SECTION: 15
DATE:
April 23, 2019

BOARD OF REGENTS
EASTERN MICHIGAN UNIVERSITY

RECOMMENDATION

NEW ACADEMIC PROGRAM

ACTION REQUESTED

It is recommended that the Board of Regents approve a new academic program: Engineering, Technology, and Workforce Education (Bachelor of Science).

STAFF SUMMARY

The *Bachelor of Science in Engineering, Technology, and Workforce Education* provides students the interdisciplinary concepts required to be effective and professional educators in secondary, post-secondary, industry, government, or nonprofit organizational training and education.

PROPOSAL ELEMENTS

Rationale

There is a critical and extreme shortage of secondary education teachers in the United States. This shortage is a result of a combination of factors including the societal changes brought about by technology. This program intends to provide competent educators to fill the growing shortage in this field.

An article by Lori Higgins, Detroit Free Press, quotes Bill Miller, Executive Director of the Michigan Association of Intermediate School Administrators. "We're closing programs … because we cannot staff these programs with qualified people." He states, "We are at a very critical point." The Michigan Department of Education reports that "within the last three years, four programs closed because of difficulty in finding instructors." Brain Pyles, Regional Director for Career and Technical Education for Berrien Regional Educational Service Agency and President of the Michigan Association of Career and Technical Education, reports that he has difficulty finding health science, welding, and engineering teachers.

With nearly 130,000 students in Michigan enrolled in Career and Technical Education programs, and districts are adding additional engineering and technology education programs, it is increasingly essential to provide appropriate training opportunities to prepare educators to teach these integrated concepts. State statistics indicate enrollment in these programs has increased by more than 5,000 students since 2015. This demand has increased pressure on

existing programs and pressed existing schools to add these advanced integrated courses into their programmatic course offerings.

Program Distinction

Two other programs are meeting the requirements for the Industrial and Technology Education teaching endorsement: Western Michigan University and Northern Michigan University. These two universities are located, three hours, and seven hours away from southeast Michigan, respectively. For professionals preparing to enter transition into teaching, these sites are neither convenient nor accessible.

Curriculum Design

Students will gain expertise in applied STEM (Science, Technology, Engineering, and Mathematics) content. The problem- and project-based curriculum teaches the foundational elements of engineering and technology, which enables graduates to teach these concepts to students.

Foundational concepts include engineering design, engineering physics, prototyping, civil engineering, construction, robotics, automation, computer programming, physical computing, and electronics. Students will learn the nature of engineering, technology, and workforce education through application, project, and problem based learning methodologies, and build a foundation of educational pedagogy, and praxis through service learning, and pre-student teaching experiences. Concentration options include robotics and machine learning, vocational education, career, and technical education, and training and development.

Projected Enrollment

It is expected this program would attract an annual enrollment of between 10 and 15 students.

FISCAL IMPLICATIONS

The current Academic Affairs budget will absorb program costs.

ADMINISTRATIVE RECOMMENDATION

The proposed Board action has been reviewed and is recommended for Board approval.

[redacted]

4/2/2019

University Executive Officer
Rhonda Longworth, Ph.D.

Date

Engineering, Technology, and Workforce Education [BS]

New Program | The effective date will be determined following consideration by the Academic Officers Committee, Michigan Association of State Universities and the Eastern Michigan University Board of Regents.

As you pursue a **Bachelor of Science in Engineering, Technology, and Workforce Teacher Education**, you will learn the interdisciplinary concepts required to be an effective and professional educator in secondary, post-secondary, industry, government, or nonprofit organizational training and education.

Learn

As an ETWE major, you will gain expertise in applied STEM (Science, Technology, Engineering, and Mathematics) education content. The content and concepts, taught through the application of problem and project-based learning, teaches the foundational elements of engineering and technology, which enables you to teach these concepts to students. Foundational concepts include engineering design, engineering physics, prototyping, civil engineering, construction, robotics, automation, computer programming, physical computing, and electronics. You will learn the nature of engineering, technology, and workforce education through application, project, and problem based learning methodologies, and build a foundation of educational pedagogy, and praxis through service learning, and pre-student teaching experiences. Concentration options include robotics and machine learning, vocational education, career, and technical education, and training and development.

Opportunities

Students who graduate from the ETWE program will be able to enter a career immediately upon graduation, and in some instances before graduation. Due to a national shortage of qualified engineering and technology teachers, and career and technical education teachers, graduates, will have their choice of rewarding employment that utilizes their experiences and training. Students will find positions available in secondary, post-secondary, industry, government, or nonprofit organizational training and education. Qualified students may also add an endorsement in Career and Technical Education by meeting the federal and state employment requirements.

As students' progress through their degree they will have the opportunity to participate in state and national competitions, as well as serve in educator roles in engineering and technology summer camps and after-school experiences. Additionally, students have the opportunity to play an active role in the Technology & Engineering Education Collegiate Association (TEECA) student organization where they can network and learn from other students and professionals, with additional opportunities to participate in national conferences, association outreach, and student competitions and events.

School Information

Technology and Professional Services Management, *College of Technology*

Susan Gregory, Ph.D. | Interim Director | 122 Sill Hall | 734.487.0854 | sgregory5@emich.edu

Advisor Information

College of Technology Student Services | 150 Sill Hall | 734.487.9751 | cot_advising@emich.edu

Teacher Certification

Successful completion of this course of study, in the context of other program requirements, qualifies the student for recommendation for the Michigan Department of Education Secondary Standard Certificate endorsed in Industrial and Technology Education certification code TE. The Michigan Test for Teacher Certification (MTTC) covering this field is Industrial Technology - 087.

Initial Teacher Preparation Program Admission

In order to pursue the sequence of courses necessary to complete eligibility for a recommendation for certification, one must apply for and be admitted to the teacher preparation program. Admission requirements are common for all teacher preparation programs, except that certain special education programs have additional requirements.

Admission to the teacher preparation program is not automatic. Only those persons who have formally applied are considered for admission. *Not all persons who apply become eligible for admission.*

Teaching majors and minors are unofficial until program admission. Students pursuing teacher certification should follow the catalog that exists at the time of program admission. It is important that students apply to the teacher preparation program as soon as they have earned 56 credit hours.

Admission to Initial Teacher Preparation Program Candidacy

Students must meet all of the following requirements

- Completion of 56 credit hours
- Appropriate cumulative GPA. One of:
  - An overall EMU GPA of 2.5 or higher based on a minimum of 12 credit hours taken at EMU. An EMU GPA of 2.5 or higher in your major, based on at least one course in your major. The Elementary Education Major is comprehensive, therefore, the elementary major GPA is based on the cumulative of liberal arts curriculum and content course work.
  - Transferred 56 credits with a cumulative 3.0 GPA from all previous institutions.
- A grade of "C" or higher in the following courses (if taken): WRTG 121, CTAC 124, Quantitative Reasoning [GEQR], One Lab Science, and all of the professional education courses.
- ICHAT criminal background check, and Statement of Civil/Criminal Convictions. If you answered yes to any of the civil/criminal conviction questions on the application, you will need to provide:
  - A copy of the Judgment of Sentence, or Registrar of Actions, or Certification of Conviction.
  - A written explanation of the offense(s). Application of students with civil/criminal convictions will be carefully reviewed and may take longer to process.
- Attendance at Group Advising Session required. Your major may require additional advising sessions.

General Education Requirements:

For specific requirements, see General Education or print a worksheet.

Major Requirements: 69 hours

Core Requirements: 63 hours

- ARTS 104 - Graphic Design for Non-Majors [GEKA] 3 hrs
- CMT 121 - Graphic Communication 3 hrs
- CNST 201 - Construction Systems 3 hrs
- CNST 212 - Construction Materials and Testing 3 hrs
- CNST 213 - Construction Safety 3 hrs
- COTS 170L1 - Global Technologies [GEGA and GELB] 3 hrs
- COTS 224 - Solving Quantitative Problems in Technology [GEQR] 3 hrs
- CTAC 124 - Foundations of Speech Communication [GEEC] 3 hrs
- ELEC 200 - Circuit Analysis I 3 hrs

- ELEC 214 - Digital Circuit Analysis I 3 hrs
- ELEC 218 - Motors and Controls 3 hrs
- ET 100 - Introduction to Engineering Technology 3 hrs
- PDET 111 - Materials 3 hrs
- PDET 122 - Engineering Graphics 3 hrs
- PDET 123 - Manufacturing Processes 4 hrs
- PDET 157 - Introduction to Product Design 3 hrs
- PDET 350 - Prototyping 3 hrs
- PHIL 216 - Philosophy, Technology, and Digital Life [GEKH] 3 hrs
- PHY 221 - Mechanics, Sound and Heat [GEKN] 4 hrs
- PHY 222 - Electricity and Light 4 hrs

Technical Concentration: 6 hours

Choose two courses from the following:

- CET 151 - Introduction to Computing in Engineering Technology 3 hrs
- CMT 427 - Digital Imaging and Reproduction 3 hrs
- CNST 125 - Introduction to Construction 3 hrs
- ELEC 314 - Digital Circuit Analysis II 3 hrs
- ETWE 104 - Modeling, Automation, and Energy 3 hrs
- ETWE 107 - Flight, Electronics, and Science of Technology 3 hrs
- ETWE 345 - Teaching Energy and Transportation in Technology and Engineering Teacher Education 3 hrs
- PDET 101 - Introduction to Industrial Drawing 3 hrs
- PDET 212 - Molding Materials and Processes 3 hrs
- PDET 325 - Applied Statics and Strength of Materials 4 hrs
- SAG 105L4 - Introduction to Simulation, Animation and Gaming [GELB] 3 hrs
- SAG 175 - Graphics for Simulation I [GEKA] 3 hrs
- SAG 225 - Graphics for Simulation II 3 hrs
- SAG 285 - Studio I Simulation 3 hrs

Professional Secondary Education Sequence: 43 hours

Pre-Admission Phase - The Learner and the Community: 10 hours

- EDPS 322 - Human Development and Learning 4 hrs
- ETWE 250 - Foundations of Technology, Vocational, and Engineering Teacher Education 3 hrs
- SPGN 251 - Introduction to Inclusion and Disabilities Studies in a Diverse Society [GEUS] 3 hrs

Phase I - Curriculum, Assessment, and the Social Context: 12 hours

Completion of the pre-admission phase is required, before taking the following courses.

- BMMT 200 - Principles of Career and Technical Education 3 hrs
- BMMT 363 - Curriculum for Career and Technical Education 3 hrs
- ETWE 450 - Capstone in Technology and Engineering Teacher Education 3 hrs
- SFCE 328W - Schools for a Diverse and Democratic Society [GEWI] 3 hrs

Phase II - Content, Methods, and Teaching: 9 hours

Completion of the previous phases is required, before taking the following courses.

- EDPS 340 - Introduction to Assessment and Evaluation 3 hrs
- PRCT 311L4 - Practicum II: Secondary [GELB] 3 hrs
- RDNG 311 - Teaching Reading in the Secondary School 3 hrs

Phase III - Capstone Experience: 12 hours

Completion of the previous phases is required, before taking the following courses.

- EDUC 492L4 - Student Teaching [GELB] 9 hrs
- ETWE 460 - Methods of Teaching Technology, Vocational, and Engineering Education 3 hrs

Minor Requirement:

This major does not require a minor.

Program Total:

Students must earn a minimum total of 124 credits at the 100-level or above.

Critical Graduation Information

The following are minimum requirements for all bachelor's degrees awarded by Eastern Michigan University. Some majors and minors require more than the minimum in one or more of the areas below; students are urged to consult the online catalog for the requirements of their particular programs.

- Earn a minimum total of 124 credits at the ***100-level and above.*** **Courses with numbers below 100 will not be counted toward this degree requirement. At most 8 credit hours of physical education (PEGN) activity courses will be counted toward this requirement.**
- Meet the requirements of the General Education program (see ***information below***).
- Complete a Writing Intensive (GEWI) Course in your major.
- Earn a minimum of 60 credits from a four-year college or university; **courses taken at community colleges cannot be used to meet this requirement.** (Some formal program-to-program articulation agreements modify this requirement. See specific agreements for details.)
- Earn a minimum of 30 credits from courses taken at EMU.
- Complete 10 of the last 30 hours for the degree from courses taken at EMU.
- Have a minimum of 30 ***unique*** credit hours in their major and 20 ***unique*** credit hours in their minor for a total of at least 50 unique credit hours between them. Some majors that require 50 or more hours themselves do not require a minor; students should check requirements of the selected major in the undergraduate catalog to see if a minor is required.
- Earn no more than 60 credit hours in one subject area (prefix). Credits in excess of the 60 maximum will not be counted toward the minimum of 124 credits required for a bachelor's degree.
- Earn the minimum number of credits in 300-level and above courses in each major and minor as specified below - these credits must be earned in distinct courses; that is, no course can be used to fulfill this requirement in more than one major or minor.
    - Earn a minimum of 6 credits in 300-level or higher courses at EMU in each minor
    - Earn a minimum of 9 credits in 300-level or higher courses at EMU in each major that requires a minor.
    - Earn a minimum of 15 credits in 300-level or higher courses at EMU in each major that does not require a minor
- Transfer credit will be awarded for courses taken at colleges and universities that are accredited by one of the recognized regional accrediting bodies only if the courses are college-level (equated to 100-level or above at EMU) and the student earned a "C" (or 2.0 on a 4 point scale) or better. Transfer credit may be awarded on a case-by-case basis for college-level courses in which a "C" (2.0) or better was earned at institutions outside the U.S. or at non-accredited U.S. institutions; the internal review of such courses is conducted by individual departments/schools within EMU, and additional documentation may be required. *Please note:* EMU awards only credit for transferred courses; grades are not used in the calculation of an EMU GPA.
- Earn a minimum cumulative GPA of 2.0 in courses taken at EMU in order to graduate. In addition, a minimum cumulative GPA of 2.0 must be reached in each major and minor. Only courses taken at EMU and those applied to a student's major or minor will be used in the calculation of their major and minor cumulative GPAs. (Note: some programs may require a higher GPA - check with your program advisor.)

General Education Requirements EMU's General Education Program requires students to choose from a menu of approved courses in several different areas; do not assume that other courses in the same department or with similar names will fulfill these requirements. A detailed description of General Education requirements is available in the General Education section of the catalog.

Students who transferred to EMU may have modified general education requirements based on Michigan Transfer Agreement (MTA) or articulation agreements; consult your academic advisor for additional information.
