



**SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS**

Substantive Program Modification Form

UNIVERSITY:	SDSU
CURRENT PROGRAM DEGREE:	Bachelor of Science (B.S.)
CURRENT PROGRAM MAJOR/MINOR:	Mechanical Engineering
CURRENT SPECIALIZATION:	N/A
CIP CODE:	14.1901
UNIVERSITY DEPARTMENT:	Mechanical Engineering
BANNER DEPARTMENT CODE:	SMEC
UNIVERSITY COLLEGE:	Jerome J Lohr College of Engineering
BANNER COLLEGE CODE:	3E

University Approval

To the Board of Regents and the Executive Director: I certify that I have read this proposal, that I believe it to be accurate, and that it has been evaluated and approved as provided by university policy.

Dennis D. Hedge

4/24/2024

Vice President of Academic Affairs or
President of the University

Date

1. This modification addresses a change in:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Total credits required within the discipline | <input checked="" type="checkbox"/> Total credits of supportive course work |
| <input type="checkbox"/> Total credits of elective course work | <input type="checkbox"/> Total credits required for program |
| <input type="checkbox"/> Program name | <input type="checkbox"/> Existing specialization |
| <input type="checkbox"/> CIP Code | <input checked="" type="checkbox"/> Other: Academic Requirements |
| <input type="checkbox"/> Modification requiring Board of Regents approval | |

Must have prior approval from Executive Director or designee

2. Effective date of change: 2024-2025 Academic Year

3. Program Degree Level:

Associate Bachelor's Master's Doctoral

4. Category:

Certificate Specialization Minor Major

5. If a name change is proposed, the change will occur:

On the effective date for all students

On the effective date for students new to the program (enrolled students will graduate from existing program)

Proposed new name:

6. Is the program being modified associated with a current articulation agreement?

Yes No

- a. **If yes, will the articulation agreement need to be updated with the partner institution following the approve of the program change? Please explain:**

Minnesota West Community and Technical College

7. Primary Aspects of the Modification:

Existing Curriculum

Proposed Curriculum (*highlight changes*)

Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
Systems General Education Requirements			33	Systems General Education Requirements			33
Systems General Education Requirements - Electives			18	Systems General Education Requirements - Electives			18
		SGR #1	3			SGR #1	3
		SGR #1	3			SGR #1	3
		SGR #2	3			SGR #2	3
		SGR #3	3			SGR #3	3
		SGR #4	3			SGR #4	3
		SGR #4	3			SGR #4	3
Systems General Education Requirements – Required			15	Systems General Education Requirements - Required			15
ECON	201	Principles of Microeconomics (SGR #3)	3	ECON	201	Principles of Microeconomics (SGR #3)	3
MATH	123	Calculus I (SGR #5)	4	MATH	123	Calculus I (SGR #5)	4
CHEM	112	General Chemistry (SGR #6)	3	CHEM	112	General Chemistry (SGR #6)	3
CHEM	112L	General Chemistry Lab (SGR #6)	1	CHEM	112L	General Chemistry Lab (SGR #6)	1
PHYS	207	Fundamentals of Physics I (SGR #6)	3	PHYS	207	Fundamentals of Physics I (SGR #6)	3
PHYS	207L	Fundamentals of Physics I Lab (SGR #6)	1	PHYS	207L	Fundamentals of Physics I Lab (SGR #6)	1
Supporting Coursework			43	Supporting Coursework			40
EE	300	Basic Electrical Engineering I	2	EE	300	Basic Electrical Engineering I	2
EE	300L	Basic Electrical Engineering I Lab	1	EE	300L	Basic Electrical Engineering I Lab	1
EE	302	Basic Electrical Engineering II	2	EE	302	Basic Electrical Engineering II	2
EE	302L	Basic Electrical Engineering II Lab	1	EE	302L	Basic Electrical Engineering II Lab	1
EM	214	Statics	3	EM	214	Statics	3
EM	215	Dynamics	3	EM	215	Dynamics	3
EM	321	Mechanics of Materials	3	EM	321	Mechanics of Materials	3
EM	331	Fluid Mechanics	3	EM	331	Fluid Mechanics	3
GE	101	Introduction to Engineering and Technical Professions	1	GE	101	Introduction to Engineering and Technical Professions	1
GE	231	Technology, Society, and Ethics	3	GE	231	Technology, Society, and Ethics	3
MATH	125	Calculus II	4	MATH	125	Calculus II	4
MATH	225	Calculus III	4	MATH	225	Calculus III	4
MATH	321	Differential Equations	3	MATH	321	Differential Equations	3
MATH OR MATH	331	Advanced Engineering Math	3	MATH OR MATH	331	Advanced Engineering Math	3
MATH	471	Numerical Analysis I	3	MATH	471	Numerical Analysis I	3
PHYS	209	Fundamentals of Physics II	3	PHYS	209	Fundamentals of Physics II	3
PHYS	209L	Fundamentals of Physics II Lab	1	PHYS	209L	Fundamentals of Physics II Lab	1
STAT	381	Introduction to Probability and Statistics	3	STAT	381	Introduction to Probability and Statistics	3
Major Requirements			54	Major Requirements			57
Major Core			39	Major Core			42
ME	121	Production and Fabrication Processes	1	ME	121	Production and Fabrication Processes	1
ME	121L	Production and Fabrication Processes Lab	1	ME	121L	Production and Fabrication Processes Lab	1
ME	212	Mechanical Engineering Design Technologies	1	ME	212	Mechanical Engineering Design Technologies	2
ME	212L	Mechanical Engineering Design Technologies Lab	1	ME	212L	Mechanical Engineering Design Technologies Lab	1
ME	230	Engineering Design Methods	2	ME	230	Engineering Design Methods	3
ME	241	Engineering Materials	3	ME	241	Engineering Materials	3
				ME	301	Engineering Ethics and Economics	1
ME	311	Thermodynamics I	3	ME	311	Thermodynamics I	3
ME	312	Thermodynamics II	3	ME	312	Thermodynamics II	3
ME	321	Fundamentals of Machine Design	3	ME	321	Fundamentals of Machine Design	3

Existing Curriculum

Proposed Curriculum (highlight changes)

Prof.	Num.	Title	Cr. Hrs.	Prof.	Num.	Title	Cr. Hrs.
ME	323	Vibrations	3	ME	323	Vibrations	3
ME	376	Measurements and Instrumentation	2	ME	376	Measurements and Materials Characterization Lab	1
				ME	377	Thermodynamics and Fluid Mechanics Lab	1
ME	415	Heat Transfer	3	ME	415	Heat Transfer	3
ME	421	Design of Machine Elements	3	ME	421	Design of Machine Elements	3
ME	451	Automatic Controls	3	ME	451	Automatic Controls	3
ME	452	Dynamic Systems Lab	1	ME	452	Mechatronics and Vibrations Lab	1
ME	476	Thermo-Fluids Lab	1	ME	476	Machine Components and Heat Transfer Lab	1
ME	478	Mechanical Systems Design I	2	ME	478	Mechanical Systems Design I	3
ME	479	Mechanical Systems Design II	2	ME	479	Mechanical Systems Design II	3
ME	479L	Mechanical Systems Design II Lab	0	ME	479L	Mechanical Systems Design II Lab	0
ME	490	Seminar	1	ME	490	Seminar	1
		Technical Electives The <u>15</u> credits of technical electives may be chosen from the following list. At least three of the electives must have the ME prefix. Courses not listed may qualify as technical electives on approval from the ME department.	15			Technical Electives The <u>15</u> credits of technical electives may be chosen from the following list. At least three of the electives must have the ME prefix. Courses not listed may qualify as technical electives on approval from the ME department.	15
ABE	314	Ag Power and Machines	3	ABE	314	Ag Power and Machines	3
ABE	314L	Ag Power and Machines Lab	1	ABE	314L	Ag Power and Machines Lab	1
ABE	350	Hydraulic and Pneumatic Systems	2	ABE	350	Hydraulic and Pneumatic Systems	2
ABE	350L	Hydraulic and Pneumatic Systems Lab	1	ABE	350L	Hydraulic and Pneumatic Systems Lab	1
GE	210	Geometric Dimensioning & Tolerancing	2	GE	210	Geometric Dimensioning & Tolerancing	2
ME	341	Metallurgy	3	ME	341	Metallurgy	3
ME	362	Industrial Engineering	3	ME	362	Industrial Engineering	3
ME	410	Principles of HVAC Engineering	3	ME	410	Principles of HVAC Engineering	3
ME	412	Internal Combustion Engines	3	ME	412	Internal Combustion Engines	3
ME	413	Turbomachinery	3	ME	413	Turbomachinery	3
ME	414	Air Pollution Control	3	ME	414	Air Pollution Control	3
ME	416	Renewable Energy Systems	3	ME	416	Renewable Energy Systems	3
ME	417	Computer-Aided Engineering	3	ME	417	Computer-Aided Engineering	3
ME	418	Design of Thermal Systems	3	ME	418	Design of Thermal Systems	3
ME	431	Aerodynamics	3	ME	431	Aerodynamics	3
ME	437	Gas Dynamics I	3	ME	437	Gas Dynamics I	3
ME	438	Machine Design – Case Studies	3	ME	438	Machine Design – Case Studies	3
ME	439	HVAC System Design	3	ME	439	HVAC System Design	3
ME	440	Computer-Aided Design	3	ME	440	Computer-Aided Design	3
ME	441	Robotic Systems	3	ME	441	Robotic Systems	3
ME	442	Applications of Computational Fluid Dynamics	3	ME	442	Applications of Computational Fluid Dynamics	3
ME	446	Engineering Mechanics in Biomedical Applications	3	ME	446	Engineering Mechanics in Biomedical Applications	3
ME	448	Mechanical Behavior of Biomaterials	3	ME	448	Mechanical Behavior of Biomaterials	3
ME	461	Analysis and Design of Industrial Systems	3	ME	461	Analysis and Design of Industrial Systems	3
ME	491	Independent Study	1-3	ME	491	Independent Study	1-3
ME	492	Topics	1-5	ME	492	Topics	1-5
ME	494	Internship	1-3	ME	494	Internship	1-3
ME	497	Cooperative Education	1-3	ME	497	Cooperative Education	1-3
ME	498	Undergraduate Scholarship/Research	1-3	ME	498	Undergraduate Scholarship/Research	1-3

Existing Curriculum

Proposed Curriculum (highlight changes)

Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
NE	435	Introduction to Nuclear Engineering	3	NE	435	Introduction to Nuclear Engineering	3
PHYS	331	Introduction to Modern Physics	3	PHYS	331	Introduction to Modern Physics	3
Electives			0	Electives			0
Summary of Credits in Mechanical Engineering (B.S.)							
System General Education Requirement			33	System General Education Requirement			33
Major Requirements			54	Major Requirements			57
Supporting Coursework			43	Supporting Coursework			40
Electives			0	Electives			0
Total number of hours required for major			121	Total number of hours required for major			112
Total number of hours required for degree			130	Total number of hours required for degree			130

Academic Requirements

Current:

- A combined average of “C” or better in the mechanical engineering courses.
- A combined average of “C” or better in the mathematics courses.
- A minimum grade of “C” in each of the following courses: MATH 123, MATH 125, PHYS 211, ME 311, ME 312, and all EM designated courses
- Students who fail to earn a “C” or better in any of these courses, will be required to repeat them in each subsequent semester until the requirement is met.

Proposed:

- A combined average of “C” or better in the mechanical engineering courses.
- A combined average of “C” or better in the mathematics courses.
- A minimum grade of “C” in each of the following courses: MATH 123, MATH 125, **PHYS 207**, ME 311, ME 312, and all EM designated courses
- Students who fail to earn a “C” or better in any of these courses, will be required to repeat them in each subsequent semester until the requirement is met.

8. Explanation of the Change:

The Department of Mechanical Engineering reviewed the Mechanical Engineering major. The following changes were identified:

- Updated existing lab courses ME 376 Measurements and Instrumentation, ME 452 Dynamic Systems Lab, and ME 476 Thermo-Fluids Lab, and added a new lab, ME 377 Thermodynamics and Fluid Mechanics Lab, so that there are four 1 credit lab courses to enhance students’ lab experience and foster hands-on skills relevant to the current industry practices. ME 376 Measurements and Instrumentation has been reduced from 2 to 1 credit and renamed to *Measurements and Materials Characterization*. The measurements and instruments used in ME 376 will be updated with new equipment and the new title reflects the emphasis on characterizing materials that the original title does not. ME 452 Dynamics Systems Lab changed titles to *Mechatronics and Vibrations Lab* which reflects the modern name of automated control systems as well as the dynamic nature of moving parts which can lead to vibrations. ME 476 Thermo Fluids Lab was renamed *Machine Components and Heat Transfer Lab* which reflects the components affected by thermal fluids more than the thermal fluids themselves. ME 377 Thermodynamics and Fluid Mechanics Lab (1 cr.) will be a new lab focused on the nature of heat flow and the experimental techniques used to measure heat and temperature. In ME 377 students will apply the theory taught in corequisite courses ME 311 Thermodynamics and EM 331 Fluid Mechanics.
- Removed GE 231 Technology, Society, and Ethics (3 cr.) based upon the feedback from student surveys indicating that GE 231 was not perceived as highly beneficial and results from the Fundamental of Engineering Exam. Students are not retaining or able to apply the content

on ethics in the desired manner. Ethics content is moved to a new course, ME 301 Engineering Economics and Ethics (1 cr.). This new course will be a combination of two required topics that are linked and would be offered with content that simultaneously develops students' ability to make complex ethical decisions that are impacted by financial decisions that are part of the design process.

- Increased ME 212 Mechanical Engineering Design Technologies from 1 to 2 credits and deleted ME 212L Mechanical Engineering Design Technologies Lab (1 cr.). The laboratory component for ME 212 was part of the original course to cover the software being used. The lab needed the software to be taught in an existing computer lab with limited seating. Changes in software being used, licensing and availability have allowed the teaching of software in the lecture portion of the course and no longer requires scheduling in the computer lab.
- Increased ME 230 Engineering Design Methods from 2 to 3 credits to reflect the level of instruction and student work more accurately for this course.
- Increased ME 478 Mechanical Systems Design I and ME 479 Mechanical Systems Design II from 2 to 3 credits to reflect the level of instruction and student work more accurately for these courses and deleted ME 479L Mechanical Systems Design II Lab (0 cr.) and ME 490 Seminar (1 cr.).