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: CCE
PROPOSED EFFECTIVE FALL YEAR: 2020

PROPOSED IMPROVEMENTS: Academic Program Proposed Improvements
☐ New degree* ☐ New minor*
☐ New major* ☐ Deletion*
☐ New curriculum* ☐ Revised major
☐ New concentration* ☐ Revised minor
☐ New certificate*

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

Title of degree, curriculum, major, minor, concentration, or certificate: Construction Engineering Major (CENJ)

Chair, Department Curriculum Committee: ____________________________ Date 9/30/2019

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 9/30/2019

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.

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### For Proposals Requiring Review By:

GSC/USC; EPGC, Graduate College, and/or Faculty Senate Executive Board

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

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.
   
   None.

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

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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

The Construction Engineering curriculum prepares students for entry-level positions in construction planning, management, or development. Technical, business, and human relations knowledge and skills are developed in classroom settings and on residential and commercial construction job sites.


For up-to-date educational objectives and learning outcomes, see department web page at www.wmich.edu/civil-construction/academics/abet/outcomes.

Baccalaureate-Level Writing Requirement

Students who have chosen the Civil or Construction Engineering curriculum will satisfy the Baccalaureate-Level Writing Requirement by successfully completing CCE 4830: Project Design and Control and CCE 4850: Senior Project.

Requirements

Candidates for the Bachelor of Science in Engineering must complete the following program of 126 semester credit hours as well as University requirements stated elsewhere in this catalog.

1. A “C” or better must be earned in all courses with a CCE, IEE, EDMM or ME prefix.
2. A student is required to earn a grade of “C” or better in the prerequisite courses for all CCE courses before enrollment is permitted in the next sequence course.
3. No more than two grades of “D” or “DC” in courses presented for graduation may be counted for graduation.
4. Complete the following program of 126 semester hours. The schedule below is an example of one leading to graduation in eight semesters. Pre-engineering requirements are indicated.
5. The Construction 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. Construction Engineering majors are required to take PHIL 3160 for Area II and Econ 2010 for Area V.

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First Semester (15 hours)

The following courses are Pre-engineering requirements.

- **CCE 1001 - Introduction to Engineering Design** Credits: 1 hour
- **GEOS 1300 - Physical Geology** Credits: 4 hours
- **IEE 1020 - Technical Communication** Credits: 3 hours
  (Satisfies General Education Proficiency 1)
- **EDMM 1420 - Engineering Graphics** Credits: 3 hours
- **MATH 1220 - Calculus I** Credits: 4 hours
  or
- **MATH 1700 - Calculus I, Science and Engineering** Credits: 4 hours

Second Semester (16 hours)

The following courses are Pre-engineering requirements.

- **CCE 1002 - Introduction to Engineering Analysis** Credits: 1 hour
- **CHEM 1100 - General Chemistry I** Credits: 3 hours
  (Satisfies General Education Area VI)
- **CHEM 1110 - General Chemistry Laboratory I** Credits: 1 hour
  (Satisfies General Education Area VI)
- **CS 1022 - Introduction to Engineering Computing II: Mathematical Software** Credits: 1 hour
- **CS 1023 - Introduction to Engineering Computing III: Computer Programming** Credits: 1 hour
- **MATH 1230 - Calculus II** Credits: 4 hours
  or
- **MATH 1710 - Calculus II, Science and Engineering** Credits: 4 hours
- **PHYS 2050 - University Physics I** Credits: 4 hours
  (Satisfies General Education Area VI)
- **PHYS 2060 - University Physics I Laboratory** Credits: 1 hour
  (Satisfies General Education Area VI)

Third Semester (18 hours)

- **CCE 2360 - Geomatics** Credits: 3 hours

Revised Sept. 2018. All previous forms are obsolete and should not be used.
• **IEE 2610 - Engineering Statistics** Credits: 3 hours
• **MATH 2720 - Multivariate Calculus and Matrix Algebra** Credits: 4 hours
  Pre-engineering requirement
• **ME 2560 - Statics** Credits: 3 hours
  Pre-engineering requirement
• **PHYS 2070 - University Physics II** Credits: 4 hours
  Pre-engineering requirement
• **PHYS 2080 - University Physics II Laboratory** Credits: 1 hour

Fourth Semester (16 hours)

• General Education Area I - Fine Arts Credits: 3 hours
• **MATH 3740 - Differential Equations and Linear Algebra** Credits: 4 hours
• **ME 2570 - Mechanics of Materials** Credits: 3 hours
  Pre-engineering requirement
• **ME 2580 - Dynamics** Credits: 3 hours
• **MGMT 2500 - Organizational Behavior** Credits: 3 hours

Fifth Semester (15 hours)

• **CCE 3360 - Soil Mechanics** Credits: 3 hours
• **ECON 2010 - Principles of Microeconomics** Credits: 3 hours
  (Satisfies General Education Area V)
• **IEE 3100 - Engineering Economy** Credits: 3 hours
• **ME 3560 - Fluid Mechanics** Credits: 3 hours
• **PHIL 3160 - Ethics in Engineering and Technology** Credits: 3 hours
  (Satisfies General Education Area II)

Sixth Semester (15 hours)

• Engineering Science or Design Elective Credits: 3 hours
• Engineering Science of Design Elective Credits: 3 hours
• **CCE 3080 - Civil and Construction Engineering Materials** Credits: 3 hours
• **CCE 3330 - Construction Codes, Specifications, and Contracts** Credits: 3 hours

Revised Sept. 2018. All previous forms are obsolete and should not be used.
• CCE 3860 - Structural Analysis Credits: 3 hours

Seventh Semester (16 hours)

• General Education Area III - U.S. Cultures and Issues Credits: 3 hours
• ACTY 2100 - Principles of Accounting | Credits: 3 hours
• CCE 4310 - Construction Planning and Scheduling Credits: 3 hours
• CCE 4360 - Construction Estimating, Bidding, and Cost Control Credits: 3 hours
• CCE 4400 - Introduction to Structural Design Credits: 3 hours
• CCE 4830 - Project Design and Control Credits: 1 hour

Eighth Semester (14 hours)

• General Education Area IV - Other Cultures Credits: 4 hours
• General Education Area VIII - Health & Well Being Credits: 2 hours
• CCE 4380 - Construction Project Management Credits: 3 hours
• CCE 4850 - Senior Project Credits: 3 hours
  (Satisfies General Education Proficiency 2)
• FIN 3200 - Business Finance Credits: 3 hours

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The Construction Engineering curriculum prepares students for entry-level positions in construction planning, management, or development. Technical, business, and human relations knowledge and skills are developed in classroom settings and on residential and commercial construction job sites.


For up-to-date educational objectives and learning outcomes, see department web page at www.wmich.edu/civil-construction/academics/abet/outcomes.

WMU Essential Studies Program Requirements

Students who have chosen the Civil or Construction 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 civil 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 CCE4850: 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 must complete the following program of 126 semester credit hours as well as University requirements stated elsewhere in this catalog.

1. A “C” or better must be earned in all courses with a CCE, IEE, EDMM or ME prefix.

2. A student is required to earn a grade of “C” or better in the prerequisite courses for all CCE courses before enrollment is permitted in the next sequence course.

3. No more than two grades of “D” or “DC” in courses presented for graduation may be counted for graduation.

4. Complete the following program of 126 semester hours. The schedule below is an example of one leading to graduation in eight semesters. Pre-engineering requirements are indicated.

First Semester (15 hours)

The following courses are Pre-engineering requirements.

- **CCE 1001 - Introduction to Engineering Design** Credits: 1 hour
- **GEOS 1300 - Physical Geology** Credits: 4 hours
- **IEE 1020 - Technical Communication** Credits: 3 hours
  
  (Satisfies WMU Essential Studies Level 1: Writing Course Requirement)
- **EDMM 1420 - Engineering Graphics** Credits: 3 hours
- **MATH 1220 - Calculus I** Credits: 4 hours

or

- **MATH 1700 - Calculus I, Science and Engineering** Credits: 4 hours
  
  (Satisfies WMU Essential Studies Level 1: Quantitative Literacy Course Requirement)

Revised Sept. 2018. All previous forms are obsolete and should not be used.
Second Semester (16 hours)

The following courses are Pre-engineering requirements.

- **CCE 1002 - Introduction to Engineering Analysis** Credits: 1 hour
- **CHEM 1100 - General Chemistry** Credits: 3 hours
- **CHEM 1110 - General Chemistry Laboratory** Credits: 1 hour
- **CS 1022 - Introduction to Engineering Computing II: Mathematical Software** Credits: 1 hour
- **CS 1023 - Introduction to Engineering Computing III: Computer Programming** Credits: 1 hour
- **MATH 1230 - Calculus II** Credits: 4 hours

or

- **MATH 1710 - Calculus II, Science and Engineering** Credits: 4 hours
- **PHYS 2050 - University Physics** Credits: 4 hours
  (Satisfies WMU Essential Studies Level 2: Laboratory Science Course Requirement)
- **PHYS 2060 - University Physics Laboratory** Credits: 1 hour
  (Satisfies WMU Essential Studies Level 2: Laboratory Science Course Requirement)

Third Semester (18 hours)

- **CCE 2360 - Geomatics** Credits: 3 hours
- **IEE 2610 - Engineering Statistics** Credits: 3 hours
  (Satisfies WMU Essential Studies Level 1: Oral and Digital Communication Course Requirement)
- **MATH 2720 - Multivariate Calculus and Matrix Algebra** Credits: 4 hours
  Pre-engineering requirement
- **ME 2560 - Statics** Credits: 3 hours
  Pre-engineering requirement
- **PHYS 2070 - University Physics II** Credits: 4 hours
  Pre-engineering requirement
- **PHYS 2080 - University Physics II Laboratory** Credits: 1 hour

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Fourth Semester (16 hours)

- WMU Essential Studies Level 1: Inquiry and Engagement Course Elective  Credits: 3 hours
- MATH 3740 - Differential Equations and Linear Algebra  Credits: 4 hours
- ME 2570 - Mechanics of Materials  Credits: 3 hours
  Pre-engineering requirement
- ME 2580 - Dynamics  Credits: 3 hours
- MGMT 2500 - Organizational Behavior  Credits: 3 hours

Fifth Semester (15 hours)

- WMU Essential Studies Level 2: Artistic Theory and Practice Course Elective  Credits: 3 hours
- WMU Essential Studies Level 2: Societies and Cultures Course Elective  Credits: 3 hours
- CCE 3360 - Soil Mechanics  Credits: 3 hours
- IEE 3100 - Engineering Economy  Credits: 3 hours
  (Satisfies WMU Essential Studies Level 2: Science and Technology Course Requirement)
- ME 3560 - Fluid Mechanics  Credits: 3 hours

Sixth Semester (15 hours)

- Engineering Science or Design Elective  Credits: 3 hours
- Engineering Science of Design Elective  Credits: 3 hours
- CCE 3080 - Civil and Construction Engineering Materials  Credits: 3 hours
- CCE 3330 - Construction Codes, Specifications, and Contracts  Credits: 3 hours
- CCE 3860 - Structural Analysis  Credits: 3 hours

Seventh Semester (16 hours)

- WMU Essential Studies Level 2: World Languages and Cultures Course Elective  Credits: 3 hours
- ACTY 2100 - Principles of Accounting I  Credits: 3 hours
- CCF 4310 - Construction Planning and Scheduling  Credits: 3 hours
- CCE 4360 - Construction Estimating, Bidding, and Cost Control  Credits: 3 hours
- CCE 4400 - Introduction to Structural Design  Credits: 3 hours

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Eighth Semester (15 hours)

- **CCE 4830 - Project Design and Control** Credits: 1 hour

- **WMU Essential Studies Level 2: Personal Wellness Course Elective** Credits: 3 hours
- **WMU Essential Studies Level 3: Global Perspectives Course Elective** Credits: 3 hours
- **CCE 4380 - Construction Project Management** Credits: 3 hours
- **CCE 4850 - Senior Project** Credits: 3 hours
  (Satisfies WMU Essential Studies Level 3: Local and National Perspectives Course Requirement and the required Planetary Sustainability outcome.)
- **FIN 3200 - Business Finance** Credits: 3 hours