

**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

- | | | |
|---|--|--|
| <input type="checkbox"/> New degree* | <input type="checkbox"/> New minor* | <input type="checkbox"/> Admission requirements |
| <input type="checkbox"/> New major* | <input type="checkbox"/> Deletion* | <input type="checkbox"/> Graduation requirements |
| <input checked="" type="checkbox"/> New curriculum* | <input type="checkbox"/> Revised major | <input type="checkbox"/> Change in Title |
| <input type="checkbox"/> New concentration* | <input type="checkbox"/> Revised minor | <input type="checkbox"/> Transfer |
| <input type="checkbox"/> New certificate* | | |

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

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

Chair, Department Curriculum Committee:	Date
--	-------------

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: <i>Bradley J Bazuin</i>	Date 10/14/2020
--	------------------------

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
---	-------------

**NOT FOR USE FOR CURRICULAR COURSE CHANGES
REQUEST FOR PROGRAM IMPROVEMENTS**

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

<input type="checkbox"/> Return to Dean		
<input type="checkbox"/> Forward to:	Curriculum Manager:	Date:
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	*needs review by Chair, GSC/USC:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Chair, EPGC:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Graduate College Dean:	Date:
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Faculty Senate President:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	*needs review by Provost:	Date

**NOT FOR USE FOR CURRICULAR COURSE CHANGES
REQUEST FOR PROGRAM IMPROVEMENTS**

1. Explain briefly and clearly the proposed improvement:

This proposal is a continuation and completion of the computer engineering change proposal from fall 2019.

The course changes for ECE 3510 and ECE 4570 that were combined as a package for 2019 were not forwarded by CEAS CCC chair after approval in fall 2019. After recognizing this failure in the spring, they were forwarded and have now been approved. Last minute changes to the catalog and curriculum were required. This proposal reincorporates the changes.

Also, here are modification to senior level ECE/CS elective course allowed based on the increased number of CS electives included in 2019.

2. Rationale. Give your reason(s) for the proposed improvement.

To complete implementation of changes intended to be made in 2019 but delayed by the CEAS CCC chair's failure to forward the approved course changes.

To increase options available for CS/ECE electives and insure that 2 of 4 course are ECE.

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.

The approved course change of ECE 3570 to ECE 4570 will add one credit hour (a lab) to the program.

5. Alignment with college's and department's strategic plan, mission, and vision.

Provides broad-based liberal arts education for computer engineering students and supports ABET accreditation requirements to ensure we graduate well-rounded computer engineers.

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 program effect on enrolled students as they will continue under the catalog year with which they entered.

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.

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 the required ABET program educational 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.**
 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 program changes were in response to course changes in the ECE and CS curriculum.

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.

The following pages show the required page changes from the 2020-2021 catalog to the 2021-2022 catalog.

(The appropriate catalog subsections are referenced.)

p. 528

Accelerated Degree Program

The Accelerated Master's Degree Program (AGDP) allows qualified undergraduate students in the Electrical Engineering program or in the Computer Engineering program to complete the requirements for the Master's degree at an accelerated pace. Currently, earning 126 undergraduate credit hours is required to receive a Bachelor's degree in Electrical Engineering; 129 undergraduate credit hours are required to receive a Bachelor's degree in Computer Engineering. The Master's degree requirement is 33 graduate credit hours with the non-thesis option, or 30 hours with the thesis option. In either case, at least 15 hours must be taken at the 6000-level. Having enrolled in the AGDP program students may count up to 12 credit hours of 5000-level courses taken during their undergraduate studies at WMU toward a Master's degree in either Electrical Engineering or in Computer Engineering. Full time students may be able to complete both their Bachelor's and Master's degrees in a five-year period.

(gap)

p. 530

Computer Engineering Major

A major in computer Engineering leading to a BSE degree will consist of the following required courses:

- ECE 3100 - Network Analysis **Credits:** 3 hours
- ECE 3570 - Introduction to Computer Architecture **Credits:** 4 hours
- ECE 3710 - Linear Systems **Credits:** 3 hours
- ECE 3800 - Probabilistic Methods of Signal and System Analysis **Credits:** 3 hours
- ECE 4510 - Microcontroller Applications **Credits:** 4 hours
- ECE 4525 - Digital Design **Credits:** 4 hours
- ECE 4810 - Electrical/Computer Engineering Design I **Credits:** 2 hours
- ECE 4820 - Electrical/Computer Engineering Design II **Credits:** 3 hours

(gap)

p. 532

Electrical and Computer Engineering/Computer Science Elective Group

Students must complete a total of four elective courses (minimum of 12 credit hours).

It is strongly suggested that one additional CS and either ECE 4500 or ECE 4550 be taken.

- CS 3240 - System Programming Concepts **Credits:** 3 hours
- CS 4310 - Design and Analysis of Algorithms **Credits:** 3 hours
(When not taken as the CS Elective)
- CS 4430 - Database Management Systems **Credits:** 3 hours
- CS 4540 - Operating Systems **Credits:** 3 hours
(When not taken as the CS Elective)
- ECE 3510 - Engineering of Real Time Systems **Credits:** 3 hours
- ECE 4500 - Digital Electronics **Credits:** 4 hours
- ECE 4550 - Digital Signal Processing **Credits:** 3 hours
- ECE 4600 - Communication Systems **Credits:** 3 hours

Note:

Other 4000 or 5000-level Electrical and Computer Engineering or Computer Science courses may be used in place of these courses if PRIOR approval is obtained from the Electrical and Computer Engineering Advisor and Department Chair.

(gap)

p. 533

Third Semester (17 hours)

- ECE 2100 - Circuit Analysis **Credits:** 4 hours

Pre-engineering requirement

- 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 (17 hours)

- WMU Essential Studies Level 2: Exploration and Discovery – Societies and Cultures Category Course Elective **Credits:** 3 hours
- CS 1120 - Computer Science II **Credits:** 4 hours
- ECE 3570 - Introduction to Computer Architecture **Credits:** 4 hours
- MATH 1450 - Discrete Mathematical Structures **Credits:** 3 hours
- MATH 3740 - Differential Equations and Linear Algebra **Credits:** 4 hours

Accelerated Degree Program

The Accelerated Master's Degree Program (AGDP) allows qualified undergraduate students in the Electrical Engineering program or in the Computer Engineering program to complete the requirements for the Master's degree at an accelerated pace. Currently, earning 126 undergraduate credit hours is required to receive a Bachelor's degree in Electrical Engineering; 130 undergraduate credit hours are required to receive a Bachelor's degree in Computer Engineering. The Master's degree requirement is 33 graduate credit hours with the non-thesis option, or 30 hours with the thesis option. In either case, at least 15 hours must be taken at the 6000-level. Having enrolled in the AGDP program students may count up to 12 credit hours of 5000-level courses taken during their undergraduate studies at WMU toward a Master's degree in either Electrical Engineering or in Computer Engineering. Full time students may be able to complete both their Bachelor's and Master's degrees in a five-year period.

Computer Engineering Major

A major in computer Engineering leading to a BSE degree will consist of the following required courses:

- ECE 3100 - Network Analysis **Credits:** 3 hours
- ECE 4570 - Introduction to Computer Architecture **Credits:** 4 hours
- ECE 3710 - Linear Systems **Credits:** 3 hours
- ECE 3800 - Probabilistic Methods of Signal and System Analysis **Credits:** 3 hours
- ECE 4510 - Microcontroller Applications **Credits:** 4 hours
- ECE 4525 - Digital Design **Credits:** 4 hours
- ECE 4810 - Electrical/Computer Engineering Design I **Credits:** 2 hours
- ECE 4820 - Electrical/Computer Engineering Design II **Credits:** 3 hours

Electrical and Computer Engineering/Computer Science Elective Group

Students must complete a total of four elective courses (minimum of 12 credit hours). Of the four electives, at least two elective courses must be ECE courses (minimum of 6 credit hours). It is strongly suggested that one additional CS and either ECE 4500 or ECE 4550 be taken.

- CS 3240 - System Programming Concepts **Credits:** 3 hours
- CS 4430 - Database Management Systems **Credits:** 3 hours
- Any of the CS Elective courses when not taken as the CS Elective
- ECE 3510 - Engineering of Real Time Systems **Credits:** 3 hours
- ECE 4500 - Digital Electronics **Credits:** 4 hours
- ECE 4550 - Digital Signal Processing **Credits:** 3 hours
- ECE 4600 - Communication Systems **Credits:** 3 hours

Note:

Other 4000 or 5000-level Electrical and Computer Engineering or Computer Science courses may be used in place of these courses if PRIOR approval is obtained from the Electrical and Computer Engineering Advisor and Department Chair.

Third Semester (17 hours)

- CS 1120 - Computer Science II **Credits:** 4 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 (18 hours)

- WMU Essential Studies Level 2: Exploration and Discovery – Societies and Cultures Category Course Elective **Credits:** 3 hours
 - ECE 2100 - Circuit Analysis **Credits:** 4 hours
- Pre-engineering requirement
- ECE 4570 - Introduction to Computer Architecture **Credits:** 4 hours
 - MATH 1450 - Discrete Mathematical Structures **Credits:** 3 hours
 - MATH 3740 - Differential Equations and Linear Algebra **Credits:** 4 hours