Lab 3-4
Note: Lab Section (ECE 420) is optional

Integrated Circuits / VLSI
ECE 402 Applications of Analog Integrated Circuits (L) 4
ECE 404 Radio Frequency Electronic Circuits 4
ECE 410 VSI Design (L) 4
ECE 411 Electronic Design Automation (L) 4
ECE 412 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 457/458 Communication Systems & Lab 3-4
Note: Lab Section (ECE 458) is optional
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 Biomedical Imaging 3
ECE 448 Modeling & Anlys of Bioelectrical Systems 3

Experiential Education Substitution
Students may use registered "out of classroom" experiences to waive one 400-level requirement outside of the major elective requirement. This is a combination of 3 or more experiences documented by pre-approved EGR/ECE credits (EGR 393, ECE 490/499).
Biomedical Engineering Concentration (15)
The Biomedical Engineering Concentration is a specific group of courses that can be completed by students who are enrolled in the Electrical Engineering bachelor degree program. It is designed for undergraduates who plan to pursue graduate work in biomedical areas or seek employment in selected medical-related areas. The option is administered by the Electrical and Computer Engineering Department and upon completion, will be noted on the final transcript.

Completion of courses in this concentration may also satisfy Major and Elective course requirements. Check with the academic adviser for guidance.

At least 6 credits from the following Life Sciences courses:
ANTR 350  Human Gross Anatomy & Structural Biology 3
BS 111   Cells and Molecules 3
PSL 250  Introductory Physiology 4
PSL 431  Human Physiology I 3
PSL 432  Human Physiology II 3

At least 6 credits from the following ECE courses:
ECE 445  Biomedical Instrumentation 3
ECE 446  Biomedical Signal Processing 3
ECE 447  Biomedical Imaging 3
ECE 448  Modeling & Anlys of Bioelectrical Systems 3

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 courses such as ECE 490 or 491 with biomedical engineering content:
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, 2008. 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.

Last revised May 2008
# Electrical Engineering

## Sample Program

### Freshman Year

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<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
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<tr>
<td>WRA 1XX or</td>
<td>4</td>
<td>WRA 1XX</td>
<td>4</td>
</tr>
<tr>
<td>ISS 2XX</td>
<td></td>
<td>or IAH 20X</td>
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<tr>
<td>Bioscience (AT)</td>
<td>3/4</td>
<td>EGR 102</td>
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<td>PHY 183</td>
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<td>MTH 132</td>
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<td>ECE 101 or</td>
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Total: 16/17

### Sophomore Year

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<td>ECE 230</td>
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<td>PHY 184</td>
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<td>ME 201 / CE 221</td>
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<td>PHY 191 or</td>
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<td>MTH 235</td>
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<td>CEM 161</td>
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Total: 16

### Junior Year

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Total: 18

### Senior Year

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</table>

Total: 14/17

## Program Objectives

The electrical engineering program provides its graduates with a solid foundation on which they can build successful and sustainable careers. Within the first several years following graduation, graduates of the electrical engineering program will:

1. **have accrued an understanding of the discipline**, built on an exposure to a broad range of electrical engineering topics including the latest and emerging techniques and technologies.

2. **have established expertise within the discipline**, originating with in-depth study in selected curricular areas emphasizing the solution to engineering problems using proper tools, practical approaches, and creative problem solving.

3. **be engaged in lifelong learning** in electrical engineering, based on a strong foundation in the core sciences and mathematics.

4. **have an appreciation for the global and societal impact of the discipline**, through an exposure to contemporary issues, and a knowledge and respect for ethical standards and professional responsibilities.

5. **have successfully utilized essential professional skills**, such as teamwork and communications, both oral and written, within the context of engineering problem solving and design.

The electrical engineering program is accredited by the Accreditation Board for Engineering and Technology (ABET).

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*Last revised May 2008*