Department of
Mechanical Engineering

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Mechanical Engineering

The Mechanical Engineering program has two engineering programs and one engineering technology program.

- 4-Year Bachelor of Science in Mechanical Engineering, BSME (470)
- 2-Year Associate of Applied Science in Engineering (351)
- 2-Year Associate of Applied Science in Engineering Technology (380)

These programs are designed to provide students with the competencies necessary to work in a variety of exciting fields within engineering and engineering technology. These majors offer excellent placement potential, professional job satisfaction, and substantial salaries. Students entering any of these programs can expect a well designed and rigorous curriculum based on industry standards.

The bachelor of science degree program in Mechanical Engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Engineering Programs

Using techniques, skills, and modern engineering modeling tools, students must demonstrate their abilities to apply mathematics, engineering science, and technology principles necessary for analyzing, modeling, and solving engineering problems. Students must communicate effectively in written and oral presentation. Each student must gain an understanding of professional and ethical behavior in the workplace. Finally, students should understand that learning is a life-long process and develop a desire to continue to enhance their abilities as a professional engineer.

The 4-year bachelor of science program in Mechanical Engineering (BSME – 470) provides students with a solid foundation in mathematics, engineering science, solid mechanics and thermal sciences. In addition, students choose a focus area in one of the following: automotive, bio-medical, civil engineering, computer aided engineering, design of mechanical systems, engineering management, engineering mechanics, manufacturing engineering, manufacturing supply chain management, material science, mining engineering, petroleum engineering, pre-medical, product development, programming, robotic systems, thermal science, welding, or general engineering.

Students in the BSME program are encouraged to take the Fundamentals of Engineering (FE) exam before they graduate. This is an important milestone of achievement for each mechanical engineering student in preparing him/her for future licensing as a Professional Engineer.

The 2-year associate program in Engineering (351) allows students to continue their engineering education at a 4-year university in several engineering fields. Areas of emphasis available in the associate program include chemical, civil, electrical, and mechanical engineering.

The bachelor of science program in Mechanical Engineering (470) and the associate program in Engineering (351) are available to students entering Brigham Young University-Idaho on any admission track.

Program Educational Objectives. Program Educational Objectives for the baccalaureate degree in Mechanical Engineering are to produce engineering graduates who:

1. Demonstrate and maintain faith in God, and exhibit high standards of personal integrity and professional ethics through lifelong service to family, church, profession, and community. [Service]
2. Provide leadership in their chosen field of endeavor through the application of effective interpersonal, communication, and teamwork skills. [Leadership]
3. Apply fundamental principles of design and analysis to develop innovative solutions in an industrial and societal context. [Design]
4. Maintain currency in their field through continued learning and education. [Lifelong Learning]

Student Outcomes. To achieve the educational objectives, the following outcomes will be measured during the course of study within the BSME program. Assessment methods consistent with accreditation recommendations will be used to determine how each student meets these outcomes. The Mechanical Engineering program at BYU-Idaho is designed to give students the ability to:

1. Apply knowledge of fundamental math, science, and engineering principles. (Fundamentals)
2. Design and conduct experiments and analyze the resulting data. (Experiments)
3. Design components, systems, or processes necessary to meet product specifications and design constraints. (Engineering Design)
4. Function well within a multidisciplinary team. (Team Work)
5. Identify, formulate, and solve engineering problems (Model & Solve)
6. Maintain high ethical, moral, and professional standards. (Ethics)
7. Communicate effectively in both oral and written format. (Communication)
8. Understand the impact engineering has on the world. (Global Impact)
9. Recognize the need for, and engage in life-long learning. (Continued Learning)
10. Understand contemporary issues. (Contemporary Issues)
11. Use the techniques, skills, and modern engineering tools necessary for engineering practice. (Engineering Tools)

Engineering Technology Programs

The 2-year associate program in Engineering Technology (380) is designed as a transfer associate degree whereby students transfer to a 4-year university to complete their education. Common engineering technology programs include manufacturing, welding, design, and mechanical engineering technology. The associate program in Engineering Technology is available to students on any track.

Student Outcomes. Student Outcomes for the associate degree in Engineering Technology are as follows. The Engineering Technology program at BYU-Idaho is designed to give students the ability to:

1. Apply knowledge of fundamental math, science, and engineering principles. (Fundamentals)
2. Use the techniques, skills, and modern engineering tools necessary for engineering practice. (Engineering Tools)
3. Communicate effectively in both oral and written format. (Communication)
4. Design components, systems, or processes necessary to meet product specifications and design constraints. (Design Concepts)
5. Demonstrate an understanding of modern manufacturing processes. (Mfg Processes)
6. Function well within a multidisciplinary team (Team Work)

General Information

Mathematics and physical sciences are critical components of any engineering or engineering technology curriculum. The normal entry level mathematics class for Mechanical Engineering and Engineering programs is Calculus I (FDMAT 112). For the Technology programs the entry level math course is Pre-Calculus (FDMAT 109) or College Algebra (FDMAT 110). Entering freshman students should consult with their advisor to ensure they are beginning with the mathematics course for which they are prepared. Students with weak mathematics skills are advised to enroll in a preparatory mathematics course to strengthen their skills. For Mechanical Engineering, Civil Engineering, Engineering, and Engineering Technology programs, the normal entry level chemistry course is General Chemistry (Chem 105). For the Welding and Fabrication Technology programs the normal entry level chemistry course is Introduction to General Chemistry (Chem 101).

It is imperative that students develop and follow a plan of study that will allow them to complete all the required courses within the credit hour limits. Students should consult with their advisor/mentor early to make sure their educational plan is correct. Sample curriculum flow charts can be found on the department web page at http://www.byui.edu/mechengr.

AAS in Engineering (351)

Take required Foundations courses (17 credits)

Major Requirements

No Double Counting of Major Courses - Students must maintain a minimum grade of C- in their major courses

Core Courses
Take these courses:

CHEM 105	4
MATH 113	3
MATH 214	3
MATH 316	4
PH 220	3
	17

For Chemical Engineering and Civil Engineering options take1 additional elective credit

Program Notes:

Additional Elective Credits Required for Graduation - 1

Select One Option

Chemical Engineering Option

Take these courses:

CHEM 106	4
CHEM 351	4
CHEM 352	4
ME 142	3
PH 121	3
	18

Take 6 credits:

CHEM 461	3
MATH 341	3
ME 201	2
ME 202	3
ME 330	3
PH 123	3
PH 220	3
	6

Civil Engineering Option

Take these courses:

CONST 340	3
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 204	3
ME 250	3
ME 250L	1
PH 123	3
	24

Electrical Engineering Option

Take these courses:

CS 124	3
CS 165	3
CS 235	3
CS 237	3
ECEN 150	3
ECEN 160	3
ECEN 250	4
PH 121	3
	25

Mechanical Engineering Option

Take these courses:

ME 101	1
ME 131	3
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 204	3
ME 250	3
ME 250L	1
PH 123	3
	25

Total Major Credits=42

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

AAS in Engineering Technology (380)

Take required Foundations courses (17 credits)

Major Requirements

No Double Counting of Major Courses - Students must maintain a minimum grade of C- in their major courses

Core Courses
Take these courses:

CHEM 105	4
FDMAT 112*	4
MATH 111	2
ME 101	1
ME 131	3
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 250	3
ME 250L	1
PH 105	4
	33

Technical Electives
Take 8 credits:

ARCH 100	3
ARCH 110	3
CONST 340	3
ECEN 150	3
MATH 113	3
ME 204	3
ME 210	2
ME 280	3
ME 330	3
ME 331	3
ME 332	3
WELD 101	3
WELD 120	3
WELD 123	3
WELD 229	3
WELD 280	3
	8

Program Notes:

Additional Elective Credits Required for Graduation - 2

****Note to students: FDMAT 112 needs to be taken to satisfy a major requirement as well as partially satisfy the Foundations Quantitative Reasoning requirement. Full completion of Foundations will also require FDMAT 108T.***

Total Major Credits=41

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

BS in Mechanical Engineering (470)

Take required Foundations courses

Major Requirements

No Double Counting of Major Courses - Students must maintain a minimum grade of C- in their major courses

Entry Courses
Take these courses your first 2 semesters:

ME 101	1
ME 131	3
ME 142	3
ME 172	3
ME 201	2
	12

Core Courses
Take these courses:

CHEM 105	4
MATH 215	4
MATH 316	4
ME 202	3
ME 204	3
ME 210	2
ME 250	3
ME 250L	1
ME 280	3
ME 310	2
ME 322	3
ME 330	3
ME 360	3
ME 370	3
ME 380	3
ME 423	3
ME 480	3
PH 223	4
	54

Experential Learning
Take 2 courses:

ME 299	1
ME 398R	1-3
ME 490R	1-3
	2

Choose a 12 credit emphasis from the following list

Automotive

AUTO 125	1
AUTO 131	3
AUTO 132	3
Choose 6 credits	
AUTO 155	4
AUTO 201	4
AUTO 221	3
AUTO 231	3
AUTO 232	3
AUTO 340	3

Bio-Medical
Choose 12 credits

BIO 180	4
BIO 181	4
BIO 460	4
BIO 461	5

Civil Engineering
Choose 12 credits

CE 321	3
CE 341	3
CE 351	3
CE 361	3
CE 421	3
CE 424	3
CE 433	3
CE 470	3
CONST 340	3

Computer Aided Engineering
Take this course:

ME 342	3

Choose 9 credits:

ME 332	3
ME 425	3
ME 438	3
ME 460	3

Design of Mechanical Sytems
Choose 12 credits:

ME 331	3
ME 337	3
ME 438	3
ME 460	3
ME 465	3

Engineering Management**
Choose 9 credits:

B 211	4
B 301	3
B 321	3
Take 3 credits:	
B 361	3
B 383	3
CIT 380	3

Engineering Mechanics
Take this course:

ME 425	3

Take 9 credits:

ME 337	3
ME 410	3
ME 445	3
ME 460	3

Manufacturing
Take these courses:

ME 332	3
B 461**	3

Take 3 credits:

ME 331	3
WELD 101	3

Take 3 credits:

ME 465	3
ME 470	3

****Manufacturing Supply Chain**
Take these courses:

B 361	3
B 461	3
B 466	4
B 468	2

Material Science
Take these courses:

CHEM 106	4
CHEM 220	5
CHEM 351	4
CHEM 352	4
CHEM 461	3
CHEM 462	3
ME 445	3

Pre-Medical
Choose 12 credits

BIO 180	4
BIO 181	4
CHEM 106	4
CHEM 351	4
CHEM 352	4
CHEM 481	4

Mining Engineering
Choose 12 credits:

GEOL 111	3
GEOL 111L	1
GEOL 140	1
GEOL 311	4
GEOL 351	3
GEOL 352	3
GEOL 370	4
ME 465	3

Petroleum Engineering
Choose 12 credits:

GEOL 111	3
GEOL 111L	1
GEOL 311	4
GEOL 370	4
GEOL 425	3
ME 465	3

****Product Development**
Take these courses:

B 341	3
B 383	3
ME 438	3

Take 3 credits:

B 466	4
B 483	3
CIT 380	3

Programming

CS 124	3

Take these courses:

CIT 320	3
CS 165	3
CS 213	3
ME 342	3
ME 425	3
ME 438	3
ME 470	3

Robotic Systems
Take these courses:

ECEN 470	3
ME 410	3
ME 337	3
ME 470	3

Thermal Science
Take this course:

ME 422	3

Take 9 credits:

ME 342	3
ME 425	3
ME 460	3
ME 465	3

Welding

WELD 101	3
WELD 123	3

Take 6 credits:

ME 332	3
WELD 120	3
WELD 229	3
WELD 280	3

General
Take 12 credits:

MATH 472	3
ME 331	3
ME 332	3
ME 337	3
ME 342	3
ME 398R	1
ME 410	3
ME 422	3
ME 425	3
ME 438	3
ME 445	3
ME 460	3
ME 465	3
ME 470	3
ME 490R	1
ME 495R	3

Program Notes:

Complete online accounting tutorial (approximately 10 hours) prior to taking first business course.

Total Major Credits=80

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Minor in Engineering (206)

Major Requirements

Students must maintain a minimum grade of C- in their major courses

Core Courses	
Take these courses:	
FDMAT 112*	4
ME 101	1
ME 131	3
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 280	3
	22

Technical Electives	
Take 3 credits:	
CHEM 105	4
CHEM 106	4
MATH 113	3
MATH 214	3
MATH 215	4
ME 204	3
ME 210	2
ME 250	3
ME 250L	1
ME 331	3
ME 332	3
PH 121	3
PH 123	3
PH 220	3
PH 223	4
	3

Program Notes:

****Note to students: FDMAT 112 needs to be taken to satisfy a major requirement as well as partially satisfy the Foundations Quantitative Reasoning requirement. Full completion of Foundations will also require FDMAT 108T.***

Total Minor Credits=25

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Mechanical Engineering Pre-approved Clusters

Engineering Cluster		6300
Take 15 credits		
FDMAT 112	Calculus 1	4
ME 101	Introduction to Mechanical Engineering	1
ME 131	Manufacturing Processes 1	3
ME 142	Engineering Computation 1	3
ME 172	Engineering Graphics	3
ME 201	Engineering Mechanics: Statics	2
ME 202	Strength of Materials	3
ME 204	Engineering Mechanics: Dynamics	3
	Total Credits	**15**

Manufacturing Cluster		6301
Take 12 credits		
ME 131	Manufacturing Processes 1	3
ME 172	Engineering Graphics	3
ME 331	Manufacturing Processes 2	3
ME 332	Advanced CNC	3
WELD 101	Welding Fundamentals	3
	Total Credits	**12**

Welding Cluster		6302
Take these courses:		
WELD 101	Welding Fundamentals	3
WELD 123	Advanced Welding Processes	3
Take 6 credits:		
ME 131	Manufacturing Processes 1	3
ME 172	Engineering Graphics	3
WELD 120	Gas Tungsten Arc Welding	3
WELD 229	Code, Certification & Inspection	3
WELD 280	Welding Fabrication	3
	Total Credits	**12**

Fabrication Cluster		6303
Take these courses:		
ME 131	Manufacturing Processes 1	3
ME 172	Engineering Graphics	3
WELD 101	Welding Fundamentals	3
Take 3 credits:		
ME 331	Manufacturing Processes 2	3
ME 332	Advanced CNC	3
WELD 120	Gas Tungsten Arc Welding	3
WELD 123	Advanced Welding Processes	3
	Total Credits	**12**

Course Descriptions — Credits*

ME 101 Introduction to Mechanical Engineering (1:1:0)
This course provides an introduction to the field of mechanical engineering and related fields. Topics include investigation of curricula; career planning, design process, and engineering software tools. In addition, student teams will complete an engineering project.
(Fall, Winter, Spring)

ME 115 Computerized Technical Illustration (2:0:0)
This course will explore the basic system of technical illustration, the use of construction aids and grids, and special techniques in rendering an animation. Students will be introduced to 3D Solids modeling and rendering using the computer software (3D Studio MAX R3) and animation techniques. This course is designed heavily around the use of 3D drawings. Students will learn to accurately portray any given object three dimensionally (both manually and using the computer).

ME 131 Manufacturing Processes 1 (3:2:2)
Introduction to manufacturing processes. Topics include milling, turning, drilling, sawing, casting, polymer processes, joining processes, deformation processes, and measurement tools and procedures.
(Fall, Winter, Spring)

ME 142 Engineering Computation 1 (3:3:0)
Co-requisites: FDMAT 112
This course provides an introduction to computation in the context of engineering problem solving. Fundamental principles of computation, such as computer representation of numbers and round-off error, are presented. Basic numerical methods, including numerical integration, differentiation, and root finding, are covered. An introduction to computer programming including flowcharts, loops, condition statements, and fuctions, is given. Emphasis is placed on using MS Excel to solve computational problems, using VBA within Excel to create computer programs, and use of a commercial math software package.
(Fall, Winter, Spring)

ME 172 Engineering Graphics (3:3:0)
Fundamentals of 3D parametric modeling and engineering design concepts including: orthographic projection, auxiliary views, sectioning, dimensions, working drawings, assembly modeling, parametric modeling fundamentals, and standards (ANSI and ISO). Instruction in computer-aided design tools with application to Mechanical Engineering.
(Fall, Winter, Spring)

ME 201 Engineering Mechanics: Statics (2:2:1)
Co-requisites: FDMAT 112
Concepts of forces, moments and other vector quantities; free body diagrams; particle and rigid body statics; trusses, frames and machines; friction; centroids and moments of inertia. Vector analysis used.
(Fall, Winter, Spring)

ME 202 Strength of Materials (3:3:0)
Prerequisites: ME 201
Review of equations of static equilibrium; introduction to engineering stress and strain; thermal loading; stress distributions and deflections resulting from axial, torsional, and transverse (beam) loadings; combined loading problems; stress and strain transformation, Mohr's circle; column buckling.
(Fall, Winter, Spring)

ME 204 Engineering Mechanics: Dynamics (3:3:0)
Prerequisites: ME 201
The study and application of the concepts of dynamics to particles, systems of particles, and rigid bodies. Scalar and vector analysis used.
(Fall, Winter, Spring)

ME 210 Electro-Mechanical Devices 1 (2:1:3)
Prerequisites: FDMAT 112
This course provides an introduction to electricity, circuits, electric power, and simple laboratory equipment like multimeters and oscilloscopes.
(Fall, Winter, Spring)

ME 250 Materials Science (3:3:0)
Prerequisites: CHEM 101 (Welding Students Only); ME 202 - CHEM 105 (for ME & CE students only)
Concurrent Courses: ME 250L
Atomic and microstructure of engineering materials, including metals, ceramics, polymers, and composites. Factors influencing the fabrication, processing, and selection of materials in engineering analysis and design. Case studies of engineering material failures. Use of material selection.
(Fall, Winter, Spring)

ME 250L Materials Lab (1:0:2)
Concurrent Courses: ME 250
Laboratory investigations in materials science and strength of materials.
(Fall, Winter, Spring)

ME 280 ME Design 1: Mechanical Design (3:2:2)
Prerequisites: ME 131 and ME 142 and ME 172 and ME 202
This course focuses on the practical aspects of mechanical design and teaches concepts such as the integration of engineering analysis and design, the strategic use of CAD in making design decisions, the effective use of vendor off-the-shelf mechanical components, and manufacturing process considerations in design. The concepts are taught in the context of small design projects where students design and build mechanical devices throughout the semester.
(Fall, Winter, Spring)

ME 299 Student Mentorship (1:0:0)
Prerequisites: Instructor Approval
Under faculty direction, student mentors work closely with and give guidance to a small group of students. Student mentors should have received a grade of B+ or better in any course they mentor.
(Fall, Winter, Spring)

ME 310 Electro-Mechanical Devices 2 (2:1:3)
Prerequisites: MATH 316 and ME 210
This course covers the basics of various types of motors and their selections. Basics of instrumentation and sensors are also discussed and implemented in a laboratory setting using LabVIEW.
(Fall, Winter, Spring)

ME 322 Thermodynamics 1 (3:3:2)
Prerequisites: ME 204
Fundamentals of classical thermodynamics. Thermodynamic property relationships for ideal gasses, vapors, liquids, and solids. First and second law analysis of open and closed systems. Energy and entropy concepts in power and refrigeration cycles. Laboratory experiences with thermodynamic devices.
(Fall, Winter, Spring)

ME 330 Engineering Statistics (3:3:0)
Prerequisites: FDMAT 112 and ME 142
Introduction to statistical methods for science and engineering. Review of basic statistical concepts of central tendency, dispersion of data, probability laws, hypothesis testing, and confidence intervals. Introduces statistical process control, design of experiments, statistical tolerance analysis, and concepts of six sigma quality.
(Fall, Winter, Spring)

ME 331 Manufacturing Processes 2 (3:2:2)
Prerequisites: ME 131 and ME 172
Integration of manufacturing processes. Continued emphasis in mechanical reduction, deformation and consolidation processes, with focus on joining processes.
(Winter)

ME 332 Computer Numerical Control (CNC) (3:2:2)
Prerequisites: ME 131 and ME 172
Automated machine control through Computer-Aided Manufacturing (CAM) and Computer Numerical Control (CNC). Students gain practical laboratory experience on CAM, CNC, and manual programming on a variety of CNC equipment (machining center, lathe, wire EDM, and plasma cutter). Principles of machining variables, tooling, and setups will be reviewed.
(Fall, Spring)

* Credit Description (Credit Hours : Lecture Hours per week : Lab Hours per week)

ME 337 Kinematics (3:3:0)
Prerequisites: ME 204
Motion analysis of mechanisms, including position, velocity, and acceleration; rolling contact; cams; gears; synthesis of mechanisms. Includes computer-aided engineering techniques.
(Spring)

ME 342 Engineering Computation 2 (3:3:0)
Prerequisites: MATH 316 and ME 142 and ME 202 and ME 204
This course builds on the basics of engineering computation from ME 142. Additional numerical methods, including curve fitting, optimization, and ordinary differential equations are covered. Additional topics in computer programming are also presented. Computational techniques are implemented in MS Excel, VBA within Excel, and a commercial math software package.
(Winter)

ME 360 Fluid Mechanics (3:3:2)
Prerequisites: MATH 316 and ME 142 and ME 250L and ME 322
Introduction to fluid mechanics and incompressible fluid flow, fluid statics, fluid dynamics, control volume and differential analysis of fluid flow, dimensional analysis and scale models, internal and external viscous flow, turbomachinery. Flow measurement lab included.
(Fall, Winter, Spring)

ME 370 Machine Design (3:3:2)
Prerequisites: ME 250L and ME 280
Analysis, modeling and design of mechanical components and systems; materials, processes and structural analysis; static and dynamic failure theories; analysis and design of machine elements. Use of computer-aided design tools emphasized.
(Fall, Winter, Spring)

ME 380 ME Design 2: Product Design (3:2:2)
Total Course Fees: $13.00
Prerequisites: ME 250 and ME 370
This course introduces a structured design methodology for product development. The methodology includes such topics as product specifications, concept generation, concept selection, and prototyping. Other topics that are associated with the design process, such as economic analysis and intellectual property, are also presented.
(Fall, Winter, Spring)

ME 398R Internship (1:0:0)
Prerequisites: Junior Standing
Industrial work experience.
(Fall, Winter, Spring)

ME 410 System Dynamics (3:3:2)
Prerequisites: ME 104 and ME 310
This course provides an introduction to dynamic system modeling and analysis. Major topics covered in this course include lumped parameter models of dynamic systems, derivation of state equations, analytical and numerical solution of state equations, and frequency response analysis. Professional software is used in obtaining numerical solutions of state equations.
(Fall)

ME 422 Thermodynamics 2 (3:3:2)
Prerequisites: ME 322
Application of principles of thermodynamics to air standard cycles (Otto, Diesel, Brayton, Sterling, and Ericsson), steam power cycles (Rankine), and refrigeration and heat pump cycles. Property calculations for gas mixtures. Processes involving air water mixtures, psychrometric charts, etc. with applications to air-conditioning and drying processes. Introduction to thermodynamic calculations for combustion chemical reactions. Laboratory experience analyzing thermodynamic systems.
(Spring)

ME 423 Heat Transfer (3:3:2)
Prerequisites: ME 360
Fundamentals of conduction, convection, and radiant modes of heat transfer; fundamental equations for steady and unsteady conduction; convection correlations; environmental radiation and radiation properties; heat exchanger analysis and design; design of systems involving multi-mode heat transfer. Heat transfer lab included.
(Fall, Winter, Spring)

ME 425 Computational Fluid Dynamics (3:3:2)
Co-requisites: ME 360
Introduction to computational methods to solve and analyze problems in fluid mechanics. This course presents the processes of grid generation, applying initial and boundary conditions, selection of solution algorithms and models, solution generation and convergence, and post-processing including flow visualization and determination of global properties. Incompressible and compressible flows will be covered. Results will be compared with selected analytical solutions.
(Fall)

ME 438 CAE Modeling and Digital Simulation (3:3:0)
Prerequisites: ME 380
A study of advanced Computer-Aided Design and engineering applications in design, modeling, simulation and customization. The use of CAD and engineering software tools is stressed. Topics include engineering design process, advanced solids modeling techniques, kinematic analysis, digital simulation techniques, optimization, and customization techniques.
(Fall)

ME 445 Mechanics of Composite Materials (3:3:0)
Prerequisites: ME 250 and ME 142
An introduction to laminated composite materials and structures. An investigation of the micromechanical and macromechanical behavior of anisotropic plies. Development of classical lamination theory for predicting the mechanical behavior of laminated composite plates. Laboratory work involving fabrication and testing of composite laminates.
(Winter)

ME 460 Fundamentals of Finite Element Analysis (3:3:0)
Prerequisites: ME 142 and ME 370
This course provides an introduction to the finite element method. Characteristics and limitations of several basic finite elements are evaluated. The finite element method is applied to both structural and thermal problems. Applications of the finite element method are carried out with commercial software.
(Winter, Spring)

ME 465 Fluid Power Fundamentals (3:2:2)
Prerequisites: ME 360
This course is a technical elective in Mechanical Engineering and teaches fundamentals of fluid power. Students will explore hydraulic and pneumatic systems including hydraulic fluids, air preparation components, pumps, compressors, cylinders, motors, valves, circuits, controls, and commercial applications.
(Fall)

ME 470 Mechatronics (3:3:2)
Prerequisites: ME 310
This course provides an introduction to systems that contain both electrical and mechanical elements. Methods for modeling, sensing, and controlling the behavior of such systems using a microcontroller and programmable logic controller are discussed.
(Winter)

ME 480 ME Design 3: Capstone Design (3:2:2)
Prerequisites: ME 322 and ME 380
Comprehensive one-semester integrated design experience using the engineering design process and skills gained in engineering science classes. Typical projects include product conception, development, design, and manufacture.
(Fall, Winter, Spring)

ME 490R Special Problems in Mechanical Engineering (1:0:0)
Prerequisites: Consent of Instructor
Students complete individual major projects or research in engineering, under the supervision of a faculty member.
(Fall, Winter, Spring)

ME 495R Special Topics in ME (3:0:0)
Prerequisites: Consent of Instructor
A one-semester course emphasizing current topics in engineering.
Continued proficiency in the use of arc welding processes in accordance with AWS EG2 (qualifications of welding personnel). This is a competency-based curriculum detailing acceptable skill requirements for entry level welders.
(Fall, Spring)

* Credit Description (Credit Hours : Lecture Hours per week : Lab Hours per week)