Focus Area in Mechanical Engineering

Manufacturing

Revised on March 22, 2022

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 or ME:4140 Modern Robotics & Automation or ME:5146 Modeling of Materials Processing	F S S[1]	3 3 3	ME:2300 or ENGR:2760 ENGR:2710 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:4024 Product Design and Realization	S	3	ME:2200 or ENGR:2760/ENGR:2750
ME:4116 Manufacturing Processes, Simulations and Automation	F	3	ME:2300 or ENGR:2760
ME:4140 Modern Robotics & Automation	S	3	ENGR:2710
ME:4145 Industrial Internet of Things	F	3	ME:3351
ME:4200 Modern Engineering Materials in Mechanical Design	F	3	ME:3052
ME:5146 Modeling of Materials Processing	S[1]	3	ME:3045
ME:5167 Composite Materials	S[1]	3	ENGR:2750
ME:5170 Data-driven Analysis in Engineering Mechanics	F[2]	3	ENGR:2750 & ME:4111
General Electives	**Session**	**SH**	**Pre-/Co-Requisites**
ME:4110 Computer Aided Engineering	S	3	ENGR:2750/ME:3052
ME:4112 Engineering Design Optimization	S	3	ENGR:2110 & MATH:2550
ME:4117 Finite Element Analysis	F[3]	3	ENGR:2750
ME:4150 Artificial Intelligence in Engineering	F	3	ME:4111
ME:4153 Fundamentals of Vibrations	S[2]	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: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[2,4]	3	ENGR:2750/ME:3052
ME:5300 Uncertainty Quantification and Design Optimization	F[1]	3	ENGR:2750 & STAT:2020/ME:3052
BME:5620 Intro to Applied Biomedical FE Modeling	S	3	ENGR:2750, BME:2500

ECE:5550 Internet of Things	S	3	ENGR:2730
ISE:3300 Manufacturing Systems	S	3	ENGR:2760 & ISE:3700
ISE:3600 Quality Control	F	3	STAT:2020 or MSCI:9100 or (STAT:3100 & STAT:3101 & STAT:3200)
ISE:3700 Operations Research	F	3	MATH:2550, STAT:2020
ISE:4620 Design of Experiments for Quality Improvement	S	3	STAT:2020
ISE:4900 Introduction to Six Sigma	S	3	ISE:3600
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, except MATH:3800, (iv) independent investigation in a mechanical engineering subject area, or (v) courses that appear on a list of approved courses found at https://me.engineering.uiowa.edu/me-elective-focus-areas-efa	Any	3	

[1] offered in even years only
[2] offered in odd years only
[3] Off-cycle students who would like to take CEE:4553 Finite Element I in the Spring shall submit the substitution form for approval
[4] Offered in the spring semester 2020, and then in spring semester of odd years only since 2023

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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