

**BOARD OF REGENTS**  
**EASTERN MICHIGAN UNIVERSITY**  
**RECOMMENDATION**

**APPROVAL OF NEW ACADEMIC PROGRAM**

**ACTION REQUESTED**

It is recommended that the Board of Regents approve a New Academic Program: **Electrical and Computer Engineering Major (Bachelor of Science)**

**SUMMARY**

The *Bachelor of Science in Electrical and Computer Engineering (EECE)* program will prepare engineers for exciting and challenging positions in diverse fields of electrical and computer engineering from automotive, energy, communication to consumer electronics such as smartphones, tablets, computers, appliances, and much more. The program prepares graduates to be at the forefront of designing the next generation of electrical devices.

**PROPOSAL ELEMENTS**

<i>Rationale</i>	An EMU Electrical and Computer Engineering program will 1) help fill a demand for electrical and computer engineers in Michigan and nationwide; 2) prepare graduates to sit for the Fundamentals of Engineering (FE) exam. After several years of work experience, the program’s graduates could also sit for the Professional Engineering (PE) exam; 3) advance the University’s research goals as an R3 research institution; 4) train graduates for high-level/high-paying engineering positions in companies such as Ford Motor Company.
<i>Program Distinction</i>	The program emphasizes applied engineering, with hands-on learning. Our students will learn the theory of EECE as well as hands-on applications such as programmable logic controllers and other lab based activities relevant to the industries in south-east Michigan.
<i>Curriculum Design</i>	This curriculum aims to prepare students to study the electrical and computer engineering areas of controls, communications, electronics, power electronics, computer architecture, digital hardware design, and computer networks. The student will be at the forefront of developing new products from innovative ideas. Students will complete 82 credit hours {Foundational Courses (12), Mathematics & Science (29), Electrical & Computer Engineering Courses (29), and a Concentration (12)}.
<i>Projected Enrollment</i>	Year 1: Fr (30), So (15), Jr (5) <b>Total (50)</b> Year 2: Fr (40), So (20), Jr (10), Sr. (5) <b>Total (75)</b> Year 3: Fr (50), So (30), Jr (15), Sr. (10) <b>Total (105)</b> Year 4: Fr (65), So (40), Jr (30), Sr. (20) <b>Total (155)</b>

**FISCAL IMPLICATIONS**

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

**ADMINISTRATIVE RECOMMENDATION**

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



University Executive Officer

10/3/17  
Date

## Program Development by Year (2013-2018)

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Yearly Average	
<b>New</b>	Graduate Certificate	1	1	1	4	1	<b>1.6</b>
	Masters Program	1	3	0	1	1	<b>1.2</b>
	Post-Masters Certificate	0	1	0	0	2	<b>0.6</b>
	Undergraduate Certificate	1	1	1	1	0	<b>0.8</b>
	Majors	1	1	1	5	3	<b>2.2</b>
	Minors	3	3	1	2	0	<b>1.8</b>
	Combined Masters/Bachelors	0	0	1	0	1	<b>0.4</b>
	Specialist of Arts	0	0	0	0	1	<b>0.2</b>
	Doctorate	0	0	0	0	1	<b>0.2</b>
	<b>Total</b>	<b>7</b>	<b>10</b>	<b>5</b>	<b>13</b>	<b>10</b>	<b>9</b>
<b>Phase-Out</b>	Graduate Certificate	0	(1)	0	0	0	<b>(0)</b>
	Masters Program	(5)	(3)	0	(1)	0	<b>(2)</b>
	Majors	(4)	(3)	(4)	(4)	(1)	<b>(3)</b>
	Minors	(4)	(1)	(4)	0	(1)	<b>(2)</b>
	<b>Total</b>	<b>(13)</b>	<b>(8)</b>	<b>(8)</b>	<b>(5)</b>	<b>(2)</b>	<b>(7)</b>
<b>Difference</b>	<b>(6)</b>	<b>2</b>	<b>(3)</b>	<b>8</b>	<b>8</b>		

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EASTERN MICHIGAN UNIVERSITY  
DIVISION OF ACADEMIC AND STUDENT AFFAIRS  
INTEROFFICE MEMORANDUM

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**TO:** Chris Shell, Registrar  
Philip Rufe, Interim Director, School of Engineering Technology

**FROM:** Michael Tew, Interim Director, Undergraduate Studies [REDACTED]

**SUBJECT:** Electrical and Computer Engineering Major (New Program)  
EECE – Electrical and Computer Engineering (New Prefix)

**DATE:** May 3, 2017

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The attached proposal from the School of Engineering Technology and the College of Technology for a new undergraduate program **Bachelor of Science in Electrical and Computer 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.

This proposal includes the following new courses (effective Fall 2017):

EECE 177/178/179 - Special Topics	EECE 377/378/379 - Special Topics
EECE 212 - Engineering Circuit Analysis	EECE 385L4/386L4/387L4 - Cooperative Education in Electrical and Computer Engineering
EECE 213 - Engineering Circuit Analysis II	EECE 400 - EECE Professional Practice
EECE 251 - Digital Logic Design	EECE 411 - Machine Learning
EECE 277/278/279 - Special Topics	EECE 421 - Control Systems Engineering
EECE 331 - Engineering Computer Systems: Design and Architecture	EECE 430 - Power Electronics
EECE 341 - Engineering Electronics I	EECE 431 - Digital Control Systems
EECE 342 - Engineering Electronics II	EECE 441 - Introduction to Digital Signal Processing
EECE 351 - Microcontrollers	EECE 452 - Advanced Digital System Designs with FPGA
EECE 352 - Digital System Designs with HDL	EECE 477/478/479 - Special Topics
EECE 362 - Engineering Algorithmic Constructions	EECE 480 - Senior Capstone
EECE 365 - Engineering Electromagnetics	EECE 488L4/489L4/490L4 - Internship
EECE 371 - Signals and Systems	EECE 497/498/499 - Independent Study
EECE 372 - Communication Systems	

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

cc:

Rhonda Longworth, Provost & Executive Vice President of Academic and Student Affairs	Extended Programs
Winifred Martin, Executive Assistant, Provost Office	John Feldkamp, Assistant Director, Honors College
Mohamad Qatu, Dean, College of Technology	Ramona Milligan, Coordinator, Registration
Mary Brake, Associate Dean, College of Technology	Carol Evans, Transfer Equivalency Coordinator, Records & Registration
Faculty Senate	Erin Burdis, Assistant Registrar
Calvin McFarland, Director, University Advising and Career Development	Karen Schiferl, Director, Student-Athlete Support Services
Pat Cygnar, Director, Community College Relations	Mary Butkovich, Halle Library
Colleen Kibin, Assistant Director, Community College Relations	Ann Richards, Assistant Director, Admissions Processing
Sarah Kersey Otto, Director, Career Development & Outreach	Bin Ning, Assistant Vice President and Executive Director, IRIM
	M.C. Greenfield, School of Engineering Technology Original, Course and Program Development



## Electrical and Computer Engineering | BS (Proposed Program)

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### **New Program | effective date TBD**

*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.*

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The **Bachelor of Science in Electrical and Computer Engineering (EECE)** program prepares engineers for interesting and challenging positions in diverse fields of electrical and computer engineering from automotive, energy, communication to consumer electronics such as smartphones, tablets, computers, appliances, and much more. The program prepares graduates to be at the forefront of designing the next generation of electrical devices.

### **Learn**

Students learn the theory and principles of electricity, electronic devices, and complex system design. The curriculum covers analog and digital circuits, microprocessors, power systems, electrical components and how these are incorporated into sensors, actuators and computer systems. Students will learn about electrical and computer engineering design, computer systems, and computer networking. There are many opportunities for hands-on learning as well as traditional theory based learning.

### **Opportunities**

Employment opportunities are excellent in developing, designing, testing and supervising the manufacturing of electrical devices, communication systems, computer systems, and power generation equipment. Electrical and computer engineers also design the electrical systems of automobiles and aircraft. There are also job opportunities in technical sales and operations. An ECE degree also offers an excellent background for advanced training in engineering, business, law, medicine, and other analytical disciplines.

## **School Information**

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*Engineering Technology, College of Technology*

Mohamed El-Sayed, Ph.D. | Director | 118 Sill Hall | 734.487.2040 | [melsayed@emich.edu](mailto:melsayed@emich.edu)

## **Advisor Information**

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*Contact department for advisor information*

## **General Education Requirements:**

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For specific General Education requirements, click [here](#) or print a [General Education Worksheet](#)

## Major Requirements: 82 hours

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### Foundational Courses: 12 hours

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- [CET 151 - Introduction to Computing in Engineering Technology](#) 3 hrs
- [COSC 111 - Introduction to Programming](#) 3 hrs
- [ME 100 - Introduction to Engineering Design & Manufacturing](#) 3 hrs
- [SET 350W - Engineering Communication | GEWI](#) 3 hrs

### Mathematics & Science Courses: 29 hours

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- [CHEM 122 - General Chemistry I Laboratory | GEKN](#) 1 hr
- [CHEM 121 - General Chemistry I | GEKN](#) 3 hrs
- [MATH 120 - Calculus I | GEQR](#) 4 hrs
- [MATH 121 - Calculus II](#) 4 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

### Electrical & Computer Engineering Courses: 29 hours

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- [EECE 212 - Engineering Circuit Analysis](#) 3 hrs  
or [ELEC 212 - Engineering Circuit Analysis](#) 3 hrs
- [EECE 213 - Engineering Circuit Analysis II](#) 3 hrs
- [EECE 251 - Digital Logic Design](#) 3 hrs
- [EECE 341 - Engineering Electronics I](#) 3 hrs
- [EECE 351 - Microcontrollers](#) 3 hrs
- [EECE 371 - Signals and Systems](#) 3 hrs
- [EECE 400 - EECE Professional Practice](#) 2 hrs
- [EECE 421 - Control Systems Engineering](#) 3 hrs
- [EECE 430 - Power Electronics](#) 3 hrs
- [EECE 480 - Senior Capstone](#) 3 hrs

### Concentration: 12 hours

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Choose one concentration from the following

#### Computer Engineering Concentration

- [COSC 211 - Programming Data Structures](#) 3 hrs
- [COSC 221 - Computer Organization I](#) 3 hrs

- EECE 352 - Digital System Designs with HDL 3 hrs
- EECE 452 - Advanced Digital System Designs with FPGA 3 hrs

#### Electrical Engineering Concentration

- EECE 342 - Engineering Electronics II 3 hrs
- EECE 365 - Engineering Electromagnetics 3 hrs
- EECE 372 - Communication Systems 3 hrs
- EECE 431 - Digital Control Systems 3 hrs

### Minor Requirement:

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*This major does not require a minor.*

### Program Total:

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

### Critical Graduation Information

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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.

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**EASTERN MICHIGAN UNIVERSITY**  
**DIVISION OF ACADEMIC AND STUDENT AFFAIRS**

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**OUTLINE FOR SUBMITTING PROPOSALS FOR NEW DEGREE PROGRAMS**

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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:** ELECTRICAL AND COMPUTER ENGINEERING **DEGREE:** BACHELOR OF SCIENCE

**REQUESTED START DATE:** FALL 2018

**DEPARTMENT(S)/SCHOOL(S):** SCHOOL OF ENGINEERING TECHNOLOGY **COLLEGE(S):** COLLEGE OF TECHNOLOGY

**CONTACT PERSON:** M. C. GREENFIELD **CONTACT PHONE:** 734-487-2069

**CONTACT EMAIL:** MGREENFI@EMICH.EDU

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## **I. Description:**

### **A. Goals, Objectives, Student Learning Outcomes**

Electrical Engineering focuses on theory and principles of electricity and electronic devices and complex system design. Electrical Engineering is typically composed of traditional circuits, signals, power systems and electrical components but are referred to as "smart" devices or systems because of the incorporation of sensors, actuators and computer control systems. Typical jobs for graduates will be in telecommunications, computer engineering, manufacturing, aerospace industry, power generation and distribution, alternative energy, robotics, and automation.

Computer Engineering focuses on hardware and software and complex system design. Electrical Engineering is typically composed of digital technology, computer systems and computer networking. Typical jobs for graduates will be in computer hardware design, design and implement software applications, design of microprocessors, computer programming, robotics, and automation.

Electrical and Computer Engineering blends both disciplines together in one program with two concentrations, electrical engineering and computer engineering.

This curriculum is designed to prepare students to study the electrical and computer engineering areas of controls, communications, electronics, power electronics, computer architecture, digital hardware design, and computer networks. The student will be at the forefront of designing new products from innovative ideas.

Recent graduates and students nearing their undergraduate engineering degree from an EAC/ABET accredited program are eligible to sit for the Fundamentals of Engineering (FE) exam which is the first step to become a professional licensed engineer (P.E.). An objective of the EECE undergraduate engineering degree is to prepare students to successfully pass the Electrical and Computer FE exam.

Another objective is to prepare a curriculum that meets the 18 different areas according to the National Council of Examiners for Engineering (NCEES). In addition, the program will be eligible for ABET accreditation.

The electrical and computer engineering curriculum is designed to prepare students for interesting and challenging positions in the diverse field of electrical and computer engineering. The curriculum provides for a strong foundation in electrical and computer engineering to support future changes in engineering or career roles. The graduate may find employment on engineering teams in product design and development, in production and automation, in instrumentation and communications, software design, or in technical sales and operations.

**The objectives of the BS-EECE Electrical Engineering concentration are:**

1. Graduates apply electrical engineering principles to solve engineering problems and address evolving technological challenges based on a solid foundation in circuits, systems, electromagnetics and devices.
2. Graduates apply modern electrical engineering techniques, tools, and practices to create and apply technologies to meet the needs of society.
3. Graduates engage in life-long learning.
4. Graduates are effective engineers in the workplace, attend graduate or professional school, or otherwise use the foundation of their technical education to progress in their career.

**The objectives of the BS-EECE Computer Engineering concentration are:**

1. Graduates apply computer engineering principles to solve engineering problems and to address evolving technological challenges based on a solid foundation in circuits, systems and computer hardware and software.
2. Graduates apply modern computer engineering techniques, tools, and practices to create and apply technologies to meet the needs of society.
3. Graduates engage in life-long learning.
4. Graduates are effective engineers in the workplace, attend graduate or professional school, or otherwise use the foundation of their technical education to progress in their career.

Both concentrations have eleven ABET standard outcomes. Each concentration has three additional outcomes.

**The ABET standard outcomes are that students will attain:**

- a. an ability to apply knowledge of mathematics, science, and engineering;
- b. an ability to design and conduct experiments, as well as to analyze and interpret data;
- c. 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;
- d. an ability to function on multidisciplinary teams;
- e. an ability to identify, formulate, and solve engineering problems;
- f. an understanding of professional and ethical responsibility;
- g. an ability to communicate effectively;
- h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i. a recognition of the need for, and an ability to engage in life-long learning;
- j. a knowledge of contemporary issues;
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**The three additional outcomes for the Electrical Engineering Concentration are:**

- l. Students can apply knowledge from a range of technical topics comprising both breadth across circuits, systems, electromagnetics and devices and depth in at least two sub-disciplines within electrical engineering.
- m. Students can apply tools and knowledge, both technical and non-technical, obtained from their undergraduate experience to a major design project.
- n. Graduates are aggressively recruited by both industry and graduate programs.

**The three additional outcomes for the Computer Engineering Concentration are:**

- o. Students can apply knowledge from a range of technical topics comprising both breadth and depth in circuits, systems and computer hardware and software sub-disciplines plus technical elective topics.
- p. Students can apply tools and knowledge, both technical and non-technical, obtained from their undergraduate experience to a major design project.
- q. Graduates are aggressively recruited by both industry and graduate programs.

## B. Program

### Major Requirements: 82 hours

#### Science & Mathematics Requirements: 29 hours

- CHEM 122 - General Chemistry I Laboratory | GEKN 1 hr
- CHEM 121 - General Chemistry I | GEKN 3 hrs
- MATH 120 - Calculus I | GEQR 4 hrs
- MATH 121 - Calculus II 4 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: 12 hours

- CET 151 - Introduction to Computing in Engineering Technology 3 hrs
- COSC 111 - Introduction to Programming 3 hrs
- ME 100 - Introduction to Engineering Design & Manufacturing 3 hrs
- SET 350W - Engineering Communication | GEWI 3 hrs

#### Electrical and Computer Engineering Core Requirements: 29 hours

- EECE 212 – Engineering Circuit Analysis I 3 hrs OR ELEC 212 - Engineering Circuit Analysis 3 hrs
- EECE 213 – Engineering Circuit Analysis II 3 hrs
- EECE 251 – Digital Logic Design 3 hrs
- EECE 341 – Engineering Electronics I 3 hrs
- EECE 351 – Microcontrollers 3 hrs
- EECE 371 – Signals and Systems 3 hrs
- EECE 400 – EECE Professional Practice 2 hrs
- EECE 421 – Control Systems Engineering 3 hrs
- EECE 430 – Power Electronics 3 hrs
- EECE 480 – Senior Capstone 3 hrs

#### Concentration: 12 hours

Choose one concentration from the following

##### *Computer Engineering Concentration*

- COSC 211 - Programming Data Structures 3 hrs
- COSC 221 - Computer Organization I 3 hrs
- EECE 352 – Digital System Designs with HDL 3 hrs
- EECE 452 – Adv. Digital Systems Designs w FPGA 3 hrs

##### *Electrical Engineering Concentration*

- EECE 365 – Engineering Electromagnetics 3 hrs
- EECE 372 – Communication Systems 3 hrs
- EECE 342 – Engineering Electronics II 3 hrs
- EECE 431 – Digital Control Systems 3 hrs

## C. Admission

Admission to Eastern Michigan University.

## D. Projections

The four-year enrollment projections for the programs are tabulated below.



New Program Guidelines

	Years	EECE Majors
Year 1 (2018-19)	Freshmen	30
	Sophomores	15
	Juniors	5
	Total	50
Year 2 (2019-20)	Freshmen	40
	Sophomores	20
	Juniors	10
	Seniors	5
	Total	75
Year 3 (2020-21)	Freshmen	50
	Sophomores	30
	Juniors	15
	Seniors	10
	Total	105
Year 4 (2021-22)	Freshmen	60
	Sophomores	35
	Juniors	25
	Seniors	15
	Total	135
Year 5 (2022-23)	Freshmen	65
	Sophomores	40
	Juniors	30
	Seniors	20
	Total	155

## II. Justification/Rationale

Information about becoming a computer engineer is the foremost stride in the direction of earning a prosperous income. In accordance with the Bureau of Labor Statistics, the median income for computer engineers was \$108,430 in 2014, on the other hand the high-end jobholders exceed \$160,000. Earnings differ throughout territories and businesses. Computer instrument commerce is more profitable than the moderate wages for scientific research. The Bureau of Labor Statistics discloses the median annual wage for electrical engineers was \$91,410 in 2014.

The highest paid electrical engineers could gross \$143,000 yearly while the lowest paid can expect to earn an average of \$60,000 per annum. The U.S. Bureau of Labor Statistics (BLS) projected that occupation of electrical engineers would rise by 5% from 2012-2022. The BLS even published that these employees earned an average salary of \$95,780 from May 2014. Broadly speaking, the engineering vocation in widespread and electrical engineering in distinction has a superb expectation in the job market. The Bureau of Labor Statistics approximates a 7.3% progress in the quantity of engineering positions from now until the coming decade. Nationwide, 174,550 jobs were available for electrical engineers while 76,360 jobs were available for computer engineers (Bureau of Labor Statistics, May 2014, [http://www.bls.gov/oes/current/oes\\_stru.htm#17-0000](http://www.bls.gov/oes/current/oes_stru.htm#17-0000)).

Among the universities throughout Michigan, Eastern Michigan University is one of several institutions that do not offer engineering programs. At the Explore Michigan event, many parents express interest in engineering programs. Engineering programs are more familiar to parents because they are well-promoted by industry. Most of the major advertisement caters towards engineering instead of engineering technology. (<http://www.electronicsengineer.com/>, <http://www.indeed.com/>, and <http://www.careerjet.com/>)

The BS in EECE, if adopted, would fulfil the need of many students in the local area. EMU needs a BS-EECE program for various rationales: 1. EECE graduates demand high salaries, 2. EECE graduates are needed in Michigan and nationwide, 3. EECE students are eligible to sit for the Fundamentals of Engineering (FE) exam. After several years of work experience, our graduates can also sit for the Professional Engineering (PE) exam, and 4. EECE advances EMU as a

ranked 3 research institution. 5. EECE allows our student to obtain high-level engineering positions in companies such as Ford Motors Company.

**Present evidence of support for the proposed program from within and outside the University.**

See **Appendix I** for letters of support from outside industries, Department of Mathematics, Department of Computer Science, and Department of Physics & Astronomy.

**III. Preparedness**

**A. Describe the qualifications of the faculty who will be involved in the proposed program.**

**Qualification of the Faculty involved with EECE major:**

**School of Engineering Technology faculty:**

Ali Eydgahi, Professor, PhD, Electrical Engineering

Jamal Bari, Associate Professor, PhD, Electrical Engineering

M. C. Greenfield, Assistant Professor, ABD, Electrical Engineering

Jonathon Lin, Professor, PhD, Mechanical Engineering but teaches in Computer Engineering Technology & Computer Aided Engineering

Tony Shay, Professor, PhD, Mechanical Engineering but teaches Computer Engineering Technology & Computer Aided Engineering, etc.

**D. Describe current library resources and analyze the adequacy of these resources for the proposed program. Include such items as books, journals, indexes, electronic resources (databases, etc.), multimedia (instructional videos, CDs, etc.) and microforms. If additional library holdings will be needed in the next three to five years, provide a plan for acquiring them.**

Current library resources on electrical and computer engineering are very limited. We will work with the University Library to acquire additional resources and research journals to enhance this program and offerings.

**E. Analyze the adequacy of existing facilities, laboratories, or other physical equipment applicable to the proposed program.**

**Existing Facilities, Laboratories, or Other Physical Equipment:**

The proposed program will use the following EMU existing labs and equipment:

1. COT computer labs
2. EET lab

**F. Determine the adequacy of supportive courses, faculty, and equipment outside of the department that may be important to the program (e.g., cognate courses, research assistance, computer services, facilities controlled by other departments/schools or colleges, etc.).**

**Adequacy of Supportive Courses, Faculty, and Equipment Outside of the Department:**

The proposed program requires supportive courses from Mathematics, Computer Science, Chemistry, and Physics. The required math and science courses for the proposed EECE program includes MATH 120, 121, 223, and 225 (pending as Differential Equations and Linear Algebra), STAT 360, PHY 223, 224 and Chemistry 121. These are the required courses.

**G. Outline a plan for marketing the proposed program and recruiting students into it.**

### **Marketing Plan for the Proposed Program and Recruiting Students:**

The students for the proposed EECE program will come from Michigan, neighboring states, and foreign countries. The marketing and recruiting efforts will focus on both domestic students and international students.

#### **Domestic students:**

1. Work with University's marketing and recruiting departments to develop program fliers and marketing CDs to promote the new program to high schools, technical schools, and community colleges.
2. Work with national and private institutions and agencies to promote the program.
3. Develop working relationships with high schools and technical schools in Southeast Michigan.
4. Work with Extended Programs to recruit students and alumni taking EECE as the second bachelor degree program.

#### **International students:**

Market and recruit international students in China, India, and other countries.  
Web marketing

#### **H. Additional information (if appropriate).**

N/A

### **IV. Assessment/Evaluation**

The BS-EECE program will be assessed using ABET accreditation standards. ABET accreditation for BS-EECE will be applied for after the first graduating class of EECE.

### **V. Program Costs**

#### **Faculty, lecturers or supportive staff required**

There are 17 new courses developed for this proposed program. The existing faculty members at Computer Engineering Technology and Electrical Engineering Technology have the expertise to develop and cover some of new courses. Two to three new faculty members are needed for this new degree program when enrollment has grown over 120 students.

#### **B. Space or facilities required**

The courses required for this new degree program can be taught in the existing labs of Computer Engineering Technology and Electrical Engineering Technology. However, some lab equipment and software will need to be added.

#### **C. Equipment required**

The main equipment items required to implement this proposed degree program include:

1. General lab equipment
2. Computers
3. Software
4. LabView equipment
5. Others

New Program Guidelines

Equipment	Estimate Cost	Remark
General lab equipment	\$60,000	
Computers	\$20,000	
Software	\$20,000	
LabView equipment	\$20,000	
<b>Total</b>	<b>\$120,000</b>	

The above equipment items can be acquired over three years.

**D. Assistantships/fellowships required**

Two to three graduate assistantships are proposed for this new degree program.

**E. Library resources required**

Will work with the University Library to acquire books, research journals and videos that are related to electrical and computer engineering.

**F. Marketing and recruiting costs**

The brochure for this proposed degree program would cost around \$2,000. The marketing and recruiting activities are part of University, College of Technology, and School of Engineering Technology marketing and recruiting plans.

**G. Other costs not covered above**

N/A

**H. Total of all financial requirements for implementation of proposed degree**

\$120,000 plus acquisition of library resources

**I. Percentage of total cost to be borne by Continuing Education**

0%

## VI. Action of the Department/College

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

Vote of faculty: For 17 Against 0 Abstentions 0  
(Enter the number of votes cast in each category.)

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

\_\_\_\_\_

Department Head/School Director/Signature

12/12/2016

Date

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

#### A. College.

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

\_\_\_\_\_

College Dean Signature

1/3/2017

Date

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## VII. Approval

\_\_\_\_\_  
Associate Vice-President for Academic Programming Signature

\_\_\_\_\_  
Date

# Appendix I

## Letters of Support

From: **Moderick Greenfield** <mgreenfi@emich.edu>  
Subject: Fwd: BSECE  
Date: February 9, 2017 at 4:00 PM  
To: Evan Finley <efinley2@emich.edu>



----- Forwarded message -----

From: **Moderick Greenfield** <mgreenfi@emich.edu>  
Date: Fri, Nov 18, 2016 at 12:56 PM  
Subject: Re: BSECE  
To: Debra Ingram <dingra12@emich.edu>

Thanks.

On Fri, Nov 18, 2016 at 9:56 AM, Debra Ingram <dingra12@emich.edu> wrote:

Dear M.C.,

The Mathematics Department is very pleased that the BS in Electrical and Computer Engineering degree is being proposed for EMU. Please let us know how we can help support the program.

Sincerely,

Dr. Debra Ingram, Head  
Department of Mathematics  
Eastern Michigan University  
Ypsilanti, Michigan 48197  
515/516 Pray-Harrold  
(734) 487-1444

**From:** Moderick Greenfield [mailto:mgreenfi@emich.edu]  
**Sent:** Thursday, November 17, 2016 2:51 PM  
**To:** dingra12@emich.edu  
**Subject:** BSECE

Hi:

SET is proposing a new BS in Electrical and Computer Engineering. It has a great depth of mathematics contained it. In fact, your department has agreed to create a consolidated differential equations and linear algebra course to meet our needs.

Thanks for your support,



From: **Evan Finley** [efinley2@emich.edu](mailto:efinley2@emich.edu)  
Subject: **Re: Physics & Astronomy Input**  
Date: **March 13, 2017 at 10:21 AM**  
To: [mbrake@emich.edu](mailto:mbrake@emich.edu)  
Cc: **Philip Rufe** [prufe@emich.edu](mailto:prufe@emich.edu)  
Bcc: **Evan Finley** [efinley2@emich.edu](mailto:efinley2@emich.edu)



Thank you, Mary.

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**Evan J. Finley** | Academic Catalogs & Curricular Development  
Academic & Student Affairs | Eastern Michigan University  
302K Pierce Hall | 734.487.8954 | [emich.edu/cpd](http://emich.edu/cpd)

On Mar 13, 2017, at 10:18 AM, Mary Brake <[mbrake@emich.edu](mailto:mbrake@emich.edu)> wrote:

Dear Evan,

On February 7th I sent the EECE proposal to Alex Oakes. She sent me an email back confirming receipt of the proposal. When I spoke to her last week, she said her Instructional Committee was going to review the proposal this week and I think that the faculty would look after that and would get back to me.

We value their input but we are hoping that the lack of a letter from Physics by March 15th does not hold up our proposal.

Thanks,

Mary

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Mary L. Brake PhD  
Interim Associate Dean  
College of Technology  
Eastern Michigan University  
734-487-0551

From: **Mary Brake** [mbrake@emich.edu](mailto:mbrake@emich.edu)  
Subject: **Re: Electrical Engineering Program**  
Date: **March 9, 2017 at 9:31 AM**  
To: **Augustine Ikeji** [aikeji@emich.edu](mailto:aikeji@emich.edu)  
Cc: **Evan Finley** [efinley2@emich.edu](mailto:efinley2@emich.edu)



Thank you!

On Thu, Mar 9, 2017 at 9:09 AM, Augustine Ikeji <[aikeji@emich.edu](mailto:aikeji@emich.edu)> wrote:

Hello, Mary,  
The COSC department have no objections to the ECE proposal.  
Thanks.  
Gus

On Fri, Mar 3, 2017 at 11:23 AM, Mary Brake <[mbrake@emich.edu](mailto:mbrake@emich.edu)> wrote:

Hi Gus,

I was just checking in to see if your faculty had had a chance to look at the electrical and computer engineering program? We need an email from you before the proposal can go forward.

Please let me know if I can help in any way.

Thanks,

Mary

--

Mary L. Brake PhD  
Interim Associate Dean  
College of Technology  
Eastern Michigan University  
[734-487-0551](tel:734-487-0551)

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Augustine Ikeji, Ph.D.  
Professor & Department Head,  
Computer Science Department, 511 Pray Harrold,  
Eastern Michigan University,  
Ypsilanti, Michigan 48197-USA.  
Phone: [734.487.1063](tel:734.487.1063) - Main Office Line  
[734.487.0056](tel:734.487.0056) - Direct Line  
[734.487.6824](tel:734.487.6824) - Fax



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Mary L. Brake PhD  
Interim Associate Dean  
College of Technology  
Eastern Michigan University  
[734-487-0551](tel:734-487-0551)



Friday, November 11, 2016

**SUBJECT:** Electrical Engineering Employment in South East Michigan

To whom it may concern,

There is a shortage of electrical controls engineers in south east Michigan. Specifically, companies are looking for electrical engineers that understand industrial controls. Some of the skills required for industrial controls are PLC programming, the ability to read electrical prints, and designing control panels.

Sincerely,  
Duckworth & Associates, Inc.  
***Kyle Koskinen***  
V.P. Electrical & Controls Engineering  
(734) 455-7500, ext. 125



Date: Nov, 2<sup>nd</sup> 2016


To whom it may concern

This letter in to inform that our company, (Mobis North America Technical Center) is in need of electrical engineers.

If you have any question please let me know.

Best Regards,

Nizar Homsy

 11/02/2016

Bluetooth Systems Analyst

**MOBIS North America**

46501 Commerce Center Dr.

Plymouth, MI 48170

E-mail: [nhomsy@mobis-usa.com](mailto:nhomsy@mobis-usa.com)

<http://www.mobistc-na.com/>



# Vantage Plastics

*Thermoforming Specialists*



1415 W Cedar St  
Standish, MI 48658  
Phone (989) 846-1029  
Fax (989) 846-0939

Dr. Bob Lahidji

Director, School of Engineering Technology

Sill Hall, Eastern Michigan University,

Ypsilanti, MI 48197

Dear Dr. Lahidji,

This letter is to support the Eastern Michigan University proposed Bachelor of Science Degree in Electrical and Computer Engineering at the School of Engineering Technology. Vantage Plastics, a specialized thermal forming manufacturer in Michigan, supports increasing graduates in electrical and computer engineers for the State of Michigan. Our company has been deeply involved with The State of Michigan's Prosperity Region Five initiative to identify economic drivers within our region. Outside consultants were brought for an extensive study. The final report identifies the need for STEM professionals for several major industries within this region if the economy is to prosper in the future. Thus we are also working with a coalition of leaders from this region to bring STEM into the lives of students at an earlier point of their academic lives. Our company division of thermoforming utilizes a substantial amount of electric power to run our operation. Electrical and Computer Engineers can assist our company and similar sister companies in the State of Michigan to achieve more sustainable and efficient manufacturing.

Eastern Michigan University's initiative to offer a Bachelor of Science Degree in Electrical and Computer Engineering is a very good step towards increasing STEM graduates in our community that will improve the gainful employment and wellbeing of future generations. We currently have a shortage of STEM graduates and do not see a diminished need within any foreseeable future. We wish you the best to achieve the roll out of this program.

Sincerely

George Aultman

Vice President of Development

[www.vantageplastics.com](http://www.vantageplastics.com)



## Hyundai America Technical Center, Inc.

6800 Geddes Rd, Superior Township, MI 48198

Dr. Bob Lahidji

Director, School of Engineering Technology  
Sill Hall, Eastern Michigan University,  
Ypsilanti, MI 48197

Dear Dr. Lahidji,

This letter is to support the Eastern Michigan University proposed Bachelor of Science Degree in Electrical and Computer Engineering at the School of Engineering Technology.

Hyundai America Technical Center feels very strongly the success of the company rely completely on their employees in general and their engineers in particular to build safer, robust, reliable, dependable, sharp styling, and high quality vehicles. In the next ten to twenty years, vehicles will not be as we know it today. For example, the same way that you get to know how your car drives and feels your car may start to get to know you in return. Many modern cars have inbuilt computer systems that help run the car itself. Some of the technologies that automotive companies are looking for, ways to enable vehicle-to-vehicle and vehicle-to-infrastructure communication to increase safety and help drivers avoid traffic jams. Also, other technologies such as self-driving vehicles, self-parking cars, and these are just naming a few.

These above mentioned technologies will not become reality if we do not have engineers that they have the background in electrical and computer disciplines. Therefore, Eastern Michigan University's initiative to offer a Bachelor of Science Degree in Electrical and Computer Engineering is a very good step towards increasing STEM graduates in our state that will improve the gainful employment and wellbeing of future generations. Higher education is no longer just a pathway to opportunity for a talented few; rather, it is a prerequisite for the growing jobs of the new economy.

We wish you the best to achieve the roll out of this program.

Sincerely



Rakan Chabaan, Ph. D.  
Advanced Research Senior Engineer  
Electronic Systems Development Dept.  
Hyundai America Technical Center



## Ford Motor Company

Global MBD Core PMTi  
3rd Floor, MailDrop 3029  
Research & Engineering Center, Building #3  
20100 Rotunda Drive  
Dearborn, MI 48124 USA

Eastern Michigan University  
College of Technology  
118 Sill Hall  
Ypsilanti, Michigan 48194 USA

To whom it may concern,

RE:: Program in Electrical and Computer Engineering

**Ford Motor Company** has a challenging time finding qualified and skilled personnel who can develop the best in-class and most sophisticated engineering solutions for our vehicle platforms. Looking into the future and seeing the growth of ECE related opportunities within vehicle systems, the need for a larger pool of ECE graduates becomes apparent. Having more institutions to select from for hiring allows us here at **Ford** to have the opportunity to select from a wider variety of students with diverse backgrounds.

As the manager of **Ford's** global model-based design efforts, I fully understand the workforce needs of **Ford** and other OEMs as related to engineering talent. With that, I would strongly recommend your institution's effort at developing engineering programs that meet current and future industry needs.

*Susan L. Smith*

Global MBD Manager  
313-32-38565



# Appendix II

## Program of Study Examples

**Typical Programs of Study 1:****Electrical and Computer Engineering – Electrical Engineering Concentration****Major/Concentration Requirements****85 Credit Hours**

<b>YEAR 1 – 1<sup>st</sup> Semester</b>	<b>Course</b>	<b>Credits</b>
ME 100	Introduction to Engineering Design & Manufacturing	3
MATH 120	Calculus I (GEQR)	4
CHEM 121/122	General Chemistry I and Lab (GEKN)	4
WRTG 121	Composition II (GEEC)	3
Gen. Ed	US Diversity (GEUS)	3
	Total	17 cr
<b>YEAR 1 – 2<sup>nd</sup> Semester</b>		
MATH 121	Calculus II	4
CET 151	Introduction to Engineering Programming	3
CTAC 124	Fundamentals of Speech (GEEC)	3
GEN ED	Arts (GEKA)	3
GEN ED	Humanities (GEKH)	3
	Total	16 cr
<b>YEAR 2 – 1<sup>st</sup> Semester</b>		
PHY 223	Mechanics, Sound & Heat (GEKN)	5
MATH 122	Linear Algebra	3
SET 350W	Engineering Communication	3
GEN ED	Social Science (GEKS)	3
ELECTIVE	Elective	3
	Total	17 cr
<b>YEAR 2 – 2<sup>nd</sup> Semester</b>		
MATH 223	Multivariable Calculus	4
EECE 212	Engineering Circuit Analysis I	3
COSC 111	Introduction to Programming	3
PHY 224	Electricity and Light	5
	Total	15 cr
<b>YEAR 3 – 1<sup>st</sup> Semester</b>		
EECE 213	Engineering Circuit Analysis II	3
EECE 251	Digital Logic Design	3
MATH 325	Differential Equations	3
GEN ED	Arts (GEKA: with different prefix)	3
GEN ED	Global Awareness	3
	Total	15 cr
<b>YEAR 3 – 2<sup>nd</sup> Semester</b>		
EECE 341	Engineering Electronics I	3

New Program Guidelines

EECE 351	Microcontrollers	3
EECE 371	Signals and Systems	3
EECE 365	Engineering Electromagnetics	3
GEN ED	Humanities (GEKH: with different prefix)	3
	Total	15 cr
<b>YEAR 4 – 1<sup>st</sup> Semester</b>		
EECE 342	Engineering Electronics II	3
EECE 372	Communication Systems	3
EECE 421	Control Systems Engineering	3
EECE 430	Power Electronics	3
GEN ED	Social Science (GEKS: with different prefix)	3
	Total	15 cr
<b>YEAR 4 – 2<sup>nd</sup> Semester</b>		
EECE 400	EECE Professional Practice	2
EECE 431	Digital Control Systems	3
EECE 480	Senior Capstone	3
Elective	Elective	3
Elective	Elective	3
	Total	14 cr
<b>Grand Total Semester Hours: 124</b>		

**Typical Programs of Study 2:****Electrical and Computer Engineering – Computer Engineering Concentration****Major/Concentration Requirements****85 Credit Hours**

<b>YEAR 1 – 1<sup>st</sup> Semester</b>	<b>Course</b>	<b>Credits</b>
ME 100	Introduction to Engineering Design & Manufacturing	3
MATH 120	Calculus I (GEQR)	4
CHEM 121/122	General Chemistry I and Lab (GEKN)	4
WRTG 121	Composition II (GEEC)	3
Gen. Ed	US Diversity (GEUS)	3
	Total	17 cr
<b>YEAR 1 – 2<sup>nd</sup> Semester</b>		
MATH 121	Calculus II	4
CET 151	Introduction to Engineering Programming	3
CTAC 124	Fundamentals of Speech (GEEC)	3
GEN ED	Arts (GEKA)	3
GEN ED	Humanities (GEKH)	3
	Total	16 cr
<b>YEAR 2 – 1<sup>st</sup> Semester</b>		
PHY 223	Mech. Sound & Heat (GEKN)	5
MATH 122	Linear Algebra	3
SET 350W	Engineering Communication	3
GEN ED	Social Science (GEKS)	3
ELECTIVE	Elective	3
	Total	17 cr
<b>YEAR 2 – 2<sup>nd</sup> Semester</b>		
MATH 223	Multivariable Calculus	4
EECE 212	Engineering Circuit Analysis I	3
COSC 111	Introduction to Programming	3
PHY 224	Electricity and Light	5
	Total	15 cr
<b>YEAR 3 – 1<sup>st</sup> Semester</b>		
ECE 213	Engineering Circuit Analysis II	3
EECE 251	Digital Logic Design	3
MATH 325	Differential Equations	3
GEN ED	Arts (GEKA: with different prefix)	3
GEN ED	Global Awareness	3
	Total	15 cr
<b>YEAR 3 – 2<sup>nd</sup> Semester</b>		
EECE 341	Engineering Electronics I	3

New Program Guidelines

EECE 351	Microcontrollers	3
EECE 371	Signals and Systems	3
COSC 221	Computer Organization I	3
Gen. Ed.	Humanities (GEKH: with different prefix)	3
	Total	15 cr
<b>YEAR 4 – 1<sup>st</sup> Semester</b>		
EECE 421	Control Systems Engineering	3
EECE 430	Power Electronics	3
EECE 352	Digital System Designs with HDL	3
COSC 211	Programming Data Structure	3
Gen. Ed.	Arts (GEKA: with different prefix)	3
	Total	15 cr
<b>YEAR 4 – 2<sup>nd</sup> Semester</b>		
EECE 400	EECE Professional Practice	2
EECE 480	Senior Capstone	3
EECE 452	Advanced Digital System Designs w/ FPGA	3
Elective	Elective	3
Elective	Elective	3
	Total	14 cr
<b>Grand Total Semester Hours: 124</b>		