

# Elective Focus Area in Mechanical Engineering

## Manufacturing

Revised on October 2, 2018

Manufacturing covers a broad range of processes and modeling/simulation/experimentation activities all focused on the conversion of materials into products. As of now in the U.S., especially in the Midwest, manufacturing represents one of the largest industrial sectors. Examples include vehicle and equipment manufacturing (GM, Ford, Chrysler, John Deere, Caterpillar, HON, Maytag, etc.) and metal, polymer, ceramic and glass processing (Alcoa, SSAB, PMX, etc.). The Elective Focus Area (EFA) in Manufacturing builds on the regular courses required for a B.S. in Mechanical Engineering and provides students with an advanced education in manufacturing and material process principles, modeling, design and control, quality control, material behaviors, automation and robotics.

Semester	Course	Session	SH	Pre-/Co-Requisites
4 (Spring)	ME:4111 Scientific Computing and Machine Learning	F, S	3	MATH:2560
6 (Spring)	ME:4116 Manufacturing Processes, Simulations and Automation	F	3	ENGR:2760
	or ME:5146 Modeling of Materials Processing	S <sup>1</sup>	3	/ME:3045
6 (Spring)	Elective		3	
7 (Fall)	Elective		3	
7 (Fall)	Elective		3	
8 (Spring)	Elective		3	
8 (Spring)	Elective		3	

Manufacturing Electives (minimum of 2 required)	Session	SH	Pre-/Co-Requisites
ME:4200 Modern Engineering Materials in Mechanical Design	F	3	ME:3052
ME:4140 Modern Robotics & Automation	S	3	ENGR:2710
ME:4024 Product Design and Realization	S	3	ME:2200 or ENGR:2760, /ENGR:2750
ME:4116 Manufacturing Processes, Simulations and Automation, or ME:5146 Modeling of Materials Processing	F S <sup>1</sup>	3 3	ENGR:2760 /ME:3045
ME:5167 Composite Materials	S <sup>1</sup>	3	ENGR:2750
General Electives	Session	SH	Pre-/Co-Requisites
ME:4110 Computer Aided Engineering	S	3	ENGR:2750, ME:3052
ME:4112 Engineering Design Optimization	S, Su	3	MATH:2550, ENGR:2110
ME:4117 Finite Element Analysis	F	3	ENGR:2750
ME:4153 Fundamentals of Vibrations	F	3	ENGR:2750
ME:4186 Enhanced Design Experience	S	3	ME:4086
ME 5114 Nonlinear Control in Robotic Systems	F	3	Any of ME:3600, ME:4113, ME:4120, CBE:4105, ECE:3600
ME:5143 Computational Fluid and Thermal Engineering	F	3	ME:3045
ME:5145 Intermediate Heat Transfer	F	3	ME:3045
ME:5159 Fracture Mechanics	S	3	Any of ME:3052, ME:5150, BME:3910
BME:5401 Biomaterials & Implant Design	F	3	ENGR:2750, BME:2500
BME:5620 Intro to Applied Biomedical FE Modeling	S	3	ENGR:2750, BME:2500
ECE:5550 Internet of Things	S	3	ENGR:2730
IE:3300 Manufacturing Systems	S	3	IE:3700
IE:3600 Quality Control	F	3	STAT:2020
IE:3700 Operations Research	F	3	MATH:2550, /STAT:2020

IE:4620 Design of Experiments for Quality Improvement	S	3	STAT:2020
IE:4900 Introduction to Six Sigma	S	3	IE:3600
OSTC:3750 Fundamentals of Micro & Nanofabrication	F, S	3	Any of BIOL:1141, CHEM:1060, CHEM:1110, CHEM:1120, PHYS:1611, PHYS:1612, PHYS:1702
Flexible Elective – At most, one general elective may be selected from: (i) engineering courses that are required in another (non-ME) program, (ii) engineering courses at an upper level (e.g. ME courses numbered 4100 and above), (iii) mathematics, physics or chemistry courses at a more advanced level than those required in the ME curriculum, (iv) independent investigation in a mechanical engineering subject area, or (v) courses that appear on a list of approved courses found at <a href="https://me.engineering.uiowa.edu/me-elective-focus-areas-efa">https://me.engineering.uiowa.edu/me-elective-focus-areas-efa</a>	Any	3	

<sup>1</sup>offered in spring semester of even years only.

Substitutions are discouraged and will only be approved under exceptional circumstances requiring the approval of the advisor, EFA coordinator and DEO (need to submit the substitution form).

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