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:** Mechanical Engineering

Contact Person: Matthew W. Priddy **Mail Stop:** 9552 **E-mail:** mwpriddy@me.msstate.edu

Nature of Change: Minor Change **Date Initiated:** 01/30/2023 **Effective Date:** Fall 2023

Current Degree Program Name: Bachelor of Science

Major: Mechanical Engineering **Concentration:** n/a

New Degree Program Name: Bachelor of Science

Major: Mechanical Engineering **Concentration:** n/a

Summary of Proposed Changes:
Modification: The Department of Mechanical Engineering is proposing to modify our curriculum by replacing Mechanical Systems Design (ME 4443) with Capstone Design and Innovation (ME 4433). This course replacement will give our curriculum a capstone design course that is focused on design, innovation, and technological advances – all of which are essential for our students to be prepared for jobs after graduation.

Approved:	Date:
Haitham El Kadiri — Digitally signed by Haitham El Kadiri Date: 2023.02.06 11:48:01 -06'00'	Haitham El Kadiri — Digitally signed by Haitham El Kadiri Date: 2023.02.06 11:48:17 -06'00'
Department Head — Dana Fonyfal Jr - AC. Qual	3/8/23
Chair, College or School Curriculum Committee	3/9/23
for Jason Keith — Dean of College or School	3/10/2023
Chair, University Committee on Courses and Curricula	
Chair, Graduate Council (if applicable)	
Chair, Deans Council	

Degree Modification Proposal

1. **Catalog Description**
   No changes

2. **Curriculum Outline**
   Use the chart below to make modifications to an existing undergraduate degree outline. If any General Education (Core) course is acceptable in the category, please indicate by saying "any Gen Ed course". There is no need to type in the whole list. All deleted courses and information should be shown in *italics* and all new courses and information in **bold**. Include the course prefix, number, and title in both columns. Expand this table as needed.

CURRENT Degree Description	PROPOSED Degree Description
Degree: Bachelor of Science Major: Mechanical Engineering Concentration: n/a	Degree: Bachelor of Science Major: Mechanical Engineering Concentration: n/a
Mechanical Engineering is the application of science and mathematics to the design, development, and operation of mechanical and energy systems. Examples of these systems include mechanical devices ranging from simple linkages and gears to complex automated robots and energy systems ranging from basic water pumps to high-performance jet engines. Since the range of applications is so broad, virtually all industries employ Mechanical Engineers in various capacities. Some of the major areas of employment are the manufacturing, chemical, paper, aerospace, utility, construction, transportation, petroleum, electronics, and computer industries. The mission of the Department of Mechanical Engineering is to educate students in fundamental engineering principles, thus enabling the understanding of existing and next generation technologies relevant to research and engineering practice. All graduates will receive a broad education that will enable them to be successful in industry or academia, the profession and the community. To carry out this mission, the Mechanical Engineering faculty, with input from other constituencies, has established the following objectives that describe the expected accomplishments of graduates during the first few years following graduation: 1. Apply fundamental engineering knowledge, industry perspective and research skills to become experts or leaders within a chosen engineering career path. 2. Exhibit life-long learning and develop personal and teamwork skills in order to effectively solve real-life problems and clearly communicate their results. 3. Practice ethical responsibility and accountability in professional activities and actively participate in professional development.	Mechanical Engineering is the application of science and mathematics to the design, development, and operation of mechanical and energy systems. Examples of these systems include mechanical devices ranging from simple linkages and gears to complex automated robots and energy systems ranging from basic water pumps to high-performance jet engines. Since the range of applications is so broad, virtually all industries employ Mechanical Engineers in various capacities. Some of the major areas of employment are the manufacturing, chemical, paper, aerospace, utility, construction, transportation, petroleum, electronics, and computer industries. The mission of the Department of Mechanical Engineering is to educate students in fundamental engineering principles, thus enabling the understanding of existing and next generation technologies relevant to research and engineering practice. All graduates will receive a broad education that will enable them to be successful in industry or academia, the profession and the community. To carry out this mission, the Mechanical Engineering faculty, with input from other constituencies, has established the following objectives that describe the expected accomplishments of graduates during the first few years following graduation: 1. Apply fundamental engineering knowledge, industry perspective and research skills to become experts or leaders within a chosen engineering career path. 2. Exhibit life-long learning and develop personal and teamwork skills in order to effectively solve real-life problems and clearly communicate their results. 3. Practice ethical responsibility and accountability in professional activities and actively participate in professional development.

The Mechanical Engineering curriculum is designed to meet these objectives. The basic courses in mechanics, materials, thermodynamics, electrical engineering systems, and dynamics prepare the student for the comprehensive design courses in the senior year culminating in major design experiences in energy systems and in mechanical systems. Throughout the curriculum there is significant use of the computer to solve realistic engineering problems. All entering ME juniors are required to have a portable computer that they will use interactively in the classroom. The ME laboratory sequence stresses the planning, design, and operation of experiments. The curriculum also places a strong emphasis on technical communications. Senior technical electives allow the student to study particular areas of interest.

The Mechanical Engineering Program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

CURRENT CURRICULUM OUTLINE	Required Hours
ME 1111 Introduction to Mechanical Engineering	1
EN 1103 English Composition I	3
MA 1713 Calculus I	3
CH 1213 Chemistry I	3
CH 1211 Investigations in Chemistry	1
Humanities Elective	6
Fine Arts Elective	3
PH 2213 Physics I	3
EN 1113 English Composition II	3
MA 1723 Calculus II	3
CH 1223 Chemistry II	3
CSE 1233 Computer Programming with C	3
EM 2413 Engineering Mechanics I	3
ME 2133 Modeling and Manufacturing	3
PH 2223 Physics II	3
MA 2733 Calculus III	3
MA 3113 Intro to Linear Algebra	3
EM 2433 Engineering Mechanics II	3
ME 3513 Thermodynamics I	3
MA 2743 Calculus IV	*3*
MA 3253 Differential Equations I	3
GE 3513 Technical Writing	3
EM 3213 Mechanics of Materials	3
EM 3313 Fluid Mechanics	3
Social/Behavioral Science Elective	6
ME 3113 Engineering Analysis	3
ME 3523 Thermodynamics I	3
ECE 3413 Introduction to Electronic Circuits	3
ME 3313 Heat Transfer	3

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PROPOSED CURRICULUM OUTLINE	Required Hours
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EM 2413 Engineering Mechanics I	3
ME 2133 Modeling and Manufacturing	3
PH 2223 Physics II	3
MA 2733 Calculus III	3
MA 3113 Intro to Linear Algebra	3
EM 2433 Engineering Mechanics II	3
ME 3513 Thermodynamics I	3
MA 2743 Calculus IV	3
MA 3253 Differential Equations I	3
GE 3513 Technical Writing	3
EM 3213 Mechanics of Materials	3
EM 3313 Fluid Mechanics	3
Social/Behavioral Science Elective	6
ME 3113 Engineering Analysis	3
ME 3523 Thermodynamics I	3
ECE 3413 Introduction to Electronic Circuits	3
ME 3313 Heat Transfer	3

ME 3403 Mat for Mech Eng Design	3	ME 3403 Mat for Mech Eng Design	3
ME 3423 Mechanics of Machinery	3	ME 3423 Mechanics of Machinery	3
ME 3103 Exp Measurements and Techniques	3	ME 3103 Exp Measurements and Techniques	3
IE 3913 Engineering Economy	3	IE 3913 Engineering Economy	3
ME 3613 System Dynamics	3	ME 3613 System Dynamics	3
ME 4301 Thermo-Fluids Laboratory	1	ME 4301 Thermo-Fluids Laboratory	1
ME 4403 Machine Design	3	ME 4403 Machine Design	3
ME 4333 Energy Systems Design	3	ME 4333 Energy Systems Design	3
ME 4443 Mechanical Systems Design	3	**ME 4433 Capstone Design and Innovation**	3
ME 4643 Intro to Vibrations and Controls	3	ME 4643 Intro to Vibrations and Controls	3
ME 4111 Professional Seminar	1	ME 4111 Professional Seminar	1
ME 4401 Solid Mechanics Laboratory	1	ME 4401 Solid Mechanics Laboratory	1
Technical Elective	9	Technical Elective	9
Total Hours	128	Total Hours	128

3. **Justification and Student Learning Outcomes**

The program is requesting one (1) course replacement by replacing ME 4443 Mechanical Systems Design with ME 4433 Capstone Design and Innovation. The modification requested will allow the program to offer students a capstone design course that allows for a focus on hands-on design projects similar to those they will experience in industry after graduation. ME 4433 is a 2 credit lecture, 1 credit lab course where the students will be required to work on an engineering design project that is motivated by projects commonly found in industry.

The ME Undergraduate Curriculum Committee proposed the creation of ME 4433 Capstone Design and Innovation to better execute the capstone design experience we wish for our students and to provide transparency to interested students that we have a dedicated capstone design course. The Committee recommended the proposed modifications/addition to the faculty and they voted unanimously to proceed with the modifications.

Student Learning Outcomes

The one (1) course replacement will not affect the overall program learning objectives. The modifications in the program meet the standards of the Accreditation Board for Engineering and Technology, Inc. (ABET). ABET is the accreditation body for all engineering degree programs.

1. **Will this program change meet local, state, regional, and national educational and cultural needs? If so, please describe.**
   Yes. There has been a recent recommendation for B.S. program curriculums, particularly in STEM, to include more experiential learning. The addition of a dedicated capstone design course will improve our ability to satisfy that recommendation.

2. **Will this program change result in duplication in the System? If so, please describe.**
   No.

3. **Will this program change/advance student diversity within the discipline? If so, please describe.**
   There is a possibility that the visibility of a capstone design course could change or advance student diversity within the ME B.S. degree program (particularly if some of the socially-responsible capstone design projects are properly advertised), but we would expect that to be a very minor change in student demographics since this is only one course in the program.

4. **Will this program change result in an increase in the potential placement of graduates in MS, the Southeast, and the U.S.? If so, please describe.**

There is a possibility that engineering companies might be more likely to recruit our students because our curriculum has a dedicated capstone design course. The presence of a capstone design course makes it more likely that we are able to recruit industry mentors and sponsors for the capstone design course, which historically has led to an increased interest in the hiring of our graduates. However, this would most likely be limited to companies located in the region, including MS and the surrounding states.

5. **Will this program change result in an increase in the potential salaries of graduates in MS, the Southeast, and the U.S.? If so, please describe.**
   No.

4. **Support**
   Letter Attached. Written and signed by the ME Undergraduate Curriculum Committee

5. **Effective Date**
   Fall 2023

6. **Contact Person**
   Matthew W. Priddy, Assistant Professor
   (662) 325-7322
   mwpriddy@me.msstate.edu

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January 24, 2023

To: University Committee on Course and Curricula:

Re: Addition of Technical Elective to ME Curriculum

The ME Undergraduate Curriculum Committee considered a proposal to update the ME curriculum by replacing Mechanical Systems Design (ME 4443) with Capstone Design and Innovation (ME 4433). The votes below from the members of the ME UG curriculum committee reflect their support for the proposal ME curriculum change.

Name and Title (Voting Members)	Signature
Kip Barrett, Assistant Professor (chair)	Kip Barrett
Alta Knizley, Associate Clinical Professor	Alta Knizley
Heejin Cho, Associate Professor	Heejin Cho
Shanti Bhushan, Associate Professor	Shanti Bhushan
Hongjoo Rhee, Associate Professor	Hongjoo Rhee
Matthew Priddy, Assistant Professor	Matt Priddy
Aaron Smith, Associate Clinical Professor	Aaron Smith
Shane Brauer, Assistant Clinical Professor	Shane Brauer
Morgan Green, Instructor	Morgan Green
Ross Smith, Instructor	Ross Smith
Omar Es-Sahli, Instructor	Omar Es-Sahli
Alejandro Martinez-Castellon, Instructor	Alejandro Martinez-Castellon
Jennie Daigler, Instructor	Jennie M. Daigler

Please feel free to contact me with any questions or concerns.

Sincerely,

Matthew Priddy, Ph.D.
Assistant Professor
Teaching Coordinator