Approved ME Technical Electives
2025/9/15

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 1090/1095	Cooperative Education; after completing three credits of work rotations and submitting a Coop Report
MEMS 1010	Experimental Methods in MSE
MEMS 1011	Structure and Properties Lab
MEMS 1012	Computational Materials Science
MEMS 1016*	Nonlinear Dynamical Systems
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 1051	Applied Thermodynamics
MEMS 1053	Structure of Crystals and Diffraction
MEMS 1055	Computer Aided Analysis of Transport Phenomena
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 1066	Methods for Material Characterization
MEMS 1070	Mechanical Behavior of Materials
MEMS 1071	Applied Fluid Mechanics

MEMS 1074	Nanomaterials and Biomolecular Assembly
MEMS 1080	Powder Processing of Materials
MEMS 1081	Smart Materials: Key to Innovations
MEMS 1087	Sustainable Materials Production
MEMS 1097	Special Projects (when taken for 3 credits)
MEMS 1098	Special Projects 2 (when taken for 3 credits)
MEMS 1104	Advanced Physical Metallurgy of Nonferrous Alloys
MEMS 1105	Steelmaking and Sustainability
MEMS 1111	Materials for Energy Generation and Storage
MEMS 1120	Application of Engineering Simulation in Design
MEMS 1122	Fundamentals of Magnetic Materials and Applications
MEMS 1130	Introduction to Additive Manufacturing of Materials
MEMS 1163	Ceramic Materials
MEMS 1165	Materials Design
MEMS 1174	Ceramic Processing
MEMS 1183	Introduction to Additive Manufacturing
MEMS 1200	Introduction to Robotic Systems
MEMS 1256	Applied Computational Heat and Mass Transfer
MEMS 1300	Linear Algebra for Machine Learning
ME 2xxx	All 2000-level ME courses other than ME 2094–2096, ME 2500–2502, and ME 2900–2999. Both ME 2027 Advanced Dynamics and ME 2042 Measurement and Analysis of Vibro-Acoustic Systems are Dynamic Systems Electives.
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 1351	Computer Applications in Bioengineering
BIOENG 1355	Medical Product Regulation and Reimbursement
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 1203	Construction Professional Development
CEE 1330	Introduction to Structural Analysis
CEE 1335	Design of Structures
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 1531	Air Pollution and Control
CEE 1605	Sustainable Materials
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 1712	Digitalization in Civil Engineering: From CAD to Virtual Reality
CEE 1714	Pavement Design and Analysis
CEE 1811	Principles of Soil Mechanics
CMNAVS 0311	Naval Ship Systems 1 – Engineering
CMNAVS 0312	Naval Ship Systems 2 – Weapons
CS 0441	Discrete Structures for CS
CS 0449	Introduction to Systems Software
CS 1501	Algorithm Implementation
CS 1520	Programming Languages for Web Applications
CS 1678	Introduction to Deep Learning
ECE 1110	Computer Organization and Architecture
ECE 1140	Systems and Project Engineering
ECE 1150	Computer Networks
ECE 1155	Information Security
ECE 1175	Embedded Systems Design
ECE 1195	Advanced Digital Design
ECE 1212	Electronic Circuit Design Laboratory
ECE 1247	Semiconductor Device Theory
ECE 1259	Electromagnetics
ECE 1560	Digital Signal Processing
ECE 1673	Linear Control Systems
ECE 1701	Fundamentals of Electric Power Engineering
ECE Elective	All ECE Elective courses

ENGR 0034	Pitt in Florence: Engineering Renaissance
ENGR 0240	Nanotechnology and Nano-Engineering
ENGR 1017	Manufacturing for the Future
ENGR 1029	Introduction to Engineering for Humanity
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 1080	Innovating for Commercial Impact
ENGR 1256	Engineering in the Americas
ENGR 1276	Engineering Design for Social Change: South Africa
ENGR 1281	Clean Energy Grid Engineering: Scandinavia
ENGR 1282	German Engineering Culture
ENGR 1450	Engineering the German Way
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 1905	Current Issues in Sustainability
ENGR 1907	Sustainability Capstone
ENGR 1909	Sustainable Food Systems
ENGR 1933	Engineering a Craft Brewery
ENGR 2811	Innovating for Public Impact

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 1055	Facilities Layout and Material Handling
IE 1061	Human Factors Engineering
IE 1080	Supply Chain Analysis
IE 1081	Operations Research
IE 1082	Probabilistic Methods in Operations Research
IE 1102	Lean Six Sigma I (Green Belt)
IE 1103	Lean Six Sigma II (Black Belt)
IE 1104	Frugal Engineering and Value Analysis
IE 1108	Health Systems Engineering: Quantitative Analytics
IE 1123	Project Management for Engineers
IE 1171	Data for Social Good
IE 1203	Warehouse Operations
IE 1301	Introduction to Safety Engineering

MATH 1070	Numerical Mathematical Analysis
MATH 1080	Numerical Math: Linear Algebra
MATH 1101	An Introduction to Optimization
MATH 1360	Modeling in Applied Mathematics 1
MATH 1550	Vector Analysis and Applications

PETE 1097	Special Projects
PETE 1160	Petroleum Reservoir Engineering
PETE 1205	Petroleum Production Engineering
PETE 1206	Oil Recovery Techniques
PETE 1207	Petroleum and Natural Gas Processing
PETE 1208	Petroleum Drilling and Well Completion
PETE 1209	Hydraulic Fracturing Mechanics and Applications

Approved Engineering Electives

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
CMPINF 0401	Intermediate Programming
CS 0445	Data Structures
CS 0447	Computer Organization and Assembly Language
ECE 0102	Microelectronic Circuits
ECE 0132	Digital Logic
ECE 0142	Computer Organization
ECE 0201	Digital Circuits & Systems
ECE 0202	Embedded Processors & Interfacing
ECE 0257	Analysis and Design of Electronic Circuits
ECE 0301	ECE Problem Solving with C++
ECE 0302	Data Structures & Algorithms
ECE 0401	ECE Analytical Methods
ECE 0402	Signals, Systems & Probability

ENGR 0021	Probability and Statistics for Engineers
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