Department of
Mechanical Engineering

Garth Miller, Department Chair
Adrian Baird, Bill Cooley, Adam Dean, Alan Dutson, Russell Daines; David Johson, David Saunders; Aaron Schellenberg; Greg Roach
Kenna Carter, Secretary (208) 496-7630
http://www.byui.edu/MechEngr /

Department of Mechanical Engineering

The Mechanical Engineering Department has two engineering programs and three engineering technology programs from which to select a career path. These are:

- 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)
- 2-Year Associate of Applied Science in Welding and Fabrication Technology (374)
- 4-year Bachelor of Science in Welding and Fabrication Technology Management (474)

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 (470) provides students with a solid foundation in mathematics, engineering science, solid mechanics and thermal sciences. In addition, students choose a focus area in computer aided engineering, mechanical systems design, engineering management, engineering mechanics, manufacturing engineering, material science, product development, robotic systems, thermal science, manufacturing supply chain management, 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 ME 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 engineering fields other than mechanical engineering. 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 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]

Program 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. Students will:

1. Demonstrate their knowledge and application of engineering mechanical systems, thermal systems, and the laws of physical and natural science to engineering analysis and design problems.
2. Demonstrate their ability to analyze and interpret the behavior of a physical system through experimentation.
3. Use acquired math skills (calculus, linear algebra, ordinary differential equations, and statistical analysis) in solving engineering design and analysis problems.
4. Use modern engineering computer software and hardware tools to create models of physical systems in order to predict behavior and develop solutions to engineering problems.
5. Competently present their technical findings to peers, supervisors, and faculty in both oral and written format.
6. Exhibit and maintain high ethical, moral and professional standards expected of members of the Church of Jesus Christ of Latter-day Saints, and as graduates from Brigham Young University-Idaho.
7. Design, model and manufacture, components, systems, or processes necessary to meet product specifications for a competitive market environment.
8. Demonstrate an understanding of modern manufacturing procedures and project management techniques as applied to the development, manufacture, and delivery of customer products.
9. Learn to function as a contributing team member in a multi-discipline work environment.
10. Develop an understanding of the impact engineering design has on the world.
11. Continue their educational processes beyond baccalaureate degree in graduate studies and/or enhancement of skills within the work environment.

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.

Program Outcomes. Program Outcomes for the associate degree in Engineering Technology are as follows. Students will:

1. Demonstrate their knowledge and application of math skills, engineering mechanical systems, and the laws of physical and natural science to fundamental engineering analysis and design problems. [Fundamentals]
2. Use modern engineering computer software to create models of physical systems in order to develop solutions to engineering problems. [Computer Tools]
3. Competently present their technical findings to peers, supervisors, and the faculty in both oral and written format. [Communication]
4. Design, model, and manufacture components or elementary systems to meet product specifications. [Design Concepts]
5. Demonstrate an understanding of modern manufacturing processes. [Manufacturing Processes]
6. Learn to function as a contributing team member in a technical work environment. [Team Work]

The 2-year associate program in Welding and Fabrication Technology (374) provides hands-on training in welding and manufacturing processes. The curriculum includes a solid foundation in welding theory, manufacturing processes, and material science. This program develops skills leading to welder certification and is designed for immediate employment in the welding, manufacturing, or fabrication industries. The associate program in Welding and Fabrication Technology is available on the Fall/Winter and Winter/Spring tracks.

The 4-year bachelor of science program in Welding and Fabrication Technology Management adds a curriculum of business management fundamentals to complement the technical courses offered in the associate program (374), providing graduates with increased career opportunities. The bachelor of science program in Welding and Fabrication Technology Management is available on the Fall/Winter and Winter/Spring tracks.

Program Outcomes. Program Outcomes for the baccalaureate degree in welding and fabrication technology management are as follows. Students will:

1. Demonstrate their knowledge and application of the laws of physical science and math to fundamental design and fabrication problems. [Fundamentals]
2. Use modern CAD/CAM software to develop solutions to design and fabrication problems. [CAD/CAM Tools]
3. Competently present their technical findings to peers, supervisors, and the faculty in both oral and written format. [Communication]
4. Design, model, and manufacture components or elementary systems to meet product specifications. [Design Concepts]
5. Demonstrate an understanding of modern manufacturing processes. [Manufacturing Processes]
6. Demonstrate an understanding of modern welding processes. [Welding Processes]
7. Learn to function as a contributing team member in a technical work environment. [Team Work]
8. Understand how technology is used in all functions of business to improve productivity, communication, and customer service. [Technological Literacy]
9. Understand international trade and financial systems. Core sources in marketing and organizational behavior will address cross-cultural issues. [Global Literacy]
10 Develop quantitative reasoning skills by utilizing business software and web-based applications to solve finance, marketing, and operational problems addressed in the curriculum. [Quantitative Analysis]
11. Participate in business case studies, internships, and/or consulting projects to develop skills in these areas. [Problem Solving & Project Management]
12. Receive education, encouragement, and support in operating and growing business ventures in appropriate courses, guest seminars and practicums. [Entrepreneurial Spirit]
13. Learn how to identify and eliminate any incongruities between their personal ethical tendencies and the gospel of Jesus Christ. [Business Ethics]

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, 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. Each student should consult with his/her advisor 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

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 371	3
PH 220	3
	16

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 218	1
ME 250	3
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 224	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 218	1
ME 250	3
PH 123	3
	25

Total Major Credits=41

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

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 218	1
ME 250	3
PH 105	4
	33

Technical Electives
Take 8 credits:

ARCH 100	2
ARCH 110	3
CONST 340	3
ECEN 150	4
MATH 113	3
ME 105	4
ME 204	3
ME 210	2
ME 280	3
ME 330	3
ME 331	3
ME 332	3
	8

Program Notes:

Total Major Credits=41

This major is available on the following tracks:

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

AAS in Welding and Fabrication Technology (374)

Take required Foundations courses

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 101	4
MATH 111	2
ME 101	1
ME 105	4
ME 131	3
ME 172	3
ME 250	3
ME 299	1
ME 332	3
PH 105	4
WELD 120	3
WELD 123	4
WELD 229	3
WELD 280	3
	41

Program Notes:

Total Major Credits=41

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- NO

BS in Welding and Fabrication Technology Management (474)

Take required Foundations courses

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:	
ACCTG 180	3
B 101	3
B 301	3
B 321	3
B 341	3
B 361	3
CHEM 101	4
CIT 140	3
ECON 150	3
FDMAT 221	3
MATH 111	2
ME 101	1
ME 105	4
ME 131	3
ME 172	3
ME 250	3
ME 332	3
PH 105	4
WELD 120	3
WELD 123	4
WELD 229	3
WELD 280	3
	67

Supplemental Courses	
Take 1 course:	
B 398	3
ME 299	1
ME 398	1-3
	1

Program Notes:

Total Major Credits=68

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- NO

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:

ME 131	3
ME 142	3
ME 172	3
ME 201	2
	11

Core Courses
Take these courses:

CHEM 105	4
MATH 215	4
MATH 316	4
ME 101	1
ME 202	3
ME 204	3
ME 210	2
ME 218	1
ME 250	3
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
	55

Experential Learning
Take 2 courses:

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

Choose a 12 credit emphasis from the following list

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 Engineering
Take these courses:

ME 332	3
B 461**	3

Take 3 credits:

ME 105	4
ME 331	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 351	4
CHEM 461	3
ME 445	3

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

B 341	3
B 383	3
ME 438	3

Take 3 credits:

B 466	3
B 483	3
CIT 380	3

Robotic Systems
Take these courses:

COMPE 470	3
ME 342	3
ME 410	3

Take 3 credits:

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

General
Take 12 credits:

ME 331	3
ME 332	3
ME 337	3
ME 342	3
ME 398	1-3
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 490	1-3
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)

Take required Foundations courses

Major Requirements

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

Core Courses *Take these courses:*	
FDMAT 112	4
ME 131	3
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 280	3
	21

Technical Electives *Take 4 credits:*	
CHEM 105	4
CHEM 106	4
MATH 113	3
MATH 214	3
MATH 215	4
ME 204	3
ME 210	2
ME 218	1
ME 250	3
ME 3XX*	3
ME 4XX*	3
PH 123	3
PH 220	3
	4

*Select from any ME 300 or 400 level course.

Program Notes:

Total Minor Credits=25

This major is available on the following tracks:

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

Minor in Welding and Fabrication Technology (217)

Take required Foundations courses

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:*	
ME 105	4
ME 131	3
WELD 120	3
WELD 123	4
WELD 280	3
	17

Technical Electives *Take 4 credits:*	
CHEM 101	4
FDMAT 110	3
Math 111	2
ME 172	3
ME 250	3
ME 332	3
WELD 229	3
	5

Program Notes:

Total Minor Credits=25

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- NO

Mechanical Engineering Pre-approved Clusters

Engineering Cluster			6300
Take 14 credits			
FDMAT 112	Calculus I	4	
ME 131	Manufacturing Processes I	3	
ME 142	Engineering Computation I	3	
ME 172	Visualization in Engineering Design	3	
ME 201	Engineering Mechanics: Statics	2	
ME 202	Strength of Materials	3	
ME 204	Engineering Mechanics: Dynamics	3	
	Total Credits	**14**	

Manufacturing Cluster			6301
Take 12 credits			
ME 105	Essentials of Welding	4	
ME 131	Manufacturing Processes I	3	
ME 172	Visualization in Engineering Design	3	
ME 331	Manufacturing Processes II	3	
ME 332	Advanced CNC	3	
	Total Credits	**12**	

Welding Cluster			6302
Take these courses:			
ME 105	Essentials of Welding	4	
WELD 123	Advanced Welding Processes	4	
Take 6 credits:			
ME 131	Manufacturing Processes I	3	
ME 172	Visual Engineering	3	
WELD 120	Gas Tungsten Arc Welding	3	
WELD 229	Welding Fabrication	3	
WELD 280	Code, Certification & Inspection	3	
	Total Credits	**14**	

Fabrication Cluster			6303
Take these courses:			
ME 105	Essentials of Welding	4	
ME 131	Manufacturing Processes I	3	
ME 172	Visual Engineering	3	
Take 3 credits:			
ME 331	Manufacturing Processes II	3	
ME 332	Advanced CNC	3	
WELD 120	Gas Tungsten Arc Welding	3	
WELD 123	Advanced Welding Processes	4	
	Total Credits	**13**	

Introductory Engineering Cluster			6304
Take these courses:			
ME 172	Visualization in Engineering Design	3	
ME 131	Manufaturing Processes I	3	
FDMAT 112	Calculus 1	4	
ME 142	Engineering Computation I	3	
ME 201	Engineering Mechanics: Statics	2	
	Total Credits	**15**	

Course Descriptions — Credits*

ME 101 Introduction to Mechanical Engineering (1.0:1:0)
This course provides an introduction to the field of mechanical engineering and related fields. Topics include investigation of curricula; career planning; design process; engineering software tools. In addition, student teams will complete an engineering project.
(Fall, Winter, Spring)

ME 105 Essentials of Welding (4.0:2:4)
Fee: $30.00
A course in beginning welding designed to teach the fundamentals of arc welding including: safety, power sources, electrodes, oxyfuel cutting, and oxyacetylene welding with an introduction to weld symbols, metallurgy, and metal identification.
(Fall, Winter, Spring)

ME 115 Computerized Technical Illustration (2.0:2:0)
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) 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).
(As needed)

ME 131 Manufacturing Processes I (3.0:2:2)
Introduction to manufacturing processes. Topics includes milling, turning, drilling, sawing, casting, polymer processes, joining processes, deformation proceses, and measurement tools and procedures.
(Fall, Winter, Spring)

ME 142 Engineering Computation I (3.0:3:0)
Prerequisite: 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 functions, 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 (3.0:3:0)
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 (2.0:2:1)
Prerequisite: 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 (3.0:3:0)
Prerequisite: 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 (3.0:3:0)
Prerequisite: 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 I (2.0:1:3)
Prerequisite: FDMAT 112
This course provides an introduction to electricity, circuits, electric power, and simple laboratory equipment like multimeters and oscilloscopes.
(Fall, Winter, Spring)

ME 218 Materials Lab (1.0:0:2)
Prerequisite: ME 202
Laboratory investigations in materials science and strength of materials.
(Fall, Winter, Spring)

ME 250 Materials Science (3.0:3:0)
Prerequisite: Chemistry 105; Mathematics 112
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 280 ME Design I (3.0:2:2)
Prerequisite: ME 131, ME 142, ME 172, 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 (1.0:0:0)
Prerequisite: 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 II (2.0:1:3)
Prerequisite: Math 215, ME 210
This course covers the basics of various types of motors and their selection. Basics of instrumentation and sensors are also discussed and implemented in a laboratory setting using LabVIEW.
(Fall, Winter, Spring)

ME 322 Thermodynamics I (3.0:3:2)
Prerequisite: 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 (3.0:3:0)
Prerequisite: Math 215
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 II (3.0:2:2)
Prerequisite: ME 131, ME 172
Integration of manufacturing processes. Continued emphasis in mechanical reduction, deformation and consolidation processes, with focus on joining processes.
(As needed)

ME 332 Advanced CNC (3.0:2:2)
Prerequisite: ME 131, 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.
(As Needed)

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

ME 337 Kinematics (3.0:3:0)
Prerequisite: ME 204
Motion analysis of mechanisms, including position, velocity and acceleration; rolling contact; cams; gears; synthesis of mechanisms. Includes computer-aided engineering techniques.
(As needed)

ME 342 Engineering Computation II (3.0:3:0)
Prerequisite: ME 142, ME 202, ME 204, Math 316 or Math 371
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.
(As needed)

ME 360 Fluid Mechanics (3.0:3:2)
Prerequisite: ME 204, ME 142, Math 316 or Math 371
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 (3.0:3:2)
Prerequisite: 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 II: Product Design (3.0:2:2)
Fee: $24.00
Prerequisite: 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 prototying. Other topics that are associated with the design process, such as economic analysis and intellectual property, are also presented.
(Fall, Winter, Spring)

ME 398 Internship (1.0-3.0:0:0)
Prerequisite: Consent of Instructor
Industrial work experience.
(Fall, Winter, Spring)

ME 410 System Dynamics (3.0:3:2)
Prerequisite: ME 204, ME 210, MATH 316 or MATH 371
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.
(As needed)

ME 422 Thermodynamics II (3.0:3:2)
Prerequisite: 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.
(As needed)

ME 423 Heat Transfer (3.0:3:2)
Prerequisite: ME 142, ME 322, Math 316 or Math 371
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 (3.0:3:2)
Prerequisite: 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.
(As needed)

ME 438 CAE Modeling and Digital Simulation (3.0:3:0)
Prerequisite: 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.
(As needed)

ME 445 Mechanics of Composite Materials (3.0:3:0)
Prerequisite: ME 342, ME 250
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.
(As needed)

ME 460 Fundamentals of Finite Element Analysis (3.0:3:0)
Prerequisite: ME 142, 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.
(As needed)

ME 465 Fluid Power Fundamentals (3.0:2:2)
Prerequisite: 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.
(As Needed)

ME 470 Mechatronics (3.0:3:2)
Prerequisite: 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.
(As needed)

ME 480 ME Design III: Capstone Design (3.0:2:2)
Prerequisite: ME 322, ME 360, ME 380
Comprehensive one-semester integrated design experience using the engineering design process and skills gained in engineering science classes. Typcial projects include product conception, development, design, and manufacture.
(Fall, Winter, Spring)

ME 490 Special Problems in Mechanical Engineering (1.0-3.0:0:0)
Prerequisite: 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 Mechanical Engineering (3.0:2:2)
Prerequisite: Consent of Instructor.
A one-semester course emphasizing current topics in engineering.
(As needed)

Weld 120 Gas Tungsten Arc Welding (3.0:2:3)
Corequisite: ME 105
Gas Tungsten Arc welding of carbon steel, stainless steel, and aluminum alloys. Students will be given instruction on theory and application for welding in all positions using the AWS EG3 standards.

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

Weld 123 Advanced Welding Processes (4.0:2:4)

Prerequisite: ME 105

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.

Weld 229 Code, Certification and Inspection (3.0:2:3)

Corequisite: Weld 123

Welding procedure, specification, and qualification according to standards of AWS D1.1, ASME Section IX, and API 1104. Interpretation of weldments, NDT inspection methods, and required reports, in accordance with AWS EG4 requirements.

Weld 280 Welding Fabrication (3.0:1:4)

Corequisite: Weld 123

The use and application of equipment, tools, fasteners, and processes used in fabrication practices in the welding industry. Interpretation of drawings for fabrication of small projects. Techniques for layout, fitting, squaring, tacking and fabricating will be developed.

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