

Weber State University
Annual Assessment of Evidence of Learning

Cover Page

Department: Manufacturing & Systems Engineering
Program: Manufacturing Systems Engineering BS
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A. Brief Introductory Statement:

Manufacturing Systems Engineering is a new program offered under the Department of Manufacturing and Systems Engineering. The Manufacturing Systems Engineering (MSE) program is designed to prepare the student for professional employment in the manufacturing, service, or public sectors. The MSE program is based on fundamental engineering knowledge, skills, and processes; including: systems thinking, process planning, model building, simulation, experimental design, project management, engineering economics, facility planning, problem solving, and process improvement.

Students complete a year-long senior project with a team that brings together their experience and education. The senior projects help the student gain confidence in their abilities while gaining additional insight and skills in both teamwork and human relations.

The design portion of the emphasis provides the knowledge and skills required to fulfill a number of career roles that focus on product development process, fabrication, sustaining, and retirement of systems. Concepts that are introduced throughout the curriculum include: system reliability, environmentally benign processes and materials, and economic competitiveness in a global economy.

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B. Mission Statement

Manufacturing and Systems Engineering Department. Manufacturing Systems Engineering Program

Mission Statement

The MSE Program at Weber State University will be a growing, nationally recognized, program offering ABET Accredited BS degrees that afford faculty and students opportunities for intellectual and personal growth. We will prepare students to demonstrate professional competence within the discipline and serve the needs of the manufacturing, service, and public sectors of Utah and throughout the nation.

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ABET Required Program Educational Objectives

1. Graduates will be recognized as having mastered both theory and application of the body of knowledge in the discipline as stated by the Society of Manufacturing Engineers (supported by Learning Outcomes)
2. Graduates will demonstrate the ability to cost effectively, creatively and methodically solve manufacturing problems through experimentation, analysis, synthesis, and evaluation of data. (supported by Learning Outcomes)
3. Graduates will be recognized as being personally effective as individuals, team members and team leaders through oral, written, and graphical communication. (supported by Learning Outcomes)
4. Graduates will demonstrate a commitment to quality, ethics, service and continuous improvement in personal and professional situations (supported by curriculum & technical content).

C. Student Learning Outcomes

The MSE program documents student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes that may be articulated by the program.

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.

Additional student outcomes based on “Manufacturing and Similarly Named Engineering Programs.” The lead society is the Society of Manufacturing Engineers. These outcomes apply to engineering programs that include “manufacturing” and similar modifiers in their titles. The program must prepare graduates to have proficiency in:

- a. materials and manufacturing processes: ability to design manufacturing processes that result in products that meet specific material and other requirements;
- b. process, assembly and product engineering: ability to design products and the equipment, tooling, and environment necessary for their manufacture;
- c. manufacturing competitiveness: ability to create competitive advantage through manufacturing planning, strategy, quality, and control;
- d. manufacturing systems design: ability to analyze, synthesize, and control manufacturing operations using statistical methods; and
- e. manufacturing laboratory or facility experience: ability to measure manufacturing process variables and develop technical inferences about the process.

D. Curriculum

Manufacturing Systems Engineering ABET Course Matrix	Student Learning Outcomes						
	1	2	3	4	5	6	7
Key I = Introduced R = Reinforced A = Assessed	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	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	an ability to communicate effectively with a range of audiences	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	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	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
MSE Common Core Courses for BS							
ENGR 1000 Introduction to Engineering	I						
ENGR 2210 Electrical Engineering	I						
ENGR 2010 Statics	I						
ENGR 2160 Material Science	I						
ENGR 2080 Dynamics	I						
ENGR 2140 Mechanics of Materials	I						
MFET 3550 Manufacturing Supervision	I						
MATH 3410 Probability and Statistics	I						
MSE 3040 Engineering Economics	I			R/A			
MSE 4610 Project Management	I				R		
MSE 3360 Manufacturing Processes	I						
MSE1210 Metal	I						
MSE 3850 SPC and Reliability	I			R		R/A	R
MSE 3910 Six Sigma	I					R/A	R
MSE 3700 Manufacturing Systems Engineering 1	I	R/A		R			
MSE 4700 Manufacturing Systems Engineering 2	I	R/A		A			
MSE 4010 Facility Design	I						
MSE 4590 Lean Manufacturing Systems	I				R		R
MSE 4615 Senior Project Design Lab 1	R/A		R/A		R/A		R/A
MSE 4620 Senior Project Design Lab 2	R/A		R/A		R/A		R/A
PDD 1160 Tolerancing	I						
MSE 3460 Product Design and Development	I						
MSE 3710 Additive Manufacturing	I						
MSE 4600 Systems Modeling	I						
PDD 1010, Technical Design	I						
MSE Support Courses for BS							
COMM 2110 or COMM 1020 Communications	I		R				
CHEM 1210 Chemistry 1	I						
PHYS 2210 Physics 1	I						
PHYS 2220 Physics 2	I						
MATH 1210 Calculus 1	I						
MATH 1220 Calculus 2	I						
MATH 2210 Calc 3 or MATH 2250 Lin Alg	I						
ENGL 2010 Writing	I						
ECON 2010 Economics	I						
Gen Ed CA/DV Elective	I						
LIBS 1704 Library Science	I						
Life Science	I						
American Institutions	I						
Social Science / Diversity Elective	I						
CA / HU / DV Elective	I						

Manufacturing Systems Engineering ABET Course Matrix	Student Learning Outcomes				
	(a)	(b)	(c)	(d)	(e)
<p>Key I = Introduced R = Reinforced A = Assessed</p>	<p>proficiency in (a) materials and manufacturing processes: ability to design manufacturing processes that result in products that meet specific material and other requirements;</p>	<p>(b) process, assembly and product engineering: ability to design products and the equipment, tooling, and environment necessary for their manufacture;</p>	<p>(c) manufacturing competitiveness: ability to create competitive advantage through manufacturing planning, strategy, quality, and control;</p>	<p>(d) manufacturing systems design: ability to analyze, synthesize, and control manufacturing operations using statistical methods; the process.</p>	<p>and (e) manufacturing laboratory or facility experience: ability to measure manufacturing process variables and develop technical inferences about</p>
MSE Common Core Courses for BS					
ENGR 1000 Introduction to Engineering					
ENGR 2210 Electrical Engineering					
ENGR 2010 Statics					
ENGR 2160 Material Science					
ENGR 2080 Dynamics					
ENGR 2140 Mechanics of Materials					
MFET 3550 Manufacturing Supervision					
MATH 3410 Probability and Statistics					
MSE 3040 Engineering Economics			R		
MSE 4610 Project Management	R		R		
MSE 3360 Manufacturing Processes					
MSE1210 Metal					
MSE 3850 SPC and Reliability	R	R	R	R/A	R/A
MSE 3910 Six Sigma	R/A	R	R/A	R	R/A
MSE 3700 Manufacturing Systems Engineering 1					
MSE 4700 Manufacturing Systems Engineering 2					
MSE 4010 Facility Design					
MSE 4590 Lean Manufacturing Systems	R/A	R/A	R/A	R/A	
MSE 4615 Senior Project Design Lab 1					
MSE 4620 Senior Project Design Lab 2					
PDD 1160 Tolerancing					
MSE 3460 Product Design and Development		A			
MSE 3710 Additive Manufacturing					
MSE 4600 Systems Modeling					
PDD 1010, Technical Design					
MSE Support Courses for BS					
COMM 2110 or COMM 1020 Communications					
CHEM 1210 Chemistry 1					
PHYS 2210 Physics 1					
PHYS 2220 Physics 2					
MATH 1210 Calculus 1					
MATH 1220 Calculus 2					
MATH 2210 Calc 3 or MATH 2250 Lin Alg					
ENGL 2010 Writing					
ECON 2010 Economics					
Gen Ed CA/DV Elective					
LIBS 1704 Library Science					
Life Science					
American Institutions					
Social Science / Diversity Elective					
CA / HU / DV Elective					

E. Assessment Plan and F. Report

Preplanned agenda items for systematic review of Program Educational Objectives (PEOs - ABET Requirement)

- Fall 2020: Review PEOs, SLO revision, annual continuous improvement metric report, general program status
- Fall 2021: Review SLOs 1, 2, 1000 & 2000 level courses, annual continuous improvement metric report, general program status
- Fall 2022: Review SLOs 3, 4, 3000 level courses, annual continuous improvement metric report, general program status
- Fall 2023: Review of SLOs 5, 4000+ level classes, relationships of courses to SLOs, relationship of SLOs to PEOs, annual continuous improvement metric report, general program status
- Fall 2024: Repeat cycle beginning with PEO review

Student learning outcomes are related to PEOs and will be assessed routinely every year. They are reported to the Industrial Advisory Committee and MSE faculty and the Engineering Department Chair. Supporting material for the assessment will be stored by the Program Coordinator. All metric assessment data will be stored for six years (relevant to the next ABET review cycle). Classroom artifacts that support curriculum requirements for ABET will be collected the year prior to ABET assessment, or as requested for regional accreditation. The program comes up for accreditation in 2020. A formal request to ABET by 1/31/2020 will be required to initiate a reaccreditation evaluation visit. A formal self-study report must be submitted to ABET by July 1, 2020 for a comprehensive general review.