SECTION: 19
DATE:
February 7, 2017

BOARD OF REGENTS

EASTERN MICHIGAN UNIVERSITY

RECOMMENDATION

NEW ACADEMIC PROGRAMS

ACTION REQUESTED

It is recommended that the Board of Regents approve a New Academic Program: *Bachelor of Science in Mechanical Engineering*

SUMMARY

The Bachelor of Science in Mechanical Engineering (ME) program at Eastern Michigan University (EMU) is dedicated to preparing students for productive careers in Mechanical Engineering with an emphasis on design and materials. Students will take courses that involve engineering materials, solid mechanics, thermodynamics, fluid mechanics, heat transfer, and manufacturing processes to evaluate and synthesize mechanical and thermal systems. Laboratory experiments and the use of computer aided engineering tools will be integrated into the program. Students will also study engineering design theories and will acquire numerous engineering design experiences. The mechanical engineering curriculum will culminate with a capstone design project experience. The capstone design project experience will require students to draw from their previously acquired knowledge in mathematics and the engineering sciences to solve engineering design problems supplied by external customers. Students that complete EMU's Mechanical Engineering program will be prepared to help solve tomorrow's engineering problems.

FISCAL IMPLICATIONS

Program costs will be absorbed with the current Academic Affairs budget.

ADMINISTRATIVE RECOMMENDATION

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

[redacted]

University Executive Officer

1/18/17

Date

EASTERN MICHIGAN UNIVERSITY
DIVISION OF ACADEMIC AND STUDENT AFFAIRS
INTEROFFICE MEMORANDUM

TO: Chris Shell, Registrar
Bob Lahidji, Director, School of Engineering Technology

FROM: Michael Tew, Interim Director, Undergraduat[redacted]

SUBJECT: **Mechanical Engineering, Bachelor of Science (New Major)**

DATE: October 31, 2016

The attached proposal from the School of Engineering Technology and the College of Arts and Sciences for a new **Bachelor of Science** in **Mechanical Engineering**, is approved.

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.

If you have any questions, please contact Evan Finley, Course and Program Development Associate (487-8954, efinley2@emich.edu).

cc: Rhonda Longworth, Interim Provost
Winifred Martin, Executive Assistant, Provost Office
Mohamad Qatu, Dean, College of Technology
Mary Brake, Associate Dean, College of Technology
Judith Kullberg, President, Faculty Senate
Original, Course and Program Development

Eastern Michigan University

2017-2018 Undergraduate Catalog (Working Draft)

Mechanical Engineering | BS

New Major | Effective Date TBD

The **Bachelor of Science** in **Mechanical Engineering** (ME) program at Eastern Michigan University (EMU) is dedicated to preparing students for productive careers in Mechanical Engineering with an emphasis on design and materials. Students will take courses that involve engineering materials, solid mechanics, thermodynamics, fluid mechanics, heat transfer, and manufacturing processes to evaluate and synthesize mechanical and thermal systems. Laboratory experiments and the use of computer aided engineering tools will be integrated into the program. Students will also study engineering design theories and will acquire numerous engineering design experiences. The mechanical engineering curriculum will culminate with a capstone design project experience. The capstone design project experience will require students to draw from their previously acquired knowledge in mathematics and the engineering sciences to solve engineering design problems supplied by external customers. Students that complete EMU's Mechanical Engineering program will be prepared to help solve tomorrow's engineering problems.

Learn

Opportunities

School Information

Engineering Technology, *College of Technology*

Bob Lahidji, Ph.D. | *Director* | 118 Sill Hall | 734.487.2040 | blahidji@emich.edu

Advisor Information

Contact department for advisor information

Program Admission

Admission Requirements

To be considered for admission students must meet the following requirements

- A minimum EMU cumulative GPA of 2.7. (If a student has not yet established an EMU GPA, a combined GPA of 2.7 from all transfer institutions will be accepted)
- Completion of PHY 223 with a grade of C or higher (or equivalent Transfer Credit)
- Completion of MATH 120 and MATH 121, with a grade of C or higher (or equivalent Transfer Credit)

Application Process

Students who wish to be admitted must do the following

- Submit an Application on-line by *October 1*, *February 1*, or *July 1*
- Attend a mandatory meeting a Mechanical Engineering faculty member or COT Staff Advisor. (Student will be contacted to schedule appointment after the receipt of their application)

Decision Notification Process

Students will be notified by letter after a decision is made. This notification will be made no later than the start of the semester following the application.

General Education Requirements:

For specific General Education requirements, click here

Major Requirements: 85-88 hours

Math and Science Requirements: 32 hours

- CHEM 121 - General Chemistry I | GEKN 3 hrs
- CHEM 122 - General Chemistry I Laboratory | GEKN 1 hr
- MATH 120 - Calculus I | GEQR 4 hrs
- MATH 121 - Calculus II 4 hrs
- MATH 122 - Elementary Linear Algebra 3 hrs
- MATH 223 - Multivariable Calculus 4 hrs
- MATH 325 - Differential Equations 3 hrs
- PHY 223 - Mechanics and Sound | GEKN 5 hrs
- PHY 224 - Electricity and Light 5 hrs

Additional Requirements: 9 hours

- CET 151 - Introduction to Computing in Engineering Technology 3 hrs
- ELEC 212 - Engineering Circuit Analysis 3 hrs
- SET 350W - Engineering Communication | GEWI 3 hrs

Technical Requirements: 44-47 hours

- ME 100 - Introduction to Engineering Design & Manufacturing 3 hrs
- ME 211 - Statics 3 hrs
- ME 312 - Dynamics 3 hrs
  or PHY 230 - Engineering Dynamics 4 hrs
- ME 313 - Mechanics of Materials 3 hrs
- ME 316 - Thermodynamics 3 hrs
  or PHY 360 - Heat and Thermodynamics 4 hrs
- ME 317 - Fluid Mechanics 3 hrs
  or PHY 485 - Fluid Dynamics 4 hrs
- ME 325 - Mechanics of Composite Materials 2 hrs
- ME 326 - Composite Design and Processes 1 hr
- ME 330 - Machine Design 3 hrs
- ME 418 - Heat Transfer 3 hrs
- ME 420 - Thermo/Fluids Lab 2 hrs
- ME 431 - Mechanical Design and Analysis 3 hrs
- ME 432 - Machine Dynamics 3 hrs
- ME 435 - Computational Solid Mechanics 3 hrs
- ME 492 - Senior Capstone I 3 hrs
- ME 493 - Senior Capstone II 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 on-line 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 credits 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.

EASTERN MICHIGAN UNIVERSITY
DIVISION OF ACADEMIC AND STUDENT AFFAIRS

OUTLINE FOR SUBMITTING PROPOSALS FOR NEW DEGREE PROGRAMS

Use this outline to prepare proposals for new programs, including undergraduate majors and minors and graduate majors. Proposals should be submitted in narrative form, organized according to the following outline. Guidelines for submitting such proposals are on the following pages.

Proposed Program Name: Mechanical Engineering Major **Degree:** Bachelor of Science
Department(s)/School(s): School of Engineering Technology **College(s):** Technology

Requested Start Date: Fall 2016

Contact Person: Dr. Mary Brake **Contact Phone:** 7-0551 **Contact Email:** mbrake@emich.edu

I. Description:

The B.S. in Mechanical Engineering (ME) program at Eastern Michigan University (EMU) is dedicated to preparing students for productive careers in Mechanical Engineering with an emphasis on design and materials. Students will take courses that involve engineering materials, solid mechanics, thermodynamics, fluid mechanics, heat transfer, and manufacturing processes to evaluate and synthesize mechanical and thermal systems. Laboratory experiments and the use of computer aided engineering tools will be integrated into the program. Students will also study engineering design theories and will acquire numerous engineering design experiences. The mechanical engineering curriculum will culminate with a capstone design project experience. The capstone design project experience will require students to draw from their previously acquired knowledge in mathematics and the engineering sciences to solve engineering design problems supplied by external customers. Students that complete EMU's Mechanical Engineering program will be prepared to help solve tomorrow's engineering problems.

A. Goals

The goal of Eastern Michigan University's Mechanical Engineering program is to prepare graduates to become Licensed Professional Mechanical Engineers. Our graduates will be equipped to pursue careers in engineering design, analysis, development, research, and the production of various products. Our students will also be prepared to solve engineering problems in global industries, including: automotive, aerospace, medical devices, defense, robotics, and others. In addition to preparing graduates to be technically component, another goal of the Mechanical Engineering program is to prepare graduates for the professional environment of engineering practice by developing industry desired soft skills, including: acting as team player; the ability to effectively communicate with both technical and non-technical personnel; the ability to accept and learn from criticism; being able to work under pressure; and being flexible/adaptable.

B. *Program Objectives*

Eastern Michigan University's Mechanical Engineering program will graduate engineers who will solve engineering problems in both local and global industries.

- The program will train graduates to be ethical, productive, and contributing members to society.
- Our graduates will be effective communicators, valued team members, and will embrace change.
- Our graduates will be lifelong learners and will pursue graduate study in mechanical engineering or other post-graduate education.

C. *Student Learning Outcomes*

- Eastern Michigan University's Mechanical Engineering program will provide graduates with the knowledge and skills needed to achieve the program's objectives after graduation.
- ME graduates will demonstrate their skills in the following areas, ABET[1].
- an ability to apply knowledge of mathematics, science, and engineering
- an ability to design and conduct experiments, as well as to analyze and interpret data
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- an ability to function on multidisciplinary teams
- an ability to identify, formulate, and solve engineering problems
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- a recognition of the need for, and an ability to engage in life-long learning
- a knowledge of contemporary issues
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

[1] http://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2015-2016/#outcomes

D. Program

The proposed Mechanical Engineering Major requires 86-89 credit hours.

- 32 Math/Science credits
- 9 Additional Requirements credits (SET 350W, CET 151, ELEC 212)
- 45-48 Technical credits

Major Requirements: 85-88 hours

Math and Science Requirements: 32 hours

- CHEM 121 - General Chemistry I (GEKN) 3 hrs
- CHEM 122 - General Chemistry I Laboratory (GEKN) 1 hr
- MATH 120 - Calculus I (GEQR) 4 hrs
- MATH 121 - Calculus II 4 hrs
- MATH 122 - Elementary Linear Algebra 3 hrs
- MATH 223 - Multivariable Calculus 4 hrs
- MATH 325 - Differential Equations 3 hrs
- PHY 223 - Mechanics and Sound (GEKN) 5 hrs
- PHY 224 - Electricity and Light 5 hrs

Additional Requirements: 9 hours

- CET 151 - Introduction to Computing in Engineering Technology 3 hrs
- ELEC 212 - Engineering Circuit Analysis 3 hrs
- SET 350W - Engineering Communication (GEWI) 3 hrs

Technical Requirements: 44-47 hours

- ME 100 – Introduction to Engineering Design and Manufacturing 3 hrs
- ME 211 – Statics 3 hrs
- ME 313 – Mechanics of Materials 3 hrs
- ME 325 – Mechanics of Composite Materials 2 hrs
- ME 326 – Composite Design and Processes 1 hr
- ME 330 – Machine Design 3 hrs
- ME 418 – Heat Transfer 3 hrs
- ME 420 – Thermo/Fluids Lab 2 hrs
- ME 431 – Mechanical Design and Analysis 3 hrs
- ME 432 – Machine Dynamics 3 hrs
- ME 435 – Computational Solid Mechanics 3 hrs
- ME 492 – Senior Capstone I 3 hrs
- ME 493 – Senior Capstone II 3 hrs

One course from the following:

- ME 312 – Dynamics 3 hrs
- PHY 230 – Engineering Dynamics 4 hrs

One course from the following

- ME 316 – Thermodynamics 3 hrs
- PHY 360 – Heat and Thermodynamics 4 hrs

One course from the following:

- ME 317 – Fluid Mechanics 3 hrs
- PHY 485 – Fluid Dynamics 4 hrs

Please see Appendix A for proposed Mechanical Engineering Major courses.

E. Admission

Requirements for Admission - Students must meet the following requirements to be admitted to the Mechanical Engineering Program:

- A minimum EMU cumulative GPA of 2.7. (If a student has not yet established an EMU GPA, a combined GPA of 2.7 from all transfer institutions will be accepted)
- Completion of PHY 223 with a grade of C or higher (or equivalent Transfer Credit)
- Completion of MATH 120 and MATH 121, with a grade of C or higher (or equivalent Transfer Credit)

Application Process - Students who wish to be admitted to the Mechanical Engineering Program must do the following:

- Submit an Application on-line by October 1, February 1, or July 1
- Attend a mandatory meeting a ME faculty member or COT Staff Advisor. (Student will be contacted to schedule appointment after the receipt of their application)

Decision Notification Process – Students will be notified by letter after a decision is made. This notification will be made no later than the start of the semester following the application.

F. Projections

Based upon current student interest, we anticipate graduating our first class of 15 – 20 students by April 2019 and plan on building the enrollment as we advertise the new major.

II. Justification/Rationale

The Mechanical Engineering Technology Major is well established at Eastern Michigan University and is accredited by the Accreditation Board of Engineering and Technology (ABET). According to ABET, mechanical engineering technology and mechanical engineering are separate but closely related professional areas that differ in curriculum focus and possible career paths. Mechanical Engineering Technology programs typically focus on application and implementation. Mechanical Engineering programs generally focus on theory and conceptual design. The proposed new Mechanical Engineering program will be based on the success of our MET program, drawing from our strengths in product design, development, and manufacturing.

In the State of Michigan, Mechanical Engineering Technology graduates cannot become Licensed Professional Engineers. Which means they cannot prepare, sign, seal or submit engineering plans and drawings to a public authority, or seal engineering work for public and private clients. In other words, our MET graduates have a limited scope of practice. However, Mechanical Engineering graduates can become Licensed Professional Engineers.

The total number of ME's that are employed in the U.S. according to a national poll from the Bureau of Labor Statistics is 238,260. The U.S. Bureau of Labor Statistics latest projections of national employment taken in 2010 projected a 9% growth in mechanical engineering employment in the 2010-2020 timeframe.

Overall employment for mechanical engineers stood at 243,200 in 2010 and is projected to reach 264,600 in 2020.[2]

According to Pure Michigan, Talent Connect and Department of Labor statistics, Michigan has the most number of mechanical engineering jobs compared to any other State in the U.S. Similarly, within the Metropolitan areas, Warren-Troy-Farmington Hills, has the highest employment level in this occupation. Our MET graduates are very successful in gaining technical employment in Southeast Michigan as evidenced by alumni surveys and senior exit surveys. We anticipate that graduates from the new ME program will be just as successful.

A.

When mechanical engineering technology (MET) students/graduates are surveyed in senior exit surveys and alumni surveys many often comment that they would have liked to have earned a B.S. in Mechanical Engineering. For this and other reasons, we propose that Eastern Michigan University offers a Bachelor of Science in Mechanical Engineering to provide our students with the opportunity to pursue a career in mechanical engineering. Specifically, our proposal to establish a Bachelor of Science in Mechanical Engineering program is based on five rationales:

Rational 1: The technological integration of modern society and economy continues to rapidly accelerate which reinforces the importance of a STEM based education and engineering research at all major universities.

Rationale 2: Eastern Michigan University does not have any engineering program. 12 of the 15 Public Universities in the State of Michigan have a bachelor level mechanical engineering degree program.

Rationale 3: The proposed B.S. in Mechanical Engineering program will provide our students with the opportunity to pursue careers in mechanical engineering.

Rationale 4: The proposed B.S. in Mechanical Engineering program will prepare our students for professional licensure.

Rationale 5: The BS in Mechanical Engineering program will contribute to EMU's vision of being a premier public university.

B.

Ferris State University, Northern Michigan University, and Eastern Michigan University do not have any engineering programs, with the exception of surveying engineering at Ferris State. The other 12 Public Universities in the State of Michigan have engineering programs, including a bachelor level degree in mechanical engineering. Our program is unique because the General Education program at Eastern Michigan is integrated into it. Besides our students having to successfully complete the general education requirements at EMU, which prepares them to participate in a global community, the proposed B.S. in Mechanical Engineering program is aligned with the mission of Eastern Michigan University. Students in

[2] http://www.bls.gov/oes/current/oes172141.htm

the B.S. in Mechanical Engineering program will learn in and beyond the classroom, and graduates will be prepared to solve future engineering problems both locally and globally.

C. *Present evidence of support for the proposed program from within and outside the University.*
See email letter from the Physics Department, attached.

D. *Additional justification (if appropriate).*

III. Preparedness.

Eastern Michigan University has a strong mechanical engineering technology (MET) program that is ABET accredited and it is a natural progression to build a mechanical engineering program from the success of the MET program. The MET program has 90+ students who have been admitted to the program via a second admit and over 100 more who would like to be admitted after they meet the criteria. In senior exit surveys and in alumni surveys, many students indicate that they would have preferred an engineering program to a technology program. There are currently 9 faculty members in SET who have Ph.D.'s in mechanical engineering, three of whom are dedicated to MET.

IV. Assessment/Evaluation

The program will be assessed in a rigorous way so that ABET accreditation will be sought as soon as possible after the program is initiated and graduates its first class.

V. Program Costs

The program will use existing facilities and labs. There are 9 faculty members with a Ph.D. in Mechanical Engineering who teach in the School of Engineering Technology and for the first few years, the courses can be covered by these faculty.

VI. Action of the Department/College

1. Department/School (Include the faculty votes signatures from all submitting departments/schools.)

Vote of faculty: For 15 Agains 0 Abstentions 0
(Enter the number of votes cast in each category.)

I support this proposal. The proposed program can X cannot _____ be implemented without additional College or University resources.

[redacted]
Department Head/School Director Signature

Oct/16/2015
Date

2. College/Graduate School (Include signatures from the deans of all submitting colleges.)

A. College.

I support this proposal. The proposed program can X cannot _____ be implemented within the affected College without additional University resources.

[redacted]
College Dean Signature

11/13/15
Date

B. Graduate School (new graduate programs ONLY)

_____ _____
Graduate Dean Signature Date

VII. Approval

_____ _____
Associate Vice-President for Academic Programming Signature Date

Apendix A

Typical Course Sequence

Prefix	Code	Title	Course Restrictions		Alternative Courses	Course Restrictions	
Year 1							
Fall							
MATH	120	Calculus I					4
CHEM	121/ 122	General Chemistry I and Lab					4
ME	100	Intro. to Engineering Design & Mfg	None				3
WRTG	121	General Educations (Written Communication)	None				3
GEKA	xxx	General Education (Arts)	TBD				3
							17
Winter							
MATH	121	Calculus II					4
CET	151	Introduction to Engineering Computing	None				3
CTAC	124	General Education (Speech Communication)	None				3
		Elective	TBD				3
							13
Year 2							
Fall							
MATH	122	Linear Algebra					3
PHY	223	Mechanics and Sound	MATH 120				5
GEGA	xxx	Global Awareness	TBD				3
GEKA	xxx	General Education (Humanities)	TBD				3
							14
Winter							
ME	211	Statics	A minimum grade of "C" in MATH 120 and PHY 223				3
ELEC	212	Engineering Circuit Analysis	Concurrent Pre-req: PHY 224				3
MATH	223	Multivariable Calculus					4
PHY	224	Electricity and Light	PHY 223 and MATH 121				5
GEKS	xxx	General Education (Social Science)	TBD				3
							18
Year 3							
Fall							
MATH	325	Differential Equations					3
ME	312	Dynamics	A minimum grade of "C" in ME 211	or	PHY 230 - Engineering Dynamics	PHY 223 and MATH 121 and MATH 122	3/4
ME	313	Mechanics of Materials	ME 211				3
ME	316	Thermodynamics	A minimum grade of "C" in PHY 223, MATH 120, and MATH 121	or	PHY 360 – Heat and Thermodynamics	(at least a C in PHY 222) or (at least a C in PHY 224) and MATH 223	3/4
GEKA	xxx	General Education (2nd Arts)	TBD				3
							15/17
Winter							
ME	317	Fluid Mechanics	ME 211 and (ME 316 or PHY 360)	or	PHY 485 – Fluid Dynamics	(PHY 230 or PHY 330) and PHY 360	3/4
ME	325	Mechanics of Composite Materials	ME 211 and (ME 312 or PHY 230) and ME 313				2
ME	326	Composite Design and Processes	ME 325				1
ME	330	Machine Design	ME 313				3

SET	350 W	General Engineering (Writing Intensive)	WRTG 121				3
GEKH	xxx	General Education (2nd Humanities)	TBD				3
							15/17
Year 4							
Fall							
ME	431	Mechanical Design and Analysis	ME 100, ME 313				3
ME	418	Heat Transfer	(ME 316 or PHY 360) and ME 317 and MATH 223				3
ME	420	Thermo/Fluids Lab	(ME 316 or PHY 360) and (ME 317 or PHY 485) and MATH 325 *Concurrent Pre-req:* ME 418				2
ME	432	Machine Dynamics	(ME 312 or PHY 230) and ME 431				3
ME	492	Senior Capstone I	SET 350W, co-req's: ME 431, 432				3
		Elective					3
							17
Winter							
ME	435	Computational Solid Mechanics	ME 431, MATH 122, MATH 325				3
GEUS	xxx	General Education (U.S. Diversity)	TBD				3
ME	493	Senior Capstone II	ME 492				3
GEKS	xxx	General Education (2nd Social Science)	TBD				3
		Elective	TBD				3
							15
							124/127

NEW COURSES

Introduction to Engineering Design & Manufacturing

2017-2018 Undergraduate Catalog (Working Draft)

ME 100 - Introduction to Engineering Design & Manufacturing

In addition to studying the ethical and professional practice of engineering, students will be introduced to engineering graphics and various manufacturing processes. Topics include resume writing, interviewing, project management, professional registration, engineering design, design for manufacturing, and computer aided design (CAD) techniques. In teams, students will work on projects and write a written report and give an oral presentation.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Fall

Class-Level Restriction | Undergraduate standing

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Statics 2017-2018 Undergraduate Catalog (Working Draft)

ME 211 - Statics

The fundamental principles that are needed to analysis and evaluate load carrying members are considered in this course, including: stress and strain, factor of safety, deformation, torsion, statically indeterminate structures, and buckling. Students will also conduct physical experiments to underscore selected topics.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Winter

Prerequisite(s) | (a minimum grade of "C" in MATH 120) and (a minimum grade of "C" in PHY 223)

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Dynamics 2017-2018 Undergraduate Catalog (Working Draft)

ME 312 - Dynamics

In this course, the fundamental principles of kinematics and kinetics of motion with an emphasis on engineering applications are studied. The construction of complete and accurate free body diagrams and the corresponding application of the equations of motion are integral parts of this course.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Fall

Prerequisite(s) | a minimum grade of "C" in ME 211

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS or Engineering Physics Major

Equivalent Courses | PHY 230
Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Mechanics of Materials

2017-2018 Undergraduate Catalog (Working Draft)

ME 313 - Mechanics of Materials

The fundamental principles that are needed to analysis and evaluate load carrying members are considered in this course, including: stress and strain, factor of safety, deformation, torsion, statically indeterminate structures, and buckling. Students will also conduct physical experiments to underscore selected topics.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Fall

Prerequisite(s) | ME 211

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Thermodynamics 2017-2018 Undergraduate Catalog (Working Draft)

ME 316 - Thermodynamics

The theory of thermodynamics including the first and second laws of thermodynamics, entropy, exergy, properties of substances and mass and energy analysis will be covered. The theory will be applied to steady flow devices, gas power cycles, and refrigeration cycles.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Fall

Prerequisite(s) | (a minimum grade of "C" in PHY 223) *and* (a minimum grade of "C" in MATH 120) *and* (a minimum grade of "C" in MATH 121)

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS, Physics Major, *or* Engineering Physics Major

Equivalent Courses | PHY 360
Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Fluid Mechanics 2017-2018 Undergraduate Catalog (Working Draft)

ME 317 - Fluid Mechanics

The theory of fluid mechanics including Bernoulli's Equation, conservation of mass, momentum and energy, laminar and turbulent flow will be covered. Fluid kinematics, control volume, and differential analysis will also be included. Applications to viscous flow in pipes, flow over immersed bodies, open channel flow and compressible flow will be discussed.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Winter

Prerequisite(s) | (ME 316 or PHY 360) *and* ME 211

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS *or* Engineering Physics Major

Equivalent Courses | PHY 485
Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Mechanics of Composite Materials

2017-2018 Undergraduate Catalog (Working Draft)

ME 325 - Mechanics of Composite Materials

The fundamentals of the mechanics of composite materials used in manufacturing will build upon a student's knowledge of the strength of materials and knowledge of manufacturing. The course will cover the terminology or composites as well as fibrous, laminated, and particulate composites. The macro- and micro-mechanical behavior of lamina will also be covered such as stress-strain relations, strength, stiffness and elasticity. Buckling, bending and vibration will also be covered.

Credit | 2 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Winter

Prerequisite(s) | (ME 312 or PHY 230), ME 211, and ME 313

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Composite Design and Processes

2017-2018 Undergraduate Catalog (Working Draft)

ME 326 - Composite Design and Processes

This course will cover composites product design and manufacturing processes. It will include short fiber composites, long fiber composites, and continuous fiber materials. It will involve the fabrication of molds to create composite objects. *This course is a laboratory.*

Credit | 1 hr *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Winter

Concurrent Prerequisite(s) | ME 325

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Machine Design 2017-2018 Undergraduate Catalog (Working Draft)

ME 330 - Machine Design

The principles and practices that are required to evaluate and design mechanical components are studied in this course. The engineering principles that are presented include: stress and strain, impact, fatigue, failure theories, tribology, safety, engineering economics, and ethics. These theories will be used to solve engineering design problems involving commonly used mechanical components.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Winter

Prerequisite(s) | ME 313

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Thermo/Fluids Lab 2017-2018 Undergraduate Catalog (Working Draft)

ME 420 - Thermo/Fluids Lab

This lab course will cover experimental methods in thermodynamics, fluids, and heat transfer. Students will learn about simple error in making measures of temperature and pressure, about uncertainty analysis in converting electrical energy into heat energy, validate Bernoulli's Equation in measure pressure and static heads of a venture, minor losses in fluid systems, and heat transfer from a fluid flowing over a plate and in tubular heat exchangers.

Credit | 2 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Fall

Prerequisite(s) | (ME 316 or PHY 360) and (ME 317 or PHY 485) and (MATH 325)

Concurrent Prerequisite(s) | ME 418

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Mechanical Design and Analysis

2017-2018 Undergraduate Catalog (Working Draft)

ME 431 - Mechanical Design and Analysis

This course is a continuation of Engineering Graphics and Solid Mechanics. The course objective is to bridge the gap between fundamental principles and practical engineering problem solving. Modern Computer Aided Engineering (CAE) problem-solving skills will be developed through the use of analysis assignments and a design project.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Fall

Prerequisite(s) | ME 100 and ME 313

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Machine Dynamics 2017-2018 Undergraduate Catalog (Working Draft)

ME 432 - Machine Dynamics

Analytical and modern computer aided engineering (CAE) problem-solving skills will be developed to solve kinematic and dynamic motion problems involving machines and mechanical systems used in the automotive, medical, energy conversion, and other industries. The design of mechanical mechanisms will also be presented.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Fall

Prerequisite(s) | (ME 312 or PHY 230) and (ME 431)

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Computational Solid Mechanics

2017-2018 Undergraduate Catalog (Working Draft)

ME 435 - Computational Solid Mechanics

The objective of this course is to introduce the theory of the finite element method (FEM). This course is delivered with an emphasis on using FEM as a solid mechanics analysis tool. 1D and 2D finite element formulations will be discussed and FEA software will be used to bridge the gap between theory and practice.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Winter

Prerequisite(s) | ME 431, MATH 122, and MATH 325

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Senior Capstone I 2017-2018 Undergraduate Catalog (Working Draft)

ME 492 - Senior Capstone I

This course sequence is a Capstone Design Project Experience. The intent of the Capstone Design Project Experience is to nurture the transition from student to practicing engineering problem solver. Students are taught how to apply their math, science, and technology knowledge to solve engineering design problems supplied by external customers.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Fall

Prerequisite(s) | SET 350W

Concurrent Prerequisite(s) | ME 431 and ME 432

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Senior Capstone II 2017-2018 Undergraduate Catalog (Working Draft)

ME 493 - Senior Capstone II

This course sequence is a Capstone Design Project Experience. The intent of the Capstone Design Project Experience is to nurture the transition from student to practicing engineering problem solver. Students are taught how to apply their math, science, and technology knowledge to solve engineering design problems supplied by external customers.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Winter

Prerequisite(s) | ME 492

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

Engineering Circuit Analysis

2017-2018 Undergraduate Catalog (Working Draft)

ELEC 212 - Engineering Circuit Analysis

The fundamental principles of DC and AC circuit analysis with an emphasis on engineering applications are studied in this course. Topics include circuit parameters and elements (resistors, inductors, capacitors, and transformers); circuit analysis techniques; and sinusoidal steady-state analysis with power applications. Students will also conduct physical experiments to underscore selected topics.

Credit | 3 hrs *May not be repeated for additional credit*
Grade Mode | Normal (A-F) **Course Rotation** | Winter

Concurrent Prerequisite(s) | PHY 224

Class-Level Restriction | Undergraduate standing

Major Restriction(s) | Mechanical Engineering | BS

Updates | New Course 10/2016, effective Fall 2017

Click here for Winter 2017 Course Offerings

EASTERN
MICHIGAN UNIVERSITY
COLLEGE of TECHNOLOGY

About CoT

- Established in 1980
- 1900 undergraduate, 400 graduate students
- Four schools and one department within the college
- Programs that emphasize practical applications of scientific knowledge
  - 17 Undergraduate programs (BS)
  - 10 Graduate programs (9 MS and 1 PhD)
  - 9 Graduate Certificates

EASTERN MICHIGAN UNIVERSITY
COLLEGE of TECHNOLOGY

Challenges

- **Declining programs**
  - Shelved Distribution Operations and Technical Sales and Applied Technology programs

- **Student and program portfolio**
  - Mostly able to attract 18-24 ACT
- **Employer portfolio**
  - Jobs offered to recent graduates ($30K-60K)
- **Challenge from community colleges**
  - Some starting to offer BA
  - Enrollment (and transfer students) are declining

EASTERN MICHIGAN UNIVERSITY COLLEGE of TECHNOLOGY

Why EMU Engineering

- **Substantial data suggests shortages in engineering at all levels**
  - National
  - State (e.g. Michigan's top 50)
  - Regional community and industry
  - Washtenaw county

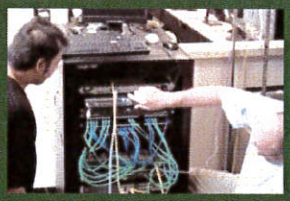
EASTERN MICHIGAN UNIVERSITY COLLEGE of TECHNOLOGY

Why EMU Engineering

- **CoT Enrollment**
  - Replace declining disciplines with popular programs
  - Ensure controlled and responsible enrollment growth
  - Assure sustainability

EASTERN MICHIGAN UNIVERSITY
COLLEGE of TECHNOLOGY

Why EMU Engineering



- **Student demand**
  - Recruitment: students are not enrolling because we are not offering engineering
  - Retention: current students transferring out after 2 years to other universities offering engineering
  - Alumni requests

EASTERN MICHIGAN UNIVERSITY
COLLEGE of TECHNOLOGY

Why EMU Engineering

- **Attract and retain competitive faculty (and research)**
  - Need to advance research portfolio at CoT
  - Need to attract faculty from research intensive universities with experience in grants and scholarship
  - More research opportunities in engineering disciplines

EASTERN MICHIGAN UNIVERSITY COLLEGE of TECHNOLOGY

Why EMU Engineering

- **Program/Student portfolio**
  - Students who succeed in engineering program have ACT between 24 and 36
  - Students who graduate with a BS in engineering
    - have a higher (almost 100%) employment rate
    - Starting salaries of ($55K-$75K)
  - More successful graduates
    - Graduation rate with 6 years > 80%
    - Salaries $100K within 5-10 years (successful alums)

EASTERN MICHIGAN UNIVERSITY COLLEGE of TECHNOLOGY

Why EMU Engineering

- **College reputation and ranking**
  - No reputable system for ranking technology as a stand alone college
  - Chance to enter more rankings by US News & World Report
  - Become full member of ASEE (American Society of Engineering Education)
    - All our peer institutions are members because they offer engineering programs

EASTERN MICHIGAN UNIVERSITY
COLLEGE of TECHNOLOGY

Why EMU Engineering

- **Faculty ready**
  - More than 15 faculty members with PhD in engineering or computer science
- **Lab ready**
  - Existing labs (with natural growth and maintenance)
- **EMU has already invested in labs and faculty but did not secure all benefits**

EASTERN MICHIGAN UNIVERSITY
COLLEGE of TECHNOLOGY

EMU Engineering

- **Ready for ABET accreditation and licensing exams**
  - Puts us on par with our peers
- **Small classes**
  - 15-30 students
- **Application oriented**
  - Requests by industrial partners
- **Engaged with Industry and community**
  - co-op required

EASTERN MICHIGAN UNIVERSITY
COLLEGE of TECHNOLOGY

EMU Engineering

- **Mechanical Engineering**
  - Admit freshman, sophomore and juniors in Fall 2017
- **Electrical and Computer Engineering**
  - Admit freshman, sophomore and juniors in Fall 2018
- **Other programs are being investigated**

EASTERN MICHIGAN UNIVERSITY
COLLEGE of TECHNOLOGY