**A MEMORANDUM**

DATE: November 19, 2021

TO: UCCC Members

FROM: Dr. Andy Perkins, Chair

SUBJECT: UCCC Meeting on Thursday, December 2, 2021 at 9:00 a.m.

The agenda and proposals for the meeting on **Thursday, December 2, 2021 at 9:00 a.m. in the Trotter Room (Room 2200) of the Center for Advanced Vehicular Systems in the Research Park** are enclosed**.** The minutes will be forwarded by a separate email. Please contact the UCCC Office if you are unable to attend the meeting.

Thank you.

Enclosures: Course/Curriculum Proposals

Summary of Recommended Changes:

Change 1: Amend the Non-Voting Members to accurately reflect the current names of the various offices and centers.

Change 2: Add Center for Distance Education, Center for Teaching and Learning, University Academic Advising Center, and Office of Research and Economic Development (as pertains to curriculum related issues with Centers and faculty research) and correct the name of Office of Institutional Research and Effectiveness (one entity).

Change 3: Stipulate that Officers shall include a Vice-Chair to be elected by membership.

**Current By-Law:**

ARTICLE III COMPOSITION

The UCCC membership shall include voting faculty members, three voting student members and additional non-voting representatives as listed below.

Section 3 The non-voting members shall be:

A. A representative of the Registrar's Office.
B. A representative of the Library.
C. The Secretary employed for the UCCC.
D. A representative of the Office of Research and Institutional Effectiveness.
E. A representative of the Information Technology Services.
F. A representative of the Graduate School.
G. A representative of the Office of Institutional Research.

**Recommended Revision:**

Section 3 The non-voting members shall be:

A. A representative of the Registrar's Office.
B. A representative of the Library.
C. The Secretary employed for the UCCC.
D. A representative of the Office of Institutional Research and Effectiveness.
E. A representative of the Information Technology Services.
F. A representative of the Graduate School.
G. ~~A representative of the Office of Institutional Research.~~
G. A representative of the Center for Distance Education.
H. A representative of the Center for Teaching and Learning.
I. A representative of the University Academic and Advising Center.
J. A representative of the Office of Research and Economic Development

**Current By-Law:**

ARTICLE VI OFFICERS

Section 1 The officers of the UCCC shall be a Chair and a Secretary.
Chair- to preside at all meetings of the UCCC and represent the UCCC to the University. The Chair shall be elected annually at the January meeting by the members of the UCCC. The Chair shall be a current, elected member of the UCCC with a minimum of one year's experience on the UCCC. The Chair's term shall be from July 1 to June 30 of the school year of election. The Chair shall receive 25% released time to perform the duties of the Chair in reviewing proposals, advising colleges and departments concerning proposals and establishing meeting times and agendas. In the event that the Chair cannot preside at a called meeting, the Secretary will serve as the presiding officer.

Secretary- the Secretary shall be a paid employee of the University with responsibility for managing the UCCC office and assisting the UCCC Chair.

**Recommended Revision:**

ARTICLE VI OFFICERS

Section 1 The officers of the UCCC shall be a Chair, Vice-Chair and a Secretary.

Chair- to preside at all meetings of the UCCC and represent the UCCC to the University. The Chair shall be elected annually at the January meeting by the members of the UCCC. The Chair shall be a current, elected member of the UCCC with a minimum of one year's experience on the UCCC. The Chair's term shall be from July 1 to June 30 of the school year of election. The Chair shall receive 25% released time to perform the duties of the Chair in reviewing proposals, advising colleges and departments concerning proposals, ~~and~~ establishing meeting times and agendas and attending Associate Deans Council. In the event that the Chair cannot preside at a called meeting, the ~~Secretary~~ Vice-Chair will serve as the presiding officer.

Vice-Chair- to assist the Chair in the execution of duties related to UCCC. The Vice-Chair shall be elected annually at the January meeting by the members of the UCCC. The Vice-Chair shall be a current, elected member of the UCCC with a minimum of one year's experience on the UCCC. The Vice Chair's term shall be from July 1 to June 30 of the school year of election. In the event that the Chair cannot preside at a called meeting, the Vice-Chair will serve as the presiding officer.

Secretary- the Secretary shall be a paid employee of the University with responsibility for managing the UCCC office and assisting the UCCC Chair.

**AGENDA**
**UNIVERSITY COMMITTEE ON COURSES AND CURRICULA**
**December 2, 2021**

1. **Welcome**
2. **Approval of minutes**
3. **Modification of By-Laws**
4. **Course proposals by college/school**

## AGRICULTURE AND LIFE SCIENCES

| | | |
|---|---|---|
| Modification +Online/Distance | ADS 3142 | Meats Judging I (cross listed with FNH 3142) |
| +Online/Distance | ADS 3214 | Livestock Growth and Development |
| Modification +Online/Distance | EPP 6543 (split level with EPP 4543) | Toxicology and Insecticide Chemistry |
| Modification +Online/Distance | FNH 3142 | Meat Judging I (cross listed with ADS 3142) |

## ARCHITECTURE, ART AND DESIGN

| | | |
|---|---|---|
| Addition | ART 3063 | Digital Painting |

## ARTS AND SCIENCES

| | | |
|---|---|---|
| +Online/Distance | CO 3343 | Writing for the Media |
| Addition | CO 3383 | Creative Services Video Production |
| Modification +Online/Distance | CO 3843 | Media Relations |
| Modification | CO 4503 | History of Theatre 1: Classical |
| Addition | CO 4513 | History of Theatre 2: Contemporary |
| Modification | CRM 4253 | White Collar and Computer Crime (cross listed with SO 4253) |
| +Online/Distance | EN 2283 | World Literature After 1600 |
| Addition | SO 3703 | Racial and Ethnic Inequality |
| Modification | SO 4253 | White Collar and Computer Crime (cross listed with CRM 4253) |

## EDUCATION

| | | |
|---|---|---|
| Addition | PE 1211 | Basketball |
| Addition | PE 1261 | Flag Football |

## ENGINEERING

| | | |
|---|---|---|
| Modification +Online/Distance | ECE 3141 | Circuits I Lab |
| Modification +Online/Distance | ECE 3143 | Circuits I |
| Modification +Online/Distance | ECE 3153 | Circuits II |
| Modification +Online/Distance | ECE 3244 | Electronics I |

| | | |
|---|---|---|
| Modification<br>+Online/Distance | ECE 3253 | Electronics II |

## VETERINARY MEDICINE

| | | |
|---|---|---|
| Addition | CVM 4991 | Preparations for Study Abroad in Uganda<br>(tabled at Oct. 22, 2021 meeting) |

**5. Degree proposals by college/school**

## ENGINEERING

| | | |
|---|---|---|
| Modification | BS | Computer Engineering |
| Modification | BS | Electrical Engineering: Electrical Engineering, Power and Energy Engineering |

**APPROVAL FORM FOR**

# DEGREE PROGRAMS

**MISSISSIPPI STATE UNIVERSITY**

**NOTE: This form is a cover sheet that must accompany the degree program change proposal. The actual proposal should be prepared in accordance with format requirements provided in the *Guide and Format for Curriculum Proposals* published by the UCCC. Both cover sheet and proposal should be submitted to UCCC Mail Stop 9702 (281 Garner Hall), Phone: 325-9410.**

**College:** Bagley College of Engineering **Department:** Electrical & Computer Engineering

**Contact Person:** Jean Mohammadi-Aragh **Mail Stop:** 9571 **E-mail:** jean@ece.msstate.edu

**Nature of Change:** revise circuits/electronics sequence
**Date Initiated:** 11/3/21 **Effective Date:** Fall 2022

**Current Degree Program Name:** Bachelor of Science in Computer Engineering

**Major:** Computer Engineering **Concentration:**

**New Degree Program Name:**

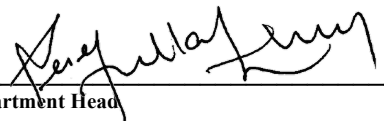
**Major:** Computer Engineering **Concentration:**

**Summary of Proposed Changes:**

The changes proposed are as follows:

1. Shift from a three-course combined circuits/electronics sequence to two two-course circuits and two-course electronics sequences.

The degree program will require the same number of credit hours (11 credit hours) within these new sequences, but the new format will allow us to reorganize topics to be consistent with current textbooks and allow us to connect the lab experience with the first circuits course rather than the second. Further, additional flexibility added by these changes will result in the removal of a five-course sequence that will allow transfer students to complete their degree in a more timely manner.

| **Approved:** | **Date:** |
| --- | --- |
|  | 11/8/21 |
| **Department Head** | |
| | 11/9/21 |
| **Chair, College or School Curriculum Committee** | |
| **Dean of College or School** | |
| **Chair, University Committee on Courses and Curricula** | |
| **Chair, Graduate Council(if applicable)** | |
| **Chair, Deans Council** | |

**PROPOSAL FOR THE MODIFICATION OF THE**
**B.S. IN COMPUTER ENGINEEIRNG**

## 1. CATALOG DESCRIPTION

No changes proposed.

## 2. CURRICULUM OUTLINE

The changes proposed are as follows:

1. Shift from a three-course combined circuits/electronics sequence to two two-course circuits and two-course electronics sequences.

The degree program will require the same number of credit hours (11 credit hours) within these new sequences.

**Table 1. Comparison of Current CPE Degree and Proposed CPE Degree Programs**

| CURRENT Degree Description | PROPOSED Degree Description |
|---|---|
| Degree: Bachelor of Science in Computer Engineering<br>Major: Computer Engineering<br>Concentration: N/A | Degree: Bachelor of Science in Computer Engineering<br>Major: Computer Engineering<br>Concentration: |
| Alumni, employers, faculty and students participate in a process used to develop educational objectives for the undergraduate programs in Electrical Engineering and Computer Engineering. Within a few years of graduation, program graduates completing the baccalaureate degree in Electrical or Computer Engineering will:<br>• Be recognized by their peers as fundamentally sound in the application of mathematics, science, computing, and engineering.<br>• Be engaged in the practice of Electrical or Computer Engineering as innovative problem solvers with a strong work ethic, by identifying and implementing solutions using the proper tools, practical approaches, and flexible thinking.<br>• Be productive and demonstrate leadership in the practice of Electrical or Computer Engineering, both individually and within multidisciplinary teams, using effective oral and written communication skills when working with peers, supervisors, and the public.<br>• Be responsible in the practice of Electrical or Computer Engineering, relying on sound engineering ethics, a commitment to lifelong learning and a genuine concern for society and the environment. | Alumni, employers, faculty and students participate in a process used to develop educational objectives for the undergraduate programs in Electrical Engineering and Computer Engineering. Within a few years of graduation, program graduates completing the baccalaureate degree in Electrical or Computer Engineering will:<br>• Be recognized by their peers as fundamentally sound in the application of mathematics, science, computing, and engineering.<br>• Be engaged in the practice of Electrical or Computer Engineering as innovative problem solvers with a strong work ethic, by identifying and implementing solutions using the proper tools, practical approaches, and flexible thinking.<br>• Be productive and demonstrate leadership in the practice of Electrical or Computer Engineering, both individually and within multidisciplinary teams, using effective oral and written communication skills when working with peers, supervisors, and the public.<br>• Be responsible in the practice of Electrical or Computer Engineering, relying on sound engineering ethics, a commitment to lifelong learning and a genuine concern for society and the environment. |

| | |
|---|---|
| With the origin of the modern computer dating back to the late 1940's and the growth of computer hardware fueled by the availability of digital integrated circuits starting in the late 1960's, computer engineers have enjoyed a pivotal role in technology that now permeates our entire society. Whether the end product is an integrated circuit, a system of networked embedded computers, or any system that relies on digital hardware or computer software, its development requires the skills of a computer engineer. While computing systems include both hardware and software, it is the optimal combination of these components that is the unique realm of the computer engineer. Today, computer engineers are a driving force in the technological and economic development of the digital age.<br><br>The curriculum requirements for computer engineering are built around a substantial engineering core curriculum and required courses in electrical engineering and computer science. The requirements in mathematics, the basic sciences, and engineering sciences provide the breadth of exposure required for all engineering disciplines. Basic electrical engineering requirements include circuit theory, electronics and digital devices which are supplemented by upper-level courses in computer architecture, and computer aided design of digital systems. Basic computer science courses include a coordinated sequence providing fundamental knowledge in data structures, algorithms, object oriented programming, software engineering, real-time application and software development tools. These courses are developed across multiple platforms and are based on the Python and Java language. Upper-level courses in data communications and computer networks, algorithms and operating systems are also provided. Students wishing to gain depth of coverage in communications, parallel computing, VLSI, embedded systems or signal processing can achieve this with the availability of technical electives selected from an approved list or in consultation with a faculty advisor. Required courses in communications skills, social sciences and humanities provide studies in non-technical areas that are traditional in a broad-based education. A capstone senior design course requires students to apply newfound knowledge and explore entrepreneurship. Students research and identify a problem and work in teams applying a combination of hardware and software to develop a solution. Critical and Final Design Reviews enable students to develop their professional presentation skills.<br><br>Students expecting to graduate from Mississippi State University with a bachelor of science degree in computer engineering, in addition to satisfactorily completing the CPE curriculum requirements, must | With the origin of the modern computer dating back to the late 1940's and the growth of computer hardware fueled by the availability of digital integrated circuits starting in the late 1960's, computer engineers have enjoyed a pivotal role in technology that now permeates our entire society. Whether the end product is an integrated circuit, a system of networked embedded computers, or any system that relies on digital hardware or computer software, its development requires the skills of a computer engineer. While computing systems include both hardware and software, it is the optimal combination of these components that is the unique realm of the computer engineer. Today, computer engineers are a driving force in the technological and economic development of the digital age.<br><br>The curriculum requirements for computer engineering are built around a substantial engineering core curriculum and required courses in electrical engineering and computer science. The requirements in mathematics, the basic sciences, and engineering sciences provide the breadth of exposure required for all engineering disciplines. Basic electrical engineering requirements include circuit theory, electronics and digital devices which are supplemented by upper-level courses in computer architecture, and computer aided design of digital systems. Basic computer science courses include a coordinated sequence providing fundamental knowledge in data structures, algorithms, object oriented programming, software engineering, real-time application and software development tools. These courses are developed across multiple platforms and are based on the Python and Java language. Upper-level courses in data communications and computer networks, algorithms and operating systems are also provided. Students wishing to gain depth of coverage in communications, parallel computing, VLSI, embedded systems or signal processing can achieve this with the availability of technical electives selected from an approved list or in consultation with a faculty advisor. Required courses in communications skills, social sciences and humanities provide studies in non-technical areas that are traditional in a broad-based education. A capstone senior design course requires students to apply newfound knowledge and explore entrepreneurship. Students research and identify a problem and work in teams applying a combination of hardware and software to develop a solution. Critical and Final Design Reviews enable students to develop their professional presentation skills.<br><br>Students expecting to graduate from Mississippi State University with a bachelor of science degree in computer engineering, in addition to satisfactorily completing the CPE curriculum requirements, must meet the following minimum GPA requirements for graduation: |

| | |
|---|---|
| meet the following minimum GPA requirements for graduation:<br>• make an overall C average on all hours scheduled and rescheduled at all institutions attended, including MSU (2.00 or better cumulative GPA)<br>• make a C average on all hours scheduled and rescheduled at MSU (2.00 or better MSU GPA)<br>• earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes scheduled and rescheduled at all institutions attended, including MSU<br><br>The computer engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.<br><br>This program is offered through joint efforts of faculty in the Department of Electrical and Computer Engineering and the Department of Computer Science and Engineering. | • make an overall C average on all hours scheduled and rescheduled at all institutions attended, including MSU (2.00 or better cumulative GPA)<br>• make a C average on all hours scheduled and rescheduled at MSU (2.00 or better MSU GPA)<br>• earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes scheduled and rescheduled at all institutions attended, including MSU<br><br>The computer engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.<br><br>This program is offered through joint efforts of faculty in the Department of Electrical and Computer Engineering and the Department of Computer Science and Engineering. |

| CURRENT CURRICULUM OUTLINE | Required Hours | PROPOSED CURRICULUM OUTLINE | Required Hours |
|---|---|---|---|
| EN 1103 English Comp I or EN 1163 Accelerated Comp I<br>EN 1113 English Comp II or EN 1173 Accelerated Comp II | 6 | EN 1103 English Comp I or EN 1163 Accelerated Comp I<br>EN 1113 English Comp II or EN 1173 Accelerated Comp II | 6 |
| Fine Arts:<br>see General Education courses | 3 | Fine Arts:<br>see General Education courses | 3 |
| Natural Sciences<br>see Major Core | | Natural Sciences<br>see Major Core | |
| Math<br>see Major Core | | Math<br>see Major Core | |
| Humanities<br>see General Education courses | 6 | Humanities<br>see General Education courses | 6 |
| Social/Behavioral Sciences<br>see General Education courses | 6 | Social/Behavioral Sciences<br>see General Education courses | 6 |
| Major Core Courses<br>Math and Basic Science (31h)<br>MA 1713 Calculus I | 3 | Major Core Courses<br>Math and Basic Science (31h)<br>MA 1713 Calculus I | 3 |

| | | | |
|---|---|---|---|
| MA 1723 Calculus II | 3 | MA 1723 Calculus II | 3 |
| MA 2733 Calculus III | 3 | MA 2733 Calculus III | 3 |
| MA 2743 Calculus IV | 3 | MA 2743 Calculus IV | 3 |
| MA 3113 Introduction to Linear Algebra | 3 | MA 3113 Introduction to Linear Algebra | 3 |
| MA 3253 Differential Equations I | 3 | MA 3253 Differential Equations I | 3 |
| IE 4613 Engineering Statistics I | 3 | IE 4613 Engineering Statistics I | 3 |
| CH 1213 Chemistry I | 3 | CH 1213 Chemistry I | 3 |
| CH 1211 Investigations in Chemistry I | 1 | CH 1211 Investigations in Chemistry I | 1 |
| PH 2213 Physics I | 3 | PH 2213 Physics I | 3 |
| PH 2223 Physics II | 3 | PH 2223 Physics II | 3 |
| | | | |
| Engineering Topics (70h) | | Engineering Topics (70h) | |
| CSE 1284 Introduction to Computer Programming | 4 | CSE 1284 Introduction to Computer Programming | 4 |
| CSE 1384 Intermediate Computer Programming | 4 | CSE 1384 Intermediate Computer Programming | 4 |
| CSE 2383 Data Structures and Analysis of Algorithms | 3 | CSE 2383 Data Structures and Analysis of Algorithms | 3 |
| CSE 2813 Discrete Structures | 3 | CSE 2813 Discrete Structures | 3 |
| CSE 3324 Distributed Client/Server Programming | 4 | CSE 3324 Distributed Client/Server Programming | 4 |
| CSE 4733 Operating Systems I | 3 | CSE 4733 Operating Systems I | 3 |
| CSE 4833 Intro Analysis of Algorithms | 3 | CSE 4833 Intro Analysis of Algorithms | 3 |
| ECE 1013 Introduction to ECE Design I | 3 | ECE 1013 Introduction to ECE Design I | 3 |
| ECE 1022 Introduction to ECE Design II | 2 | ECE 1022 Introduction to ECE Design II | 2 |
| *ECE 3413 Introduction to Electronic Circuits* | *3* | **ECE 3143 Circuits I** | **3** |
| | | **ECE 3141 Circuits I Lab** | **1** |
| *ECE 3424 Intermediate Electronic Circuits* | *4* | **ECE 3153 Circuits II** | **3** |
| | | **ECE 3244 Electronics I** | **4** |
| *ECE 3434 Advanced Electronic Circuits* | *4* | ECE 3443 Signals and Systems | 3 |
| ECE 3443 Signals and Systems | 3 | ECE 3714 Digital Devices and Logic Design | 4 |
| ECE 3714 Digital Devices and Logic Design | 4 | ECE 3724 Microprocessors | 4 |
| ECE 3724 Microprocessors | 4 | ECE 4723 Embedded Systems or ECE 4263 Principles of VLSI Design | 3 |
| ECE 4723 Embedded Systems or ECE 4263 Principles of VLSI Design | 3 | ECE 4532 CPE Design I | 2 |
| ECE 4532 CPE Design I | 2 | ECE 4542 CPE Design II | 2 |
| ECE 4542 CPE Design II | 2 | ECE 4713 Computer Architecture | 3 |
| ECE 4713 Computer Architecture | 3 | ECE 4743 Digital System Design | 3 |
| ECE 4743 Digital System Design | 3 | ECE 4833 Data Communication and Computer Networks | 3 |
| ECE 4833 Data Communication and Computer Networks | 3 | CPE technical electives (6h) | 6 |
| CPE technical electives (6h) | 6 | | |
| | | Oral Communication Requirement Fulfilled in ECE 1013, ECE 1022, ECE 4532, ECE 4542, and GE 3513 | |
| Oral Communication Requirement Fulfilled in ECE 1013, ECE 1022, ECE 4532, ECE 4542, and GE 3513 | | | |
| | | Writing Requirement | |
| Writing Requirement | | GE 3513 Technical Writing | 3 |
| GE 3513 Technical Writing | 3 | | |
| | | Computer Literacy Fulfilled in Engineering Topics courses | |
| Computer Literacy Fulfilled in Engineering Topics courses | | | |
| Concentration Courses | | Concentration Courses | |

| | | | |
|---|---|---|---|
| Total Hours | 128 | Total Hours | 128 |

## 3. JUSTIFICATION AND STUDENT LEARNING OUTCOMES

We are shifting from a three-course sequence of combined circuits/electronics topics to two two-course sequences. The degree program will require the same number of credit hours (11 credit hours) within these new sequences, but the new format will allow us to reorganize topics to be consistent with current textbooks and allow us to connect the lab experience with the first circuits course rather than the second. Further, additional flexibility added by these changes will result in the removal of a five-course sequence that will allow transfer students to complete their degree in a more-timely manner.

1. **Update Circuits/Electronics Sequence:** The key motivations for revising and updating the Circuits and Electronics course sequence is to better prepare students to effectively solve circuits and electronics problems. The benefits of moving to two separate sequences are numerous. A few benefits include:
    a. The merged circuits and electronics courses often cause confusion. Though circuits and electronics are closely-related topics, they are not the same. Students have trouble separating the two concepts. Moreover, most universities teach the topics separately, and it is hard for students to transfer credit to MSU that provides credit for our current sequence.
    b. Though we are updating the sequence, we will continue to teach ECE 3413 Introduction to Electronic Circuits. ECE 3413 is required by other engineering majors but will no longer be required for ECE students. This returns us to our historical practices of offering a circuits/electronics course dedicated to non-majors. This allows us to offer a more effective curriculum for ECE and non-ECE students because course topics can be fine-tuned and offered at more appropriate levels for ECE and non-ECE students.
    c. This update will allow us to shift a lab experience to the initial circuits course for ECE students. Currently, students are struggling in our circuits sequence. The ECE faculty think a hands-on lab experience in the first course will allow students to better grasp the material. Since circuits and electronics build on the fundamental concepts taught in the initial circuits course, it is critical for students to thoroughly understand the topics.
    d. This reorganization and update will allow us to use the second circuits course a bridge for our signals and systems courses. We have identified signals and systems as a trouble area for student success. The signals and systems course covers numerous, complex topics. We are evaluating ways to reorganize that course, but for now, a first step is to provide some exposure to topics in earlier, related courses. This reorganization provides the opportunity to do that.
    e. This reorganization will remove a five-course prerequisite chain that is currently in the program due to the three-course combined circuits/electronics sequence (ECE 3413 – ECE 3424 – ECE 3434) which is followed by a two-course senior design sequence (ECE 4512 – ECE 4522). Now transfer students will be able to enroll in senior design by their third semester and can finish their degree in four semesters instead of five semesters.

To provide clarity for circuits/electronics change. The below summaries are provided.

**Current required courses** impacted by this change (11 credit hours for EE and CPE):

- ECE 3413 – currently required for EE, CPE, AE, IE, and ME. Will continue offering and in the future work with AE, IE, and ME faculty to revise topics, if needed, for their students.
- ECE 3424 – currently required for EE and CPE; will phase out
- ECE 3434 – currently required for EE and CPE; will phase out
- Several courses will need prerequisite updates after new sequence is approved; these will be processed as technical changes when new courses are approved.

**New required** courses proposed (11 credit hours for EE and CPE):

- ECE 3143 Circuits I – required for EE and CPE. Equivalent to ECE 3413 but requires co-registration in lab.
- ECE 3141 Circuits I Lab – new standalone lab for introductory circuits topics. (Students who take ECE 3413 can take this lab to continue in ECE circuits and electronics courses.)
- ECE 3153 Circuits II – required for EE and CPE. New course to bridge circuits and signals and systems. Additional applications for circuits topics.
- ECE 3244 Electronics I – required for EE and CPE. Equivalent to ECE 3424

**New elective** courses proposed:

- ECE 3253 Electronics II (elective) – advanced electronics topics from current ECE 3434; can be taken as a technical elective.

As a result of this degree program modification, there are no changes to the student learning outcomes. The CPE student learning outcomes are as follows:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

- Will this program change meet local, state, regional, and national educational and cultural needs?
  **Yes**

- Will this program change result in duplication in the System? **No**
- Will this program change/advance student diversity within the discipline? **No**
- Will this program change result in an increase in the potential placement of graduates in MS, the Southeast, and the U.S.? **No**
- Will this program change result in an increase in the potential salaries of graduates in MS, the Southeast, and the U.S.? **No**

**4. SUPPORT**

See the attached letter from the ECE Undergraduate Committee. Changes in this degree program were discussed multiple times throughout the 2020-2021 academic year. Changes were recommended by the ECE Undergraduate Committee by unanimous vote in their March 22, 2021 meeting and approved by a vote of the ECE faculty on March 26, 2021.

See letter of support from CSE Department.

**5. PROPOSED 4-LETTER ABBREVIATION**

No changes

**6. EFFECTIVE DATE**

Fall 2022

**APPROVAL FORM FOR**

# DEGREE PROGRAMS

**MISSISSIPPI STATE UNIVERSITY**

**NOTE: This form is a cover sheet that must accompany the degree program change proposal. The actual proposal should be prepared in accordance with format requirements provided in the *Guide and Format for Curriculum Proposals* published by the UCCC. Both cover sheet and proposal should be submitted to UCCC Mail Stop 9702 (281 Garner Hall), Phone: 325-9410.**

**College:** Bagley College of Engineering **Department:** Electrical & Computer Engineering

**Contact Person:** Jean Mohammadi-Aragh **Mail Stop:** 9571 **E-mail:** jean@ece.msstate.edu

**Nature of Change:** Update EE GPA requirement modifications, add flexibility through technical elective options, revise circuits/electronics sequence, add concentration

**Date Initiated:** 11/3/21 **Effective Date:** Fall 2022

**Current Degree Program Name:** Bachelor of Science in Electrical Engineering

**Major:** Electrical Engineering **Concentration:**

**New Degree Program Name:**

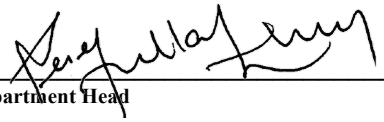
**Major:** Electrical Engineering **Concentration:** Electrical Engineering, Power and Energy Engineering

**Summary of Proposed Changes:**

A summary of proposed changes follows:

1. Update the GPA requirements for EE
2. Remove ECE 3213 Solid State course from degree program and replace with an ECE technical elective option to increase flexibility.
3. Shift from a three-course combined circuits/electronics sequence to two two-course circuits and two-course electronics sequences. The degree program will require the same number of credit hours (11 credit hours) within these new sequences.
4. Add language for Power and Energy Engineering concentration

**Approved:** **Date:**



11/8/21

**Department Head**

11/9/21

**Chair, College or School Curriculum Committee**

**Dean of College or School**

**Chair, University Committee on Courses and Curricula**

**Chair, Graduate Council(if applicable)**

**Chair, Deans Council**

**PROPOSAL FOR THE MODIFICATION OF THE**
**B.S. IN ELECTRICAL ENGINEEIRNG**

## 1. CATALOG DESCRIPTION

No changes proposed.

## 2. CURRICULUM OUTLINE

The changes proposed are as follows:

1. Update the GPA requirements for EE
    a. EOP 21 was mistakenly removed in a previous change. The following language from EOP 21 will be added: earn at least a 2.00 cumulative grade point average on all courses scheduled and rescheduled (average on all attempts) at MSU that are applied toward meeting degree requirements.
    b. Remove "scheduled and rescheduled" for 2.5/4.0 GPA average requirement:
    Replace "earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes scheduled and rescheduled at all institutions attended, including MSU." with "earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes at all institutions attended, including MSU, that are applied toward meeting degree requirements."
2. Remove ECE 3213 Solid State course from degree program and replace with an ECE technical elective option to increase flexibility.
3. Shift from a three-course combined circuits/electronics sequence to two two-course circuits and two-course electronics sequences. The degree program will require the same number of credit hours (11 credit hours) within these new sequences.
4. Add Power and Energy Engineering concentration.

| CURRENT Degree Description | PROPOSED Degree Description |
|---|---|
| Degree: Bachelor of Science in Electrical Engineering<br>Major: Electrical Engineering<br>Concentration: *N/A* | Degree: Bachelor of Science in Electrical Engineering<br>Major: Electrical Engineering<br>Concentration: **Electrical Engineering** |
| Alumni, employers, faculty and students participate in a process used to develop educational objectives for the undergraduate programs in Electrical Engineering and Computer Engineering. Within a few years of graduation, program graduates completing the baccalaureate degree in Electrical or Computer Engineering will:<br>• Be recognized by their peers as fundamentally sound in the application of mathematics, science, computing, and engineering.<br>• Be engaged in the practice of Electrical or Computer Engineering as innovative problem solvers with a strong work ethic, by identifying and implementing solutions using the proper tools, practical approaches, and flexible thinking.<br>• Be productive and demonstrate leadership in the practice of Electrical or Computer Engineering, both individually and within multidisciplinary teams, using effective oral | Alumni, employers, faculty and students participate in a process used to develop educational objectives for the undergraduate programs in Electrical Engineering and Computer Engineering. Within a few years of graduation, program graduates completing the baccalaureate degree in Electrical or Computer Engineering will:<br>• Be recognized by their peers as fundamentally sound in the application of mathematics, science, computing, and engineering.<br>• Be engaged in the practice of Electrical or Computer Engineering as innovative problem solvers with a strong work ethic, by identifying and implementing solutions using the proper tools, practical approaches, and flexible thinking.<br>• Be productive and demonstrate leadership in the practice of Electrical or Computer Engineering, both individually and within multidisciplinary teams, using effective oral |

and written communication skills when working with peers, supervisors, and the public.
- Be responsible in the practice of Electrical or Computer Engineering, relying on sound engineering ethics, a commitment to lifelong learning and a genuine concern for society and the environment.

The electrical engineer is a principal contributor to the modern technological age in which we live today. Following in the footsteps of inventors such as Thomas Edison and Alexander Graham Bell, the electrical engineer is developing technology that improves the quality of life. Developments in microelectronics, telecommunications, and power systems have had a profound effect on each of us. Electrical engineers have affected all segments of our society such as transportation, medicine, and the entertainment industry, to name only a few. Indeed, the electrical engineer has principally been responsible for the advent of the computer age in which we live today as well as the computer's miniaturization and rapid expansion in computational power.

The curriculum in electrical engineering has a foundation based on the principles of the electrical and physical sciences and uses mathematics as a common language to facilitate the solution of engineering problems. The core curriculum consists of a sequence of courses in digital devices, circuits and electronics, electromagnetic field theory, and modern energy conversion. In the senior year, students have the opportunity to take additional course work in one or more technical areas that include: telecommunications, electromagnetics, power systems, high voltage, feedback control systems, microelectronics, signal processing, and computer systems. Supporting course work outside electrical engineering consists of a strong background in mathematics, physical sciences, computer programming, social sciences, fine arts, humanities, and personal communication skills. Computers are used extensively throughout the curriculum, and students are expected to become proficient in higher-order programming languages and several application software tools. Although the concept of design is stressed throughout the program so as to emphasize the problem-solving skills of the engineer, the senior year includes a capstone design experience where much of the previous study is culminated. Through this two-semester design course sequence, students are required to integrate design and analytical problem-solving skills together with communication skills in a team environment.
Students expecting to graduate from Mississippi State University with a bachelor of science degree in electrical engineering, in addition to satisfactorily completing the EE curriculum requirements, must meet the following minimum GPA requirements for graduation:

and written communication skills when working with peers, supervisors, and the public.
- Be responsible in the practice of Electrical or Computer Engineering, relying on sound engineering ethics, a commitment to lifelong learning and a genuine concern for society and the environment.

The electrical engineer is a principal contributor to the modern technological age in which we live today. Following in the footsteps of inventors such as Thomas Edison and Alexander Graham Bell, the electrical engineer is developing technology that improves the quality of life. Developments in microelectronics, telecommunications, and power systems have had a profound effect on each of us. Electrical engineers have affected all segments of our society such as transportation, medicine, and the entertainment industry, to name only a few. Indeed, the electrical engineer has principally been responsible for the advent of the computer age in which we live today as well as the computer's miniaturization and rapid expansion in computational power.

The curriculum in electrical engineering has a foundation based on the principles of the electrical and physical sciences and uses mathematics as a common language to facilitate the solution of engineering problems. The core curriculum consists of a sequence of courses in digital devices, circuits and electronics, electromagnetic field theory, and modern energy conversion. In the senior year, students have the opportunity to take additional course work in one or more technical areas that include: telecommunications, electromagnetics, power systems, high voltage, feedback control systems, microelectronics, signal processing, and computer systems. Supporting course work outside electrical engineering consists of a strong background in mathematics, physical sciences, computer programming, social sciences, fine arts, humanities, and personal communication skills. Computers are used extensively throughout the curriculum, and students are expected to become proficient in higher-order programming languages and several application software tools. Although the concept of design is stressed throughout the program so as to emphasize the problem-solving skills of the engineer, the senior year includes a capstone design experience where much of the previous study is culminated. Through this two-semester design course sequence, students are required to integrate design and analytical problem-solving skills together with communication skills in a team environment.
Students expecting to graduate from Mississippi State University with a bachelor of science degree in electrical engineering, in addition to satisfactorily completing the EE curriculum requirements, must meet the following minimum GPA requirements for graduation:

| | |
|---|---|
| • make an overall C average on all hours scheduled and rescheduled at all institutions attended, including MSU (2.00 or better cumulative GPA)<br>• make a C average on all hours scheduled and rescheduled at MSU (2.00 or better MSU GPA)<br>• *earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes scheduled and rescheduled at all institutions attended, including MSU*<br><br>The electrical engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. | • make an overall C average on all hours scheduled and rescheduled at all institutions attended, including MSU (2.00 or better cumulative GPA)<br>• make a C average on all hours scheduled and rescheduled at MSU (2.00 or better MSU GPA)<br>• **earn at least a 2.00 cumulative grade point average on all courses scheduled and rescheduled (average on all attempts) at MSU that are applied toward meeting degree requirements**<br>• **earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes at all institutions attended, including MSU, that are applied toward meeting degree requirements**<br><br>The electrical engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. |
| "[Click here and type old concentration description]" | **The electrical engineering concentration allows students the flexibility to take a broad range of course in a minimum of two topic areas. Students may take a variety of courses that fit their individual interests in electrical engineering.** |

| CURRENT CURRICULUM OUTLINE | Required Hours | PROPOSED CURRICULUM OUTLINE | Required Hours |
|---|---|---|---|
| EN 1103 English Comp I or EN 1163 Accelerated Comp I<br>EN 1113 English Comp II or EN 1173 Accelerated Comp II | 6 | EN 1103 English Comp I or EN 1163 Accelerated Comp I<br>EN 1113 English Comp II or EN 1173 Accelerated Comp II | 6 |
| Fine Arts:<br>see General Education courses | 3 | Fine Arts:<br>see General Education courses | 3 |
| Natural Sciences<br>see Major Core | | Natural Sciences<br>see Major Core | |
| Math<br>see Major Core | | Math<br>see Major Core | |
| Humanities<br>see General Education courses | 6 | Humanities<br>see General Education courses | 6 |
| Social/Behavioral Sciences<br>see General Education courses | 6 | Social/Behavioral Sciences<br>see General Education courses | 6 |
| Major Core Courses<br>Math and Basic Science (31h) | | Major Core Courses<br>Math and Basic Science (31h) | |
| MA 1713 Calculus I | 3 | MA 1713 Calculus I | 3 |
| MA 1723 Calculus II | 3 | MA 1723 Calculus II | 3 |
| MA 2733 Calculus III | 3 | MA 2733 Calculus III | 3 |
| MA 2743 Calculus IV | 3 | MA 2743 Calculus IV | 3 |
| MA 3113 Introduction to Linear Algebra | 3 | MA 3113 Introduction to Linear Algebra | 3 |

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|---|---|---|---|
| MA 3253 Differential Equations I | 3 | MA 3253 Differential Equations I | 3 |
| IE 4613 Engineering Statistics I | 3 | IE 4613 Engineering Statistics I | 3 |
| CH 1213 Chemistry I | 3 | CH 1213 Chemistry I | 3 |
| CH 1211 Investigations in Chemistry I | 1 | CH 1211 Investigations in Chemistry I | 1 |
| PH 2213 Physics I | 3 | PH 2213 Physics I | 3 |
| PH 2223 Physics II | 3 | PH 2223 Physics II | 3 |
| | | | |
| *Engineering Topics (70h)* | | **Engineering Topics (61h)** | |
| CSE 1284 Introduction to Computer Programming | 4 | CSE 1284 Introduction to Computer Programming | 4 |
| CSE 1384 Intermediate Computer Programming | 4 | CSE 1384 Intermediate Computer Programming | 4 |
| CSE 2383 Data Structures and Analysis of Algorithms | 3 | CSE 2383 Data Structures and Analysis of Algorithms | 3 |
| ECE 1013 Introduction to ECE Design I | 3 | ECE 1013 Introduction to ECE Design I | 3 |
| ECE 1022 Introduction to ECE Design II | 2 | ECE 1022 Introduction to ECE Design II | 2 |
| *ECE 3213 Introduction to Solid State Electronics* | *3* | **ECE 3143 Circuits I** | **3** |
| | | **ECE 3141 Circuits I Lab** | **1** |
| *ECE 3413 Introduction to Electronic Circuits* | *3* | **ECE 3153 Circuits II** | **3** |
| | | **ECE 3244 Electronics I** | **4** |
| *ECE 3424 Intermediate Electronic Circuits* | *4* | ECE 3443 Signals and Systems | 3 |
| *ECE 3434 Advanced Electronic Circuits* | *4* | ECE 3313 Electromagnetics I | 3 |
| ECE 3443 Signals and Systems | 3 | ECE 3323 Electromagnetics II | 3 |
| ECE 3313 Electromagnetics I | 3 | ECE 3614 Fundamentals of Energy Systems | 4 |
| ECE 3323 Electromagnetics II | 3 | ECE 4512 EE Design I | 2 |
| ECE 3614 Fundamentals of Energy Systems | 4 | ECE 4522 EE Design II | 2 |
| ECE 4512 EE Design I | 2 | ECE 3714 Digital Devices and Logic Design | 4 |
| ECE 4522 EE Design II | 2 | ECE 3724 Microprocessors | 4 |
| ECE 3714 Digital Devices and Logic Design | 4 | EM 2413 Engineering Mechanics I or ME 3513 Thermodynamics I | 3 |
| ECE 3724 Microprocessors | 4 | Engineering Science elective (3h) | 3 |
| EM 2413 Engineering Mechanics I or ME 3513 Thermodynamics I | 3 | Professional Enrichment elective (3h) | 3 |
| *EE technical electives (9h)* | *9* | Oral Communication Requirement | |
| Engineering Science elective (3h) | 3 | Fulfilled in ECE 1013, ECE 1022, ECE | |
| Professional Enrichment elective (3h) | 3 | 4512, ECE 4522, and GE 3513 | |
| | | | |
| Oral Communication Requirement | | Writing Requirement | |
| Fulfilled in ECE 1013, ECE 1022, ECE 4512, ECE 4522, and GE 3513 | | GE 3513 Technical Writing | 3 |
| | | Computer Literacy Fulfilled in Engineering | |
| Writing Requirement | | Topics courses | |
| GE 3513 Technical Writing | 3 | | |
| Computer Literacy Fulfilled in Engineering Topics courses | | | |
| Concentration Courses | | Concentration Courses | |
| | | **EE technical electives** **(see advisor for list of approved elective courses)** | **12** |

| | | | |
|---|---|---|---|
| Total Hours | 128 | Total Hours | 128 |

| CURRENT Degree Description | PROPOSED Degree Description |
|---|---|
| Degree: Bachelor of Science in Electrical Engineering<br>Major: Electrical Engineering<br>Concentration: N/A | Degree: Bachelor of Science in Electrical Engineering<br>Major: Electrical Engineering<br>Concentration: **Power and Energy Engineering** |
| Alumni, employers, faculty and students participate in a process used to develop educational objectives for the undergraduate programs in Electrical Engineering and Computer Engineering. Within a few years of graduation, program graduates completing the baccalaureate degree in Electrical or Computer Engineering will:<br><br>• Be recognized by their peers as fundamentally sound in the application of mathematics, science, computing, and engineering.<br>• Be engaged in the practice of Electrical or Computer Engineering as innovative problem solvers with a strong work ethic, by identifying and implementing solutions using the proper tools, practical approaches, and flexible thinking.<br>• Be productive and demonstrate leadership in the practice of Electrical or Computer Engineering, both individually and within multidisciplinary teams, using effective oral and written communication skills when working with peers, supervisors, and the public.<br>• Be responsible in the practice of Electrical or Computer Engineering, relying on sound engineering ethics, a commitment to lifelong learning and a genuine concern for society and the environment.<br><br>The electrical engineer is a principal contributor to the modern technological age in which we live today. Following in the footsteps of inventors such as Thomas Edison and Alexander Graham Bell, the electrical engineer is developing technology that improves the quality of life. Developments in microelectronics, telecommunications, and power systems have had a profound effect on each of us. Electrical engineers have affected all segments of our society such as transportation, medicine, and the entertainment industry, to name only a few. Indeed, the electrical engineer has principally been responsible for the advent of the computer age in which we live today as well as the computer's miniaturization and rapid expansion in computational power.<br><br>The curriculum in electrical engineering has a foundation based on the principles of the electrical and physical sciences and uses mathematics as a common | Alumni, employers, faculty and students participate in a process used to develop educational objectives for the undergraduate programs in Electrical Engineering and Computer Engineering. Within a few years of graduation, program graduates completing the baccalaureate degree in Electrical or Computer Engineering will:<br><br>• Be recognized by their peers as fundamentally sound in the application of mathematics, science, computing, and engineering.<br>• Be engaged in the practice of Electrical or Computer Engineering as innovative problem solvers with a strong work ethic, by identifying and implementing solutions using the proper tools, practical approaches, and flexible thinking.<br>• Be productive and demonstrate leadership in the practice of Electrical or Computer Engineering, both individually and within multidisciplinary teams, using effective oral and written communication skills when working with peers, supervisors, and the public.<br>• Be responsible in the practice of Electrical or Computer Engineering, relying on sound engineering ethics, a commitment to lifelong learning and a genuine concern for society and the environment.<br><br>The electrical engineer is a principal contributor to the modern technological age in which we live today. Following in the footsteps of inventors such as Thomas Edison and Alexander Graham Bell, the electrical engineer is developing technology that improves the quality of life. Developments in microelectronics, telecommunications, and power systems have had a profound effect on each of us. Electrical engineers have affected all segments of our society such as transportation, medicine, and the entertainment industry, to name only a few. Indeed, the electrical engineer has principally been responsible for the advent of the computer age in which we live today as well as the computer's miniaturization and rapid expansion in computational power.<br><br>The curriculum in electrical engineering has a foundation based on the principles of the electrical and physical sciences and uses mathematics as a common |

| | |
|---|---|
| language to facilitate the solution of engineering problems. The core curriculum consists of a sequence of courses in digital devices, circuits and electronics, electromagnetic field theory, and modern energy conversion. In the senior year, students have the opportunity to take additional course work in one or more technical areas that include: telecommunications, electromagnetics, power systems, high voltage, feedback control systems, microelectronics, signal processing, and computer systems. Supporting course work outside electrical engineering consists of a strong background in mathematics, physical sciences, computer programming, social sciences, fine arts, humanities, and personal communication skills. Computers are used extensively throughout the curriculum, and students are expected to become proficient in higher-order programming languages and several application software tools. Although the concept of design is stressed throughout the program so as to emphasize the problem-solving skills of the engineer, the senior year includes a capstone design experience where much of the previous study is culminated. Through this two-semester design course sequence, students are required to integrate design and analytical problem-solving skills together with communication skills in a team environment.<br>Students expecting to graduate from Mississippi State University with a bachelor of science degree in electrical engineering, in addition to satisfactorily completing the EE curriculum requirements, must meet the following minimum GPA requirements for graduation:<br>• make an overall C average on all hours scheduled and rescheduled at all institutions attended, including MSU (2.00 or better cumulative GPA)<br>• make a C average on all hours scheduled and rescheduled at MSU (2.00 or better MSU GPA)<br>• *earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes scheduled and rescheduled at all institutions attended, including MSU*<br><br>The electrical engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. | language to facilitate the solution of engineering problems. The core curriculum consists of a sequence of courses in digital devices, circuits and electronics, electromagnetic field theory, and modern energy conversion. In the senior year, students have the opportunity to take additional course work in one or more technical areas that include: telecommunications, electromagnetics, power systems, high voltage, feedback control systems, microelectronics, signal processing, and computer systems. Supporting course work outside electrical engineering consists of a strong background in mathematics, physical sciences, computer programming, social sciences, fine arts, humanities, and personal communication skills. Computers are used extensively throughout the curriculum, and students are expected to become proficient in higher-order programming languages and several application software tools. Although the concept of design is stressed throughout the program so as to emphasize the problem-solving skills of the engineer, the senior year includes a capstone design experience where much of the previous study is culminated. Through this two-semester design course sequence, students are required to integrate design and analytical problem-solving skills together with communication skills in a team environment.<br>Students expecting to graduate from Mississippi State University with a bachelor of science degree in electrical engineering, in addition to satisfactorily completing the EE curriculum requirements, must meet the following minimum GPA requirements for graduation:<br>• make an overall C average on all hours scheduled and rescheduled at all institutions attended, including MSU (2.00 or better cumulative GPA)<br>• make a C average on all hours scheduled and rescheduled at MSU (2.00 or better MSU GPA)<br>• **earn at least a 2.00 cumulative grade point average on all courses scheduled and rescheduled (average on all attempts) at MSU that are applied toward meeting degree requirements**<br>• **earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes at all institutions attended, including MSU, that are applied toward meeting degree requirements**<br><br>The electrical engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. |
| "[Click here and type old concentration description]" | **CONCENTRATION DESCRIPTION**<br><br>**Power and Energy Engineering Concentration. Engineers employed in the power and energy systems workforce need a fundamental knowledgebase in power distribution and power transmission plus a working knowledge of high voltage, power** |

| | | **electronics, relays, or insulation. This concentration prepares students for jobs in power and energy industries, especially utilities.** | |
|---|---|---|---|
| CURRENT CURRICULUM OUTLINE | Required Hours | PROPOSED CURRICULUM OUTLINE | Required Hours |
| EN 1103 English Comp I or EN 1163 Accelerated Comp I<br>EN 1113 English Comp II or EN 1173 Accelerated Comp II | 6 | EN 1103 English Comp I or EN 1163 Accelerated Comp I<br>EN 1113 English Comp II or EN 1173 Accelerated Comp II | 6 |
| Fine Arts:<br>see General Education courses | 3 | Fine Arts:<br>see General Education courses | 3 |
| Natural Sciences<br>see Major Core | | Natural Sciences<br>see Major Core | |
| Math<br>see Major Core | | Math<br>see Major Core | |
| Humanities<br>see General Education courses | 6 | Humanities<br>see General Education courses | 6 |
| Social/Behavioral Sciences<br>see General Education courses | 6 | Social/Behavioral Sciences<br>see General Education courses | 6 |
| Major Core Courses<br>Math and Basic Science (31h) | | Major Core Courses<br>Math and Basic Science (31h) | |
| MA 1713 Calculus I | 3 | MA 1713 Calculus I | 3 |
| MA 1723 Calculus II | 3 | MA 1723 Calculus II | 3 |
| MA 2733 Calculus III | 3 | MA 2733 Calculus III | 3 |
| MA 2743 Calculus IV | 3 | MA 2743 Calculus IV | 3 |
| MA 3113 Introduction to Linear Algebra | 3 | MA 3113 Introduction to Linear Algebra | 3 |
| MA 3253 Differential Equations I | 3 | MA 3253 Differential Equations I | 3 |
| IE 4613 Engineering Statistics I | 3 | IE 4613 Engineering Statistics I | 3 |
| CH 1213 Chemistry I | 3 | CH 1213 Chemistry I | 3 |
| CH 1211 Investigations in Chemistry I | 1 | CH 1211 Investigations in Chemistry I | 1 |
| PH 2213 Physics I | 3 | PH 2213 Physics I | 3 |
| PH 2223 Physics II | 3 | PH 2223 Physics II | 3 |
| *Engineering Topics (70h)* | | **Engineering Topics (61h)** | |
| CSE 1284 Introduction to Computer Programming | 4 | CSE 1284 Introduction to Computer Programming | 4 |
| CSE 1384 Intermediate Computer Programming | 4 | CSE 1384 Intermediate Computer Programming | 4 |
| CSE 2383 Data Structures and Analysis of Algorithms | 3 | CSE 2383 Data Structures and Analysis of Algorithms | 3 |
| ECE 1013 Introduction to ECE Design I | 3 | ECE 1013 Introduction to ECE Design I | 3 |
| ECE 1022 Introduction to ECE Design II | 2 | ECE 1022 Introduction to ECE Design II | 2 |
| *ECE 3213 Introduction to Solid State Electronics* | *3* | **ECE 3143 Circuits I**<br>**ECE 3141 Circuits I Lab** | **3**<br>**1** |
| *ECE 3413 Introduction to Electronic Circuits* | *3* | **ECE 3153 Circuits II**<br>**ECE 3244 Electronics I** | **3**<br>**4** |

| | | | |
|---|---|---|---|
| *ECE 3424 Intermediate Electronic Circuits* | *4* | ECE 3443 Signals and Systems | 3 |
| *ECE 3434 Advanced Electronic Circuits* | *4* | ECE 3313 Electromagnetics I | 3 |
| ECE 3443 Signals and Systems | 3 | ECE 3323 Electromagnetics II | 3 |
| ECE 3313 Electromagnetics I | 3 | ECE 3614 Fundamentals of Energy Systems | 4 |
| ECE 3323 Electromagnetics II | 3 | ECE 4512 EE Design I | 2 |
| ECE 3614 Fundamentals of Energy Systems | 4 | ECE 4522 EE Design II | 2 |
| ECE 4512 EE Design I | 2 | ECE 3714 Digital Devices and Logic Design | 4 |
| ECE 4522 EE Design II | 2 | ECE 3724 Microprocessors | 4 |
| ECE 3714 Digital Devices and Logic Design | 4 | EM 2413 Engineering Mechanics I or ME 3513 Thermodynamics I | 3 |
| ECE 3724 Microprocessors | 4 | Engineering Science elective (3h) | 3 |
| EM 2413 Engineering Mechanics I or ME 3513 Thermodynamics I | 3 | Professional Enrichment elective (3h) | 3 |
| *EE technical electives (9h)* | *9* | Oral Communication Requirement | |
| Engineering Science elective (3h) | 3 | Fulfilled in ECE 1013, ECE 1022, ECE | |
| Professional Enrichment elective (3h) | 3 | 4512, ECE 4522, and GE 3513 | |
| Oral Communication Requirement | | Writing Requirement | |
| Fulfilled in ECE 1013, ECE 1022, ECE 4512, ECE 4522, and GE 3513 | | GE 3513 Technical Writing | 3 |
| | | Computer Literacy Fulfilled in Engineering | |
| Writing Requirement | | Topics courses | |
| GE 3513 Technical Writing | 3 | | |
| Computer Literacy Fulfilled in Engineering Topics courses | | | |
| Concentration Courses | | Concentration Courses | |
| | | **Power and Energy Engineering** | |
| | | **ECE 4613 Power Transmission Systems** | **3** |
| | | **ECE 4633 Power Distribution Systems** | **3** |
| | | **Power and Energy Electives (6h)** | **6** |
| | | **Choose from:** | |
| | | **ECE 4643 Power Systems Relaying & Control** | |
| | | **ECE 4653 Power Electronics** | |
| | | **ECE 4663 Insulation Coordination in Electric Power Systems** | |
| | | **ECE 4673 Fundamentals of High Voltage Engineering** | |
| | | **(see advisor for list of additional approved elective courses)** | |
| Total Hours | 128 | Total Hours | 128 |

## 3. JUSTIFICATION AND STUDENT LEARNING OUTCOMES

This modification is being made in order to provide a more flexible curriculum for students in our department. These changes are supported by a longitudinal analysis of departmental student exit surveys and interviews, updates to the ABET accreditation criteria following our accreditation visit in Fall 2017, and a comparison of MSU's EE degree program with other EE programs nationwide. These changes enable some EE students to choose an area of concentration and complete a series of courses to build depth of knowledge within that concentration, The proposed changes in this modification form will, in the future, enable us to propose additional concentrations within electrical engineering so that students' concentrations are noted on their transcript. This modification will add an initial concentration in Power and Energy with subsequent concentrations forthcoming.

Additionally, we will shift from a three-course sequence of combined circuits/electronics topics to two two-course sequences. The degree program will require the same number of credit hours (11 credit hours) within these new sequences, but the new format will allow us to reorganize topics to be consistent with current textbooks and allow us to connect the lab experience with the first circuits course rather than the second. Further, additional flexibility added by these changes will result in the removal of a five-course sequence that will allow transfer students to complete their degree in a more-timely manner.

In sum, these changes are very positive for our students.

1. **EE Degree Program GPA Updates:** A degree program change initiated on Feb 1, 2018 and discussed at the March 23, 2018 UCCC meeting modified the EE degree program GPA requirements. Prior to the change, EE had four requirements: Cumulative GPA, MSU GPA, MSU Degree Program GPA, and Engineering Topics GPA.
    - The change removed the **MSU Degree Program GPA** requirement, which we have since learned is required by EOP 21. The MSU Degree Program GPA must be included in the list of GPA requirements to clearly state all GPA requirements and avoid student confusion. This degree modification will correct that omission.
    - The change modified the **Engineering Topics GPA** requirement by increasing the GPA requirement from a 2.0 to a 2.5. However, the faculty intent was to simultaneously strike "scheduled and rescheduled" from the requirement. During advising and graduation audits, we realized the original degree modification did not strike that language. After a review of historical meeting minutes, the ECE Undergraduate Committee reviewed this concern and reaffirmed the original intent of the GPA modification. The ECE faculty voted to reaffirm the recommendation to strike the "scheduled and rescheduled" in the Engineering Topics GPA requirements and to specify that the 2.5 GPA requirement threshold apply only to ECE and CSE courses used in a student's final program of study. The change is "earn at least a 2.5/4.0 average on all hours with ECE or CSE course prefixes ~~scheduled and rescheduled~~ at all institutions attended, including MSU, that are applied toward meeting degree requirements." This modification is to ensure the 2.5 Engineering Topics GPA requirement is consistent with the original intention of the ECE faculty. If applied to all courses scheduled and rescheduled, the faculty view a threshold of 2.5 as excessive.

2. **Remove ECE 3213 Solid State course from degree program requirements:** The faculty wish to replace ECE 3213 with a technical elective option. By replacing the course with a technical elective option, we are allowing students more flexibility to choose an upper-level ECE course that is more relevant to their individual career plans. ECE 3213 is not part of our ABET EE degree program accreditation requirements.

3. **Update Circuits/Electronics Sequence:** The key motivations for revising and updating the Circuits and Electronics course sequence is to better prepare students to effectively solve circuits and electronics problems. The benefits of moving to two separate sequences are numerous. A few benefits include:
    - The merged circuits and electronics courses often cause confusion. Though circuits and electronics are closely-related topics, they are not the same. Students have trouble separating the two concepts. Moreover, most universities teach the topics separately, and it is hard for students to transfer credit to MSU that provides credit for our current sequence.
    - Though we are updating the sequence, we will continue to teach ECE 3413 Introduction to Electronic Circuits. ECE 3413 is required by other engineering majors but will no longer be required for ECE students. This returns us to our historical practices of offering a circuits/electronics course dedicated to non-majors. This allows us to offer a more effective curriculum for ECE and non-ECE students because course topics can be fine-tuned and offered at more appropriate levels for ECE and non-ECE students.
    - This update will allow us to shift a lab experience to the initial circuits course for ECE students. Currently, students are struggling in our circuits sequence. The ECE faculty think a hands-on lab experience in the first course will allow students to better grasp the material. Since circuits and electronics build on the fundamental concepts taught in the initial circuits course, it is critical for students to thoroughly understand the topics.
    - This reorganization and update will allow us to use the second circuits course a bridge for our signals and systems courses. We have identified signals and systems as a trouble area for student success. The signals and systems course covers numerous, complex topics. We are evaluating ways to reorganize that course, but for now, a first step is to provide some exposure to topics in earlier, related courses. This reorganization provides the opportunity to do that.
    - This reorganization will remove a five-course prerequisite chain that is currently in the program due to the three-course combined circuits/electronics sequence (ECE 3413 – ECE 3424 – ECE 3434) which is followed by a two-course senior design sequence (ECE 4512 – ECE 4522). Now transfer students will be able to enroll in senior design by their third semester and can finish their degree in four semesters instead of five semesters. This change will allow the current five-semester EE program on the Coast campus to transition to a four-semester program similar to other Coast campus programs.

    To provide clarity for circuits/electronics change. The below summaries are provided.

    **<u>Current required courses</u>** impacted by this change (11 credit hours for EE and CPE):
    - ECE 3413 – currently required for EE, CPE, AE, IE, and ME. Will continue offering and in the future work with AE, IE, and ME faculty to revise topics, if needed, for their students.
    - ECE 3424 – currently required for EE and CPE; will phase out

- ECE 3434 – currently required for EE and CPE; will phase out
- Several courses will need prerequisite updates after new sequence is approved; these will be processed as technical changes when new courses are approved.

**New required** courses proposed (11 credit hours for EE and CPE):

- ECE 3143 Circuits I – required for EE and CPE. Equivalent to ECE 3413 but requires co-registration in lab.
- ECE 3141 Circuits I Lab – new standalone lab for introductory circuits topics. (Students who take ECE 3413 can take this lab to continue in ECE circuits and electronics courses.)
- ECE 3153 Circuits II – required for EE and CPE. New course to bridge circuits and signals and systems. Additional applications for circuits topics.
- ECE 3244 Electronics I – required for EE and CPE. Equivalent to ECE 3424

**New elective** courses proposed:

- ECE 3253 Electronics II (elective) – advanced electronics topics from current ECE 3434; can be taken as a technical elective.

4. **Add "Power and Energy Engineering" concentration:** This modification is being made in order to create the first concentration in electrical engineering. In the future, we plan to propose additional concentrations within electrical engineering. The vision is that ECE students will be able to choose an area of concentration and then choose a series of courses to build depth of knowledge within that concentration. The benefits of formal concentration areas are related to transcript endorsement, tracking of students, and improved advising practices. For this proposed Power and Energy Engineering Concentration, all seven faculty within the Power and Energy Emphasis Area in ECE unanimously stated that they are already offering this concentration without it being acknowledged. They regularly offer the courses that form the proposed concentration and students regularly complete them. We can begin to offer this concentration immediately without any additional effort or reorganization.

As a result of this degree program modification, there are no changes to the student learning outcomes. The EE student learning outcomes are as follows:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

- Will this program change meet local, state, regional, and national educational and cultural needs? **Yes**
- Will this program change result in duplication in the System? **No**
- Will this program change/advance student diversity within the discipline? **Yes**, the added flexibility through technical electives will enable students to take courses in a variety of areas both inside and outside of ECE. We anticipate this will be viewed favorably by all students, but particularly for women who often struggle to connect electrical engineering to societal impact. Interdisciplinary engineering projects and courses can help address societal impact. The ability to enroll in interdisciplinary courses that will count towards their degree program through the flexibility of technical electives should aid departmental efforts to advance diversity. For more information on department diversity efforts see: www.ece.msstate.edu/bp-ece-plan/
- Will this program change result in an increase in the potential placement of graduates in MS, the Southeast, and the U.S.? **Yes**, the visibility of the Power and Energy Engineering concentration via transcript endorsement should improve potential placement within power and energy industries.
- Will this program change result in an increase in the potential salaries of graduates in MS, the Southeast, and the U.S.? **No**

**4. SUPPORT**

See the attached letter from the ECE Undergraduate Committee. All the changes in this degree program were discussed multiple times throughout the 2020-2021 academic year. All these changes were recommended by the ECE Undergraduate Committee by unanimous vote in their March 22, 2021 meeting and approved by a vote of the ECE faculty on March 26, 2021.

**5. PROPOSED 4-LETTER ABBREVIATION**

No changes

**6. EFFECTIVE DATE**

Fall 2022