NOT FOR USE FOR CURRICULAR COURSE CHANGES
REQUEST FOR PROGRAM IMPROVEMENTS

NOTE: Changes to programs may require course changes, which must be processed electronically. Any questions should be directed to Associate Provost David Reinhold at 7-4564 or david.reinhold@wmich.edu

DEPARTMENT: ECE
COLLEGE: CEAS
PROPOSED EFFECTIVE FALL YEAR: 2020

PROPOSED IMPROVEMENTS: Academic Program Proposed Improvements

☐ New degree*
☐ New major*  ☐ New minor*
☐ New curriculum*  ☐ Deletion*
☐ New concentration*  ☐ Revised major
☐ New certificate*
☐ Revised minor
☐ Admission requirements
☐ Graduation requirements
☐ Change in Title
☐ Transfer

☐ Other (explain**)  ** Other: Only revised general education requirements for WMU Essential Studies

Title of degree, curriculum, major, minor, concentration, or certificate: Electrical Engineering

Chair, Department Curriculum Committee:  Date 10/9/19

CHECKLIST FOR DEPARTMENT CHAIRS/DIRECTORS

☐ For new programs and other changes that have resource implications, the dean has been consulted.
☐ When appropriate, letters of support from department faculty are attached.
☐ When appropriate, letters of support from other departments in the same college are attached.
☐ When appropriate, letters of support from other college deans, whose programs/courses may be affected by the change, are attached.
☐ The proposal has been reviewed by HIGE for possible implications for international student enrollment.
☐ The proposal is consistent with the departmental assessment plan, and identifies measurable learning outcomes for assessment.
☐ Detailed resource plan is attached where appropriate.
☐ All questions attached have been completed and supporting documents are attached.
☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Chair/Director:  Date 10/9/19

CHECKLIST FOR COLLEGE CURRICULUM COMMITTEE

☐ The academic quality of the proposal and the faculty involved has been reviewed.
☐ Detailed resource plan is attached where appropriate.
☐ Consistency between the proposal and the relevant catalog language has been confirmed.
☐ The proposal has been reviewed for effect on students transferring from Michigan community colleges. Detailed information on transfer articulation must be included with undergraduate proposals.
☐ Consistency between the proposal and the College and department assessment plans has been confirmed.
☐ Consistency between the proposal and the College and department strategic plans has been confirmed.
☐ All questions attached have been completed and supporting documents are attached.
☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Chair, College Curriculum Committee:  Date

Revised Sept. 2018. All previous forms are obsolete and should not be used.
CHECKLIST FOR COLLEGE DEANS

☐ For new programs and proposed program deletions, the provost has been consulted.
☐ For new programs, letter of support from University Libraries Dean indicating library resource requirements have been met.
☐ When appropriate, letters of support from other college faculty and/or chairs are attached.
☐ When appropriate, letters of support from other college deans, whose programs/courses may be affected by the change, are attached.
☐ The proposal has been reviewed for implications for accreditation, certification, or licensure.
☐ Detailed resource plan is attached where appropriate.
☐ All questions attached have been completed and supporting documents are attached.
☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Dean: __________________________ Date: __________________________

FOR PROPOSALS REQUIRING REVIEW BY:
GSC/USC; EPGC, GRADUATE COLLEGE, and/or FACULTY SENATE EXECUTIVE BOARD

☐ Return to Dean

☐ Forward to:
   Curriculum Manager: __________________________ Date: __________________________

☐ Approve ☐ Disapprove
   Chair, GSC/USC: __________________________ Date

☐ Approve ☐ Disapprove
   Chair, EPGC: __________________________ Date

☐ Approve ☐ Disapprove
   Graduate College Dean: __________________________ Date

☐ Approve ☐ Disapprove
   Faculty Senate President: __________________________ Date

☐ Approve ☐ Disapprove
   *needs review by
   Provost: __________________________ Date

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REQUEST FOR PROGRAM IMPROVEMENTS

1. Explain briefly and clearly the proposed improvement:
   Updated program content to address WMU Essential Studies Program requirements and to incorporate credit hour changes to courses.

2. Rationale. Give your reason(s) for the proposed improvement.
   Required to remove references to general education requirements and update with WMU Essential Studies Program requirements.

3. Effect on other colleges, departments, or programs. If consultation with others is required, attach evidence of consultation and support. If objections have been raised, document the resolution. Demonstrate that the program you propose is not a duplication of an existing one.
   No effect.

4. Effect on your department’s programs. Show how the proposed change fits with other departmental offerings.
   This change will add one (1) credit hour to the program.

5. Alignment with college’s and department’s strategic plan, mission, and vision.
   Provides broad-based liberal arts education for civil engineering students and supports both ABET requirements and ASCE Body of Knowledge recommendations to ensure we graduate well-rounded civil engineers ready to lead challenges facing our society.

6. Effects on enrolled students: Are program conflicts avoided? Will your proposal make it easier or harder for students to meet graduation requirements? Can students complete the program in a reasonable time? Show that you have considered scheduling needs and demands on students’ time.
   No effect on enrolled students as they will continue under the catalog year with which they entered. A deliberate transition will occur university-wide to address any issues that arise for current students.

7. Student or external market demand. What is your anticipated student audience? What evidence of student or market demand or need exists? What is the estimated enrollment? What other factors make your proposal beneficial to students?
   Not applicable.

8. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. If proposing a new program, include a letter and/or email of support from the university libraries affirming that the library resource issues have been reviewed. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.)
   None. All revisions to the civil engineering program in response to the new WMU Essential Studies Program were coordinated across the college and university through the WMU Essential Studies Program design.

9. List the learning outcomes for the revised or proposed major, minor, or concentration. The department will use these outcomes for future assessments of the program.
   No change to program outcomes.

   1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
   2. an ability to 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. an ability to communicate effectively with a range of audiences.
   4. an ability to 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.

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5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

10. Describe how this change is a response to assessment outcomes that are part of a department or college assessment plan or informal assessment activities.

The changes were in response to a university-wide revised general education program.

11. (Undergraduate proposals only) Describe in detail how this change affects transfer articulation for Michigan community colleges. For new majors or minors, describe transfer guidelines to be developed with Michigan community colleges. For revisions to majors or minors, describe necessary revisions to Michigan community college guidelines. Department chairs should seek assistance from college advising directors or from the admissions office in completing this section.

This aspect is being addressed by the Director of the WMU Essential Studies Program, the Associate Provost for Assessment and Undergraduate Studies, and the advising staff.

12. Please offer both “Current Catalog Language” and “Proposed Catalog Language” if there is to be a change in the catalog description for a given program. For the “current” language, please copy and paste relevant language from the most current catalog and for the “proposed” language, please share the exact proposed new catalog language. As possible, bold or otherwise note the key changes in the new proposed catalog language.

CURRENT CATALOG COPY


Program Educational Objectives

Electrical Engineering Graduates, within a few years of graduation, should:

1. Use their understanding of electrical engineering fundamentals to solve problems in professional practice while exhibiting rigorous analysis and creative design skills that reflect their technical depth and ability to draw on multiple disciplines;

2. Continue their intellectual development through professional development courses, including online learning opportunities, and/or graduate education; and

3. Practice their career in a manner consistent with a high degree of professional ethics, and participate in their community and professional organizations.

(For up-to-date program educational objectives and learning outcomes, see the Department web page at www.wmich.edu/electrical-computer)

Admission

1. To be admitted to this Engineering curriculum, a student must complete all pre-engineering requirements with grades of “C” or better. These requirements may be found in the beginning of the College of Engineering and Applied Sciences section.

2. Students seeking admission to this curriculum must submit an application following procedures established by the College of Engineering and Applied Sciences. Upper level transfer students may complete an application prior to their first semester of enrollment. Only students in good academic standing as defined by the University will be admitted to this curriculum.

Revised Sept. 2018. All previous forms are obsolete and should not be used.
Baccalaureate-Level Writing Requirement

Students who have chosen the Electrical Engineering curriculum will satisfy the Baccalaureate-Level Writing Requirement by successfully completing IEE 3160 - Report Preparation Credits: 3 hours.

Requirements

Candidates for the Bachelor of Science in Engineering (Electrical) must satisfy the following requirements in addition to those required by Western Michigan University:

1. A grade point average of 2.0 or better must be earned in courses presented for graduation with ECE, IEE, and ME prefixes.
2. Students may enroll in an ECE course only after earning at least a “C” in its prerequisite course(s).
3. No more than two grades of “D” or “DC” in courses presented for graduation may be counted for graduation.
4. The following program of 125 or more semester credit hours must be completed. For transfer students at least 16 credit hours of ECE course work must be completed at WMU. The schedule below is an example of one leading to graduation in eight semesters, beginning in fall. Pre-engineering requirements are indicated.

5. The Electrical Engineering curriculum requires students to complete a course in General Education Area I, Area II, Area III, Area IV, Area V, and Area VIII. At least two of the General Education Area courses must be at the 3000/4000-level, and no more than two courses from any one department may be used to satisfy the Area requirements.

First Semester (16 hours)

- General Education Credits: 2 hours
- CHEM 1100 - General Chemistry I Credits: 3 hours
  Pre-engineering requirement
- CHEM 1110 - General Chemistry Laboratory I Credits: 1 hour
  Pre-engineering requirement
- ECE 2500 - Digital Logic Credits: 3 hours
- IEE 1020 - Technical Communication Credits: 3 hours
  Pre-engineering requirement
- MATH 1220 - Calculus I Credits: 4 hours
  or
- MATH 1700 - Calculus I, Science and Engineering Credits: 4 hours
  Pre-engineering requirement

Revised Sept. 2018. All previous forms are obsolete and should not be used.
Second Semester (15-16 hours)
- General Education Credits: 3 hours
- CS 1110 - Computer Science I Credits: 4 hours
  or
- CS 1200 - Programming in C for Engineers Credits: 3 hours
- MATH 1230 - Calculus II Credits: 4 hours
  or
- MATH 1710 - Calculus II, Science and Engineering Credits: 4 hours
  Pre-engineering requirement
- PHYS 2050 - University Physics I Credits: 4 hours
  Pre-engineering requirement
- PHYS 2060 - University Physics I Laboratory Credits: 1 hour
  Pre-engineering requirement

Third Semester (16 hours)
- General Education Credits: 3 hours
- ECE 2510 - Introduction to Microprocessors Credits: 4 hours
- MATH 2720 - Multivariate Calculus and Matrix Algebra Credits: 4 hours
  Pre-engineering requirement
- PHYS 2070 - University Physics II Credits: 4 hours
  Pre-engineering requirement
- PHYS 2080 - University Physics II Laboratory Credits: 1 hour
  Pre-engineering requirement

Fourth Semester (15-16 hours)
- General Education Credits: 3 hours
- ECE 2100 - Circuit Analysis Credits: 4 hours
  Pre-engineering requirement
- MATH 3740 - Differential Equations and Linear Algebra Credits: 4 hours

Science Elective Credits (4 hours)
Select one of the following:
- CHEM 1120 - General Chemistry II Credits: 3 hours
  and
- CHEM 1130 - General Chemistry Laboratory II Credits: 1 hour
  or
- PHYS 3090 - Introductory Modern Physics Credits: 4 hours
  and
- PHYS 3100 - Introductory Modern Physics Lab Credits: 1 hour

Revised Sept. 2018. All previous forms are obsolete and should not be used.
Fifth Semester (17 hours)
- General Education Credits: 3 hours
- Engineering Science Elective Credits: 3 hours
- ECE 2210 - Electronics I Credits: 4 hours
- ECE 3100 - Network Analysis Credits: 3 hours
- ECE 3610 - Electromagnetic Fields Credits: 4 hours

Sixth Semester (16 hours)
- Engineering Science Elective Credits: 3 hours
- ECE 3200 - Electronics II Credits: 4 hours
- ECE 3710 - Linear Systems Credits: 3 hours
- ECE 3800 - Probabilistic Methods of Signal and System Analysis Credits: 3 hours
- IEE 3160 - Report Preparation Credits: 3 hours

Seventh Semester (15 hours)
- Engineering Science Elective Credits: 3 hours
- Electrical and Computer Engineering Elective Group Credits: 3 hours
- IEE 3100 - Engineering Economy Credits: 3 hours
- ECE 3300 - Electrical Machinery Credits: 4 hours
- ECE 4810 - Electrical/Computer Engineering Design I Credits: 2 hours
  Permission form required to be signed by ECE advisor and department chair. Must complete IEE 3160
  and ECE 2510 and ECE 3710, and either (ECE 3200 or ECE 3300) or (ECE 4525 and ECE 4510).

Eighth Semester (15 hours)
- General Education Credits: 3 hours
- Engineering Science Elective Credits: 3 hours
- Electrical and Computer Engineering Elective Group Credits: 3 hours
- Electrical and Computer Engineering Elective Group Credits: 3 hours
- ECE 4820 - Electrical/Computer Engineering Design II Credits: 3 hours

Revised Sept. 2018. All previous forms are obsolete and should not be used.
PROPOSED CATALOG COPY (CHANGES IN YELLOW)


Program Educational Objectives

Electrical Engineering Graduates, within a few years of graduation, should:

1. Use their understanding of electrical engineering fundamentals to solve problems in professional practice while exhibiting rigorous analysis and creative design skills that reflect their technical depth and ability to draw on multiple disciplines;

2. Continue their intellectual development through professional development courses, including online learning opportunities, and/or graduate education; and

3. Practice their career in a manner consistent with a high degree of professional ethics, and participate in their community and professional organizations.

(For up-to-date program educational objectives and learning outcomes, see the Department web page at www.wmich.edu/electrical-computer)

Admission

4. To be admitted to this Engineering curriculum, a student must complete all pre-engineering requirements with grades of “C” or better. These requirements may be found in the beginning of the College of Engineering and Applied Sciences section.

5. Students seeking admission to this curriculum must submit an application following procedures established by the College of Engineering and Applied Sciences. Upper level transfer students may complete an application prior to their first semester of enrollment. Only students in good academic standing as defined by the University will be admitted to this curriculum.

WMU Essential Studies Program Requirements

Students who have chosen the electrical engineering curriculum will satisfy the WMU Essential Studies Program Requirements as outlined within the course listings below. To satisfy these requirements students take courses in twelve (12) categories. Six (6) of the courses are designated within the electrical engineering program requirements and six (6) are free electives which students choose from a list of courses in the corresponding course category. Students will meet the planetary sustainability outcome in ECE4820: Senior Project and must select a course that satisfies the Diversity and Inclusion outcome when choosing a course in the other six (6) categories.

Requirements

Candidates for the Bachelor of Science in Engineering (Electrical) must satisfy the following requirements in addition to those required by Western Michigan University:

1. A grade point average of 2.0 or better must be earned in courses presented for graduation with ECE, IEE, and ME prefixes.
2. Students may enroll in an ECE course only after earning at least a “C” in its prerequisite course(s).
3. No more than two grades of “D” or “DC” in courses presented for graduation may be counted for graduation.
4. The following program of 126 or more semester credit hours must be completed. For transfer students at least 16 credit hours of ECE course work must be completed at WMU. The schedule below is an example of one leading to graduation in eight semesters, beginning in fall. Pre-engineering requirements are indicated.

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First Semester (17 hours)
- WMU Essential Studies Level 2: Personal Wellness Course Elective  Credits: 3 hours
- CHEM 1100 - General Chemistry I  Credits: 3 hours
  Pre-engineering requirement
- CHEM 1110 - General Chemistry Laboratory I  Credits: 1 hour
  Pre-engineering requirement
- ECE 2500 - Digital Logic  Credits: 3 hours
- IEE 1020 - Technical Communication  Credits: 3 hours
  Pre-engineering requirement
  (Satisfies WMU Essential Studies Level 1: Writing Course Requirement)
- MATH 1220 - Calculus I  Credits: 4 hours
  or
- MATH 1700 - Calculus I, Science and Engineering  Credits: 4 hours
  Pre-engineering requirement
  (Satisfies WMU Essential Studies Level 1: Quantitative Literacy Course Requirement)

Second Semester (15-16 hours)
- WMU Essential Studies Level 2: Artistic Theory and Practice Course Elective  Credits: 3 hours
- CS 1110 - Computer Science I  Credits: 4 hours
  or
- CS 1200 - Programming in C for Engineers  Credits: 3 hours
- MATH 1230 - Calculus II  Credits: 4 hours
  or
- MATH 1710 - Calculus II, Science and Engineering  Credits: 4 hours
  Pre-engineering requirement
- PHYS 2050 - University Physics I  Credits: 4 hours
  Pre-engineering requirement
  (Satisfies WMU Essential Studies Level 2: Laboratory Science Course Requirement)
- PHYS 2060 - University Physics I Laboratory  Credits: 1 hour
  Pre-engineering requirement
  (Satisfies WMU Essential Studies Level 2: Laboratory Science Course Requirement)

Third Semester (16 hours)
- WMU Essential Studies Level 2: Societies and Cultures Course Elective  Credits: 3 hours
- ECE 2510 - Introduction to Microprocessors  Credits: 4 hours
- MATH 2720 - Multivariate Calculus and Matrix Algebra  Credits: 4 hours
  Pre-engineering requirement
- PHYS 2070 - University Physics II  Credits: 4 hours
  Pre-engineering requirement
- PHYS 2080 - University Physics II Laboratory  Credits: 1 hour
  Pre-engineering requirement

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Fourth Semester (15-16 hours)
- WMU Essential Studies Level 1: Inquiry and Engagement Course Elective Credits: 3 hours
- ECE 2100 - Circuit Analysis Credits: 4 hours
  Pre-engineering requirement
- MATH 3740 - Differential Equations and Linear Algebra Credits: 4 hours

Science Elective Credits (4 hours)
Select one of the following:
- CHEM 1120 - General Chemistry II Credits: 3 hours
  and
- CHEM 1130 - General Chemistry Laboratory II Credits: 1 hour
  or
- PHYS 3090 - Introductory Modern Physics Credits: 4 hours
  and
- PHYS 3100 - Introductory Modern Physics Lab Credits: 1 hour

Fifth Semester (17 hours)
- WMU Essential Studies Level 2: World Language and Cultures Course Elective Credits: 3 hours
- Engineering Science Elective Credits: 3 hours
  ECE 2210 - Electronics I Credits: 4 hours
  (Satisfies WMU Essential Studies Level 1: Oral and Digital Communication Course Requirement)
- ECE 3100 - Network Analysis Credits: 3 hours
- ECE 3610 - Electromagnetic Fields Credits: 4 hours

Sixth Semester (16 hours)
- Engineering Science Elective Credits: 3 hours
- ECE 3200 - Electronics II Credits: 4 hours
- ECE 3710 - Linear Systems Credits: 3 hours
- ECE 3800 - Probabilistic Methods of Signal and System Analysis Credits: 3 hours
- IEE 3160 - Report Preparation Credits: 3 hours

Seventh Semester (15 hours)
- Engineering Science Elective Credits: 3 hours
- Electrical and Computer Engineering Elective Group Credits: 3 hours
  IEE 3100 - Engineering Economy Credits: 3 hours
  (Satisfies WMU Essential Studies Level 2: Science and Technology Course Requirement)
- ECE 3300 - Electrical Machinery Credits: 4 hours
- ECE 4810 - Electrical/Computer Engineering Design I Credits: 2 hours
  Permission form required to be signed by ECE advisor and department chair. Must complete IEE 3160
  and ECE 2510 and ECE 3710, and either (ECE 3200 or ECE 3300) or (ECE 4525 and ECE 4510).

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Eighth Semester (15 hours)

- WMU Essential Studies Level 3: Global Perspectives Course Elective  Credits: 3 hours
- Engineering Science Elective  Credits: 3 hours
- Electrical and Computer Engineering Elective Group  Credits: 3 hours
- Electrical and Computer Engineering Elective Group  Credits: 3 hours
- **ECE 4820 - Electrical/Computer Engineering Design II** Credits: 3 hours
  (Satisfies WMU Essential Studies Level 3: Local and National Perspectives Course Requirement and the required Planetary Sustainability outcome.)