

# MECHANICAL AND MATERIALS ENGINEERING: TECHNICAL ELECTIVES

These lists establish which courses qualify to meet the program elective requirements for each of the academic plans.

## List 1: General Mechanical Engineering Electives

These courses provide experiences that are central to the development of General Mechanical Engineering attributes. Lists 1A and 1B are included in List 1 for meeting technical elective requirements.

Code	Title	Units
APSC 381	Advanced Design and Skills for Innovation	3.50
APSC 400	Technology, Engineering & Management (TEAM)	7.00
APSC 401	Interdisciplinary Projects	4.50
CHEE 490	Polymer Forms & Proc Tech	3.50
ELEC 280	Fundamentals of Electromagnets	3.75
ELEC 333	Electric Machines	4.25
MECH 330	Applied Thermo II (Option core to ME1, and a List 1 Tech for ME2 and ME3)	3.50
MECH 341	Fluid Mechanics II (Option core to ME1, and a List 1 Tech for ME2 and ME3)	3.50
MECH 361	Project Based Engineering: Conceive, Design, Implement & Operate	3.50
MECH 370	Prin Of Materials Processing (Option core to ME2, and a List 1 to ME1 and ME3)	3.50
MECH 371	Fracture Mech & Dislocation (Option core to ME2, and a List 1 to ME1 and ME3)	3.50
MECH 393	Biomechanical Product Developm (Option core to ME3, and a List 1 Tech for ME1 and ME3)	3.50
MECH 394	Frontiers in Biomechanical Engineering (Option core to ME3, and a List 1 Tech for ME1 and ME3)	3.50
MECH 420	Vibrations	3.50
MECH 423	Introduction To Microsystems	3.50
MECH 424	Sustainable Product Design	3.50
MECH 430	Thermal Systems Design	4.00
MECH 435	Internal Combustion Engines	3.50
MECH 437	Fuel Cell Technology	3.50
MECH 439	Turbomachinery	3.50
MECH 441	Fluid Mechanics III	3.50
MECH 444	Computational Fluid Dynamics	3.50

MECH 448	Compressible Fluid Flow	3.50
MECH 452	Mechatronics Engineering	5.00
MECH 455	Computer Integrated Manufacturing	3.50
MECH 456	Introduction To Robotics	3.50
MECH 457	Additive Manufacturing	4.00
MECH 461	Research Project	4.00
MECH 462	Team Project - Implement and Operate (Option core to ME3, and a List 1 Tech for ME1 and ME2)	3.50
MECH 465	Computer Aided Design	3.50
MECH 480	Airplane Aerodynamics and Performance	3.50
MECH 481	Wind Energy	3.50
MECH 482	Noise Control	3.50

## List 1A: Engineering Science

These List 1 courses include substantial Engineering Science content and are staffed by Mechanical and Materials Engineering with licensed Professional Engineers, or EITs, as instructors to meet the requirements of CEAB Appendix 3.

Code	Title	Units
MECH 492	Biological Fluid Dynamics	3.50

## List 1B: Engineering Design

These List 1 courses include substantial Engineering Design content and are staffed by Mechanical and Materials Engineering with licensed Professional Engineers as instructors to meet the requirements of CEAB Appendix 3.

Code	Title	Units
MECH 495	Ergonomics And Design	3.50

## List 2: Materials Engineering Electives

Code	Title	Units
MECH 461	Research Project	4.00
MECH 470	Deformation Processing	3.50
MECH 476	Eng Of Polymers And Composite	3.50
MECH 478	Biomaterials	3.50
MECH 479	Nano-Structured Materials	3.50
MECH 483	Nuclear Materials	3.50



### List 3: Biomechanical Engineering Electives

Code	Title	Units
MECH 461	Research Project	4.00
CHEE 380	Biochemical Engineering	3.50
CHEE 440	Pharmaceutical Technology	3.50
CHEE 484	Bioremediation	3.50
ELEC 408	Biomedical Signal and Image Processing	3.00
MECH 465	Computer Aided Design	3.50
MECH 478	Biomaterials	3.50
MECH 492	Biological Fluid Dynamics	3.50
MECH 494	Kinematics Of Human Motion	3.50
MECH 495	Ergonomics And Design	3.50
MECH 496	Musculoskeletal Biomechanics	3.50

### List 4: Multi-Disciplinary Engineering Electives

Code	Title	Units
ANAT 100	Anatomy of the Human Body	3.00
APSC 250	Biology Through an Engineering Lens	3.50
APSC 303	Professional Internship	3.50
CHEE 340	Biomedical Engineering	3.50
CHEE 342	Environmental Biotechnology	3.50
CHEE 371	Mitigation of Industrial Pollution	3.50
CHEE 412	Transport Phenomena	3.50
CHEE 363	Electrochemical Engineering	3.50
CIVL 371	Groundwater Engineering	4.00
CIVL 372	Water and Wastewater	4.00
CIVL 471	Subsurface Contamination	4.00
CIVL 473	Water Resources Systems	4.00
ELEC 271	Digital Systems	4.00
ELEC 274	Computer Architecture	4.00
ELEC 371	Microprocessor Interfacing and Embedded Systems	4.00
MTHE 212	Linear Algebra	3.50
MTHE 337	Intro. To Operations Research	3.00
MTHE 338	Fourier Methods for Boundary Value Problems	3.50
MTHE 434	Optimization Theory with Applications to Machine Learning	3.50
MTHE 472	Optimization and Control of Stochastic Systems	3.50
MINE 272	Applied Data Science	4.50
MINE 431	Life-Cycle Assessment for Green Technologies	3.50

MINE 459	Risk and Reliability Analysis for Industrial Asset Management, Health & Safety	4.00
ENPH 491	Physics Of Nuclear Reactors	3.50

### Areas of Concentration in Mechanical

Although there is no formal streaming of electives in the Mechanical Engineering Curriculum, the following groupings are provided in order to give students some guidance in areas where they may wish to concentrate their studies.

#### Aerospace Engineering

Code	Title	Units
MECH 371	Fracture Mech & Dislocation (Core for ME2.50 option)	3.50
MECH 437	Fuel Cell Technology	3.50
MECH 439	Turbomachinery	3.50
MECH 441	Fluid Mechanics III	3.50
MECH 444	Computational Fluid Dynamics	3.50
MECH 448	Compressible Fluid Flow	3.50
MECH 465	Computer Aided Design	3.50
MECH 480	Airplane Aerodynamics and Performance	3.50
MECH 481	Wind Energy	3.50

#### Biomechanical Engineering

Code	Title	Units
CHEE 340	Biomedical Engineering	3.50
MECH 370	Prin Of Materials Processing (Core for ME2.50 option)	3.50
MECH 371	Fracture Mech & Dislocation (Core for ME2.50 option)	3.50
MECH 393	Biomechanical Product Developm (Core for ME3 option)	3.50
MECH 394	Frontiers in Biomechanical Engineering (Core for ME3 option)	3.50
MECH 465	Computer Aided Design	3.50
MECH 478	Biomaterials	3.50
MECH 492	Biological Fluid Dynamics	3.50
MECH 494	Kinematics Of Human Motion	3.50
MECH 495	Ergonomics And Design	3.50
MECH 496	Musculoskeletal Biomechanics	3.50

#### Manufacturing Engineering

Code	Title	Units
APSC 381	Advanced Design and Skills for Innovation	3.50
MECH 370	Prin Of Materials Processing (Core for ME2.50 option)	3.50
MECH 424	Sustainable Product Design	3.50
MECH 455	Computer Integrated Manufacturing	3.50

MECH 457	Additive Manufacturing	4.00
MECH 462	Team Project - Implement and Operate (Core for ME3 option)	3.50
MECH 465	Computer Aided Design	3.50
MECH 476	Eng Of Polymers And Composite	3.50
MECH 482	Noise Control	3.50

## Mechatronics Engineering

Code	Title	Units
ELEC 271	Digital Systems	4.00
ELEC 274	Computer Architecture	4.00
ELEC 371	Microprocessor Interfacing and Embedded Systems	4.00
MECH 420	Vibrations	3.50
MECH 423	Introduction To Microsystems	3.50
MECH 452	Mechatronics Engineering	5.00
MECH 455	Computer Integrated Manufacturing	3.50
MECH 456	Introduction To Robotics	3.50
MECH 482	Noise Control	3.50

## Energy and Fluid Systems

Code	Title	Units
MECH 430	Thermal Systems Design	4.00
MECH 435	Internal Combustion Engines	3.50
MECH 437	Fuel Cell Technology	3.50
MECH 439	Turbomachinery	3.50
MECH 441	Fluid Mechanics III	3.50
MECH 444	Computational Fluid Dynamics	3.50
MECH 448	Compressible Fluid Flow	3.50
MECH 480	Airplane Aerodynamics and Performance	3.50
MECH 481	Wind Energy	3.50
MECH 492	Biological Fluid Dynamics	3.50

## Materials Engineering

Code	Title	Units
MECH 370	Prin Of Materials Processing (Core to ME23.50 option)	3.50
MECH 371	Fracture Mech & Dislocation (Core to ME23.50 option)	3.50
MECH 470	Deformation Processing	3.50
MECH 476	Eng Of Polymers And Composite	3.50
MECH 478	Biomaterials	3.50
MECH 479	Nano-Structured Materials	3.50
MECH 483	Nuclear Materials	3.50