Approved ME Technical Electives
8/25/20

The following list of approve ME Technical Electives includes undergraduate and graduate courses from the MEMS Departments, as well as ENGR courses and courses from other Swanson School of Engineering departments.

1) New courses will be added to this list as they are approved. See Heather Manns for an Elective Request form if there is a course that you think should be added to this list. Note that, in general, courses will be approved as ME Technical Electives only if (a) they are not part of another engineering program's sophomore curriculum and (b) they do not substantially overlap other courses in the mechanical engineering curriculum.
2) Dynamic Systems Electives are differentiated in the list below by an asterisk (*).
3) Study abroad courses are assessed on a case-by-case basis.
4) 2000-level courses are graduate courses and require permission from the Undergraduate Director.

ENGR 1090 (x3)	Cooperative Education; after completing three work rotation (1-credit of ENGR1090 each) and submitting a Coop Report
MEMS 1010	Experimental Methods in MSE
MEMS 1011	Structure and Properties Lab
MEMS 1020*	Mechanical Vibrations
MEMS 1030	Material Selection
MEMS 1032	Automotive Fabrication
MEMS 1033	Fracture Mechanics
MEMS 1035	Composites
MEMS 1045*	Automatic Controls
MEMS 1046*	Human Robotics and Control
MEMS 1047	Finite Element Analysis
MEMS 1048	Analysis and Characterization at the Nano-scale
MEMS 1049*	Mechatronics
MEMS 1053	Structure of Crystals and Diffraction
MEMS 1055	Computer Aided Analysis of Transport Phenomena
MEMS 1056	Introduction to Combustion Theory
MEMS 1057	Micro/Nano Manufacturing
MEMS 1058	Electromagnetic Properties of Materials
MEMS 1059	Phase Equilibria in Materials
MEMS 1060	Numerical Methods
MEMS 1063	Phase Transformation and Microstructural Evolution
MEMS 1065	Thermal Systems Design
MEMS 1070	Mechanical Behavior of Materials
MEMS 1082*	Electromechanical Sensors and Actuators
MEMS 1097	Special Projects (when taken for 3 credits)
MEMS 1098	Special Projects 2 (when taken for 3 credits)
MEMS 1101	Ferrous Physical Metallurgy

MEMS 1102	Principles and Applications in Steel Alloy Design
MEMS 1103	Principles and Applications in Steel Product Design
MEMS 1111	Materials for Energy Generation and Storage
MEMS 1120	Application of Engineering Simulation in Design
MEMS 1174	Ceramic Processing
MEMS 1256	Applied Computational Heat and Mass Transfer
ME 2001	Differential Equations
ME 2002	Linear and Complex Analysis
ME 2003	Introduction to Continuum Mechanics
ME 2022	Applied Solid Mechanics
ME 2027	Advanced Dynamics
ME 2042*	Measurement and Analysis of Vibro-Acoustic Systems
ME 2054	Parallel Computing for Engineers
ME 2061	Reduced Order Modeling for Engineering
BIOENG 1024	Medical Product Design
BIOENG 1050	Artificial Organs (Lung and Vascular)
BIOENG 1051	Artificial Organs 2 (Blood and Heart)
BIOENG 1052	Artificial Organs 3 (Kidney and Liver)
BIOENG 1218	Emerging Biomedical Technologies
BIOENG 1220	Biotransport Phenomena
BIOENG 1320	Biological Signals & Systems
BIOENG 1330	Biomedical Imaging
BIOENG 1340	Introduction to Medical Imaging and Image Analysis
BIOENG 1355	Medical Product Regulation and Reimbursement
BIOENG 1370	Computational Simulation in Medical Device Design
BIOENG 1615	Introduction to Neural Engineering
BIOENG 1631	Biomechanics 2 – Introduction to Biodynamics and Biosolid Mechanics
BIOENG 1632	Biomechanics 3 – Biodynamics of Movement
BIOENG 1633	Biomechanics 4 – Biomechanics of Organs, Tissues and Cells
BIOENG 1680	Biomedical Applications of Control
BIOENG 1810	Biomaterials and Biocompatibility
CHE 0314	Taking Products to Market: The Next Step in Chemical Product Design
CHE 0400	Reactive Process Engineering
CHE 0500	Systems Engineering 1: Dynamics and Modeling
CEE 1200	Construction Management
CEE 1330	Introduction to Structural Analysis
CEE 1340	Concrete Structures 1
CEE 1341	Steel Structures 1
CEE 1401	Open Channel Hydraulics
CEE 1410	Water Resources Engineering
CEE 1412	Introduction to Hydrology
CEE 1505	Water Treatment and Distribution System Design

CEE 1513	Environmental Engineering Processes
CEE 1515	Wastewater Collection and Treatment Plant Design
CEE 1609	Life Cycle Assessment Methods and Tools
CEE 1610	Engineering and Sustainable Development
CEE 1618	Design for the Environment
CEE 1703	Transportation Engineering
CEE 1714	Pavement Design and Analysis
CEE 1811	Principles of Soil Mechanics
COE 0449	Systems Software
COE 1186	Software Engineering
COE 1501	Algorithms
COE 1502	Advanced Digital Design
COE 1520	Programming Languages for Web Applications
COE 1541	Computer Architecture
CS 0441	Discrete Structures for CS
CS 0449	Introduction to Systems Software
CS 1501	Algorithm Implementation
CS 1520	Programming Languages for Web Applications
ECE 1201	Electronic Measurements and Circuits Laboratory
ECE 1212	Electronic Circuit Design Laboratory
ECE 1215	Electroacoustics and Audioelectronics
ECE 1238	Digital Electronics
ECE 1247	Semiconductor Device Theory
ECE 1259	Electromagnetics
ECE 1563	Signal Processing Laboratory
ECE 1673	Linear Control Systems
ECE 1701	Fundamentals of Electric Power Engineering
ECE 1771	Electronic Machinery
ENGR 0034	Pitt in Florence: Engineering Renaissance
ENGR 0240	Nanotechnology and Nano-Engineering
ENGR 0241	Fabrication and Design in Nanotechnology
ENGR 1011/1012	Modern Machining Processes plus Basic Lab
ENGR 1013	Modern Machining Processes Advanced Lab
ENGR 1017	Manufacturing for the Future
ENGR 1050	Product Realization
ENGR 1060	Social Entrepreneurship – Engineering for Humanity
ENGR 1061	Intrapreneurship: Entrepreneurship within the Corporation
ENGR 1062	Start Up Fundamentals
ENGR 1066	Introduction to Solar Cells and Nanotechnology
ENGR 1070	Power Generation from the Ground Up
ENGR 1071	Electrical Power Transmission, Distribution and Grid Technology
ENGR 1080	Lean Launchpad: Evidence-Based Entrepreneurship

ENGR	1256	Engineering in the Americas
ENGR	1281	Clean Energy Grid Engineering: Scandinavia
ENGR	1282	German Engineering Culture
ENGR	1450	Engineering–The German Way
ENGR	1500	Ethical Dilemmas Balancing Cost, Risk, and Scheduling
ENGR	1620	Product Design and Development
ENGR	1625	Engineering Business Collaborations in India
ENGR	1700	Introduction to Nuclear Engineering
ENGR	1701	Fundamentals of Nuclear Reactors
ENGR	1702	Nuclear Plant Technology
ENGR	1704	The French Nuclear Cycle
ENGR	1713	Radiation Detection and Measurement
ENGR	1716	The Art of Making: An Intro. to Hands-On System Design and Engineering
ENGR	1770	Engineering Foundations of Music
ENGR	1900	Introduction to Sustainable Water Technology & Design
ENGR	1905	Current Issues in Sustainability
ENGR	1907	Sustainability Capstone
ENGR	1933	Engineering a Craft Brewery
IE	1013	Manufacturing Process Engineering
IE	1014	Data Base Design
IE	1015	Geographic Information Systems
IE	1035	Engineering Management
IE	1051	Engineering Product Design
IE	1057	Computer Aided Manufacturing
IE	1061	Human Factors Engineering
IE	1076	Total Quality Management
IE	1081	Operations Research
IE	1082	Probabilistic Methods in Operations Research
IE	1089	Additive Manufacturing
IE	1102	Lean Six Sigma I (Green Belt)
IE	1103	Lean Six Sigma II (Black Belt)
IE	1123	Project Management for Engineers
MATH	1101	An Introduction to Optimization

Approved Engineering Electives
3/26/20

The courses approved as Engineering Electives are listed below.

1) New courses will be added to this list as they are approved. See Heather Manns for an Elective Request form if there is a course that you think should be added to this list. Note that, in general, courses will be approved as Engineering Electives only if (a) they are offered within the Swanson School of Engineering and (b) they do not substantially overlap other courses in the mechanical engineering curriculum.
2) Study abroad courses are assessed on a case-by-case basis.

All of the courses approved as ME Technical Electives are also approved Engineering Electives.

The following courses are additionally approved as Engineering Electives.

MEMS 1121 (x3)	Applied Engineering Simulation in Design Workshop; three 1-credit sections of this course can be used to fulfill the Engineering Elective requirement
BIOENG 1000	Statistics for Bioengineering
BIOENG 1070	Introductory Cell Biology 1
BIOENG 1071	Introduction to Cell Biology 2
CEE 1105	Materials of Construction
CEE 1503	Introduction to Environmental Engineering
CHE 0100	Foundations of Chemical Engineering
CHE 0214	Introduction to Chemical Product Design
COE 0132	Digital Logic
COE 0147	Computer Organization and Assembly Language
COE 0257	Analysis and Design of Electronic Circuits
COE 0401	Intermediate Programming Using JAVA
COE 0445	Data Structures
COE 0447	Computer Organization and Assembly Language
COE 0501	Digital Systems Laboratory
CS 0401	Intermediate Programming Using JAVA
CS 0445	Data Structures
CS 0447	Computer Organization and Assembly Language
ECE 0132	Digital Logic
ECE 0142	Computer Organization
ECE 0257	Analysis and Design of Electronic Circuits
ECE 0401	Analytical Methods
ECE 0402	Signals, Systems & Probability

ECE 0501	Digital Systems Laboratory
ENGR 0020	Probability and Statistics for Engineers 1
ENGR 0023	Plus 3 Costa Rica
ENGR 0024	International Field Project – China
ENGR 0025	International Field Project – Czech Republic
ENGR 0026	International Field Project – Germany
ENGR 0027	International Field Project – France
ENGR 0031	Plus 3 Italy
ENGR 0032	International Field Project – Brazil
ENGR 0033	International Field Project – Vietnam
ENGR 0035	Plus 3 Korea
IE 0015	Introduction to Information Systems Engineering
IE 1040	Engineering Economic Analysis
IE 1052	Manufacturing Processes and Analysis
IE 1054	Productivity Analysis
IE 1070	Probability, Random Variables, and Distributions
IE 1071	Statistical Testing and Regression