Department of
Mechanical Engineering

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Mechanical Engineering

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

- 4-Year Bachelor of Science in Mechanical Engineering, BSME (470)
- 4-Year Bachelor of Science in Manufacturing and Supply Chain (490)
- 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 ABET, http://www.abet.org

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 will develop a desire to enhance their abilities as a professional engineer as they grow to understand that learning is a life-long process.

The 4-year Bachelor of Science degree program in Mechanical Engineering (BSME – 470) provides students with a solid foundation in mathematics, engineering science, solid mechanics, and thermal sciences. Students also choose a focus area in one of the following: automotive, biomedical, 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 required to take and pass the Mechanical Engineering competency exam prior to registering for any 300 or 400 level Mechanical Engineering courses.

Students in the BSME program are strongly 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.

Mechanical Engineering (470)

The Bachelor of Science program in Mechanical Engineering (470) is 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)

Manufacturing and Supply Chain (490)

Student Outcomes:

1. **Engineering Fundamentals:** Apply practical knowledge of mathematics, science, engineering, and technology to engineering technology problems.
2. **Business Fundamentals:** Apply knowledge and skills in accounting, finance, marketing, and operations management to demonstrate effective business analysis and decision making.
3. **Manufacturing Processes:** Demonstrate extensive practical experience with a variety of manufacturing processes.
4. **Quality Management and Control:** Use tools and methods for measuring quality to develop or implement effective quality systems in a manufacturing enterprise.
5. **Supply Chain and Operations Management:** Utilize supply chain knowledge and skills to demonstrate effective management and decisions if forecasting, planning, sourcing, supplier management, purchasing, and logistics management.
6. **Team Work:** Function well within a multidisciplinary team.
7. **Ethics:** Maintain high ethical, moral, and professional standards.
8. **Communication:** Apply written, oral, and graphical communication in both technical and non-technical environments.

The Bachelor of Science program in Manufacturing and Supply Chain (490) is available to students entering Brigham Young University-Idaho on any admission track.

Engineering Technology (380)

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, and Engineering Technology programs, the normal entry level chemistry course is General Chemistry (CHEM 105). Students in the Mechanical Engineering Bachelor of Science degree program will be required to pass a competency exam prior to registering for any 300 or 400 level courses.

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 Technology (380)

Core Courses

Take 1 course:	
CHEM 101	3
CHEM 105	4
	3
Take these courses:	
MATH 111	2
FDMAT 110	3
OR	
Take this course:	
MATH 109	5
	5

Take these courses:	
FDMAT 112*	4
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 231	2
ME 250	3
	20
Take 1 course:	
PH 105	4
PH 121	3
	3

Technical Electives

Take 12 credits:	
MATH 113 & 214	6
or	
MATH 215	4
MATH 330	3
ME 101	1
ME 162	3
ME 204	3
ME 210 or ECEN 150	2-3
ME 231L	1
ME 250L	1
ME 272	3
ME 280	3
ME 299	1
ME 398R	1
	12

Program Notes:

- *No Double Counting of Major Courses*
- *No Grade Less Than C- in Major Courses*
- ***FDMAT 112 needs to be taken to satisfy a major requirement as well as the Foundations Quantitative Reasoning requirement.***

Credit Requirements:

Foundations	17
Major	43
Total	60

Tracks Available:

Fall-Winter	Yes
Winter-Spring	Yes
Spring-Fall	Yes

BS in Mechanical Engineering (470)

Entry Courses
Take these courses your first 2 semesters:

CHEM 105	4
ME 101	1
ME 142	3
ME 172	3
ME 201	2
	13

Core Courses
Take these courses:

MATH 215	4
MATH 316	4
MATH 330	3
ME 202	3
ME 204	3
ME 210	2
ME 231	2
ME 231L	1
ME 250	3
ME 250L	1
ME 280	3
ME 310	2
ME 322	3
ME 360	3
ME 370	3
ME 380	3
ME 423	3
ME 480	3
PH 223	4
	53

Experential Learning
Take 2 courses:

ME 299	1
ME 398R	1
ME 490R	1
	2

Choose a 12 credit emphasis from the following list:

Automotive
Take 12 credits:

AUTO 125	1
AUTO 131	3
AUTO 132	3
AUTO 155	4
AUTO 221	3
AUTO 231	3
AUTO 232	3
AUTO 340	3

Bio-Medical
Take 12 credits:

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

Civil Engineering
Take 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

Take 9 credits:

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

Design of Mechanical Sytems
Take 12 credits:

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

Engineering Management**
Take these courses:

B 211	3
B 301	3
B 321	3

Take 3 credits:

B 361	3
B 383	3
CIT 380	3
ME 340	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:

B 361	3
ME 331	3
ME 332	3
ME 340	3

Manufacturing Supply Chain
Take these courses:

B 361	3
B 461	3
B 478	3

Take 1 course:

B 466	3
B 468	3
ME 340	3

Material Science
Take12 credits:

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

Pre-Medical
Take 12 credits:

BIO 180	4
BIO 181	4
CHEM 106	4
CHEM 351	4
CHEM 352	4
CHEM 481	3

Mining Engineering
Take these courses:

GEOL 111	3
GEOL 111L	1

Choose 8 credits:

GEOL 140	1
GEOL 340	3
GEOL 351	3
GEOL 352	3
GEOL 370	4
ME 465	3

Petroleum Engineering
Take these courses:

GEOL 111	3
GEOL 111L	1

Choose 8 credits:

GEOL 340	3
GEOL 370	4
GEOL 425	3
GEOL 435	3
ME 465	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

Programming
Take this course:

CS 124	3

Take 9 credits:

CIT 225	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
Take these courses:

WELD 101	3
WELD 123	3

Take 6 credits:

ME 332	3
WELD 120	3
WELD 229	3
WELD 280	3
WELD 350	3

General
Take 12 credits:

MATH 472	3
ME 331	3
ME 332	3
ME 337	3
ME 340	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
WELD 350	3

Program Notes:

•No Double Counting of Major Courses

•No Grade Less Than C- in Major Courses

*•*See list of specific Foundations courses for Mechanical Engineering in this section of the catalog.*

•Students must complete and pass the MEC Competency Exam

Credit Requirements:

Foundations	40
Major	80
Total	120

Tracks Available:

Fall-Winter	Yes
Winter-Spring	Yes
Spring-Fall	Yes

Foundation Requirements for BS in Mechanical Engineering

Academic Fundamentals

Quantitative Reasoning
Take these courses:

FDMAT 112	4
	4

Reading and Writing
Take these courses:

FDENG 101	3
FDENG 301	3
	6

Science

Science Foundations
Take this course:

FDSCI 101	2
	2

Science Issues
Take these courses:

CHEM 105	4
PH 121	3
	7

Cultural Awareness

American Foundations
Take 1 course:

FDAMF 101	3
FDCIV 101	3
	3

Choose 1 Option:

Option 1:
Humanities Foundations
Take this course:

FDHUM 110	3
	3

Take 1 course:

FDHUM 214	3
FDHUM 299	3
FDINT 211	3
FDINT 215	3
FDINT 299	3
FDLIT 216	3
FDLIT 299	3
	3

Option 2:
World Foundations
Take these courses:

FDWLD 101	3
FDWLD 201	3
	6

Eternal Truths

Family Foundations
Take these courses:

FDREL 200	2
FDREL 225	2
FDREL 250	2
FDREL 275	2
	8

Other Religion Courses
Take 6 credits:

FDREL 100	2
FDREL 130	2
FDREL 190	1-3
FDREL 211	2
FDREL 212	2
FDREL 215	2
FDREL 234	2
FDREL 235	2

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FDREL 261	2
FDREL 301	2
FDREL 302	2
FDREL 324	2
FDREL 325	2
FDREL 327	2
FDREL 333	2
FDREL 341	2
FDREL 342	3
FDREL 343	3
FDREL 351	2
FDREL 352	2
FDREL 390R	2
FDREL 404	2
FDREL 431	2
FDREL 471	2
FDREL 475	2
	6

Program Notes:

- *No Double Counting of Major Courses*
- *No Grade Less Than C- in Major Courses*
- ****FDMAT 112 needs to be taken to satisfy a major requirement as well as the Foundations Quantitative Reasoning requirement.***

BS in Manufacturing and Supply Chain (490)

Core Courses
Take these courses:

FDMAT 112*	4
ME 172	3
ME 201	2
ME 202	3
ME 231	2
ME 231L	1
	15

Take 4 credits:

ME 101	1
ME 142	3
or	
B 212	4
	4

Take these courses:

ACCTG 180	3
B 100	1
B 211	3
B 301	3
B 341	3
B 361	3
B 461	3
B 466	3
B 468	3
B 478	3
MATH 330	3
ME 331	3
ME 332	3
	37

Interdisciplinary Courses
Take 1 course:

ME 398R	1
IDS 398R	1
	1

Take 1 course:

ME 340	3
IDS 499	2
	2

Program Notes:

- ***No Double Counting of Minor Courses***
- ***No Grade Less Than C- in Minor Courses***
- ****FDMAT 112 needs to be taken to satisfy a major requirement as well as the Foundations Quantitative Reasoning requirement.***

Credit Requirements:

Foundations	40
Major	59
Elective	21
Total	120

Tracks Available:

Fall-Winter	Yes
Winter-Spring	Yes
Spring-Fall	Yes

Minor in Engineering (206)

Core Courses
Take these courses:

FDMAT 112*	4
ME 101	1
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 231	2
ME 231L	1
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:

- *No Double Counting of Minor Courses*
- *No Grade Less Than C- in Minor Courses*
- **FDMAT 112 needs to be taken to satisfy a major requirement as well as the Foundations Quantitative Reasoning requirement.*

Credit Requirements:

Total 25

Tracks Available:

Fall-Winter	Yes
Winter-Spring	Yes
Spring-Fall	Yes

Minor in Manufacturing Technology (244)

Core Courses
Take these courses:

ME 172	3
ME 231	2
ME 231L	1
ME 331	3
ME 332	3
WELD 101	3
WELD 123	3
	18

Technical Electives
Take 6 credits:

CHEM 101	3
ME 101	1
ME 250	3
ME 250L	1
ME 398R	1
WELD 120	3
WELD 229	3
WELD 280	3
	6

Program Notes:

- *No Double Counting of Minor Courses*
- *No Grade Less Than C- in Minor Courses*

Credit Requirements:

Total 24

Tracks Available:

Fall-Winter	Yes
Winter-Spring	Yes
Spring-Fall	Yes

Manufacturing Technology Concentration (D 146)

Core Courses
Take these courses:

FDMAT 112	4
MATH 330	3
ME 172	3
ME 201	2
ME 202	3
ME 231	2
ME 231L	1
ME 331	3
ME 332	3
	24

Take 1 of the following groups:

ME 101	1
ME 142	3
OR	
B 212	4
	4

Interdisciplinary Courses
Take 1 course:

IDS 398R	1-3
ME 398R	1
	1

Take 1 course:

IDS 499	2
ME 340	3
	2

Program Notes:

- *No Double Counting of Concentration Courses*
- *No Grade Less Than C- in Concentration Courses*

Credit Requirements:

Total 31

Tracks Available:

Fall-Winter	Yes
Winter-Spring	Yes
Spring-Fall	Yes

Mechanical Engineering Pre-approved Clusters

Engineering		6300
Take 15 credits:		
FDMAT 112	Calculus 1	4
ME 101	Introduction to Engineering and Technology	1
ME 142	Engineering Computation I	3
ME 172	Engineering Graphics	3
ME 201	Engineering Mechanics: Statics	2
ME 202	Strength of Materials	3
ME 204	Engineering Mechanics: Dynamics	3
ME 231	Manufacturing Processes I	2
ME 231L	Manufacturing Processes I Lab	1
	Total Credits	**15**

Manufacturing		6301
Take 12 credits:		
ME 172	Engineering Graphics	3
ME 231	Manufacturing Processes I	2
ME 231L	Manufacturing Processes I Lab	1
ME 331	Manufacturing Processes II	3
ME 332	Computer Numerical Control (CNC)	3
WELD 101	Welding Fundamentals	3
	Total Credits	**12**

Welding		6302
Take these courses:		
WELD 101	Welding Fundamentals	3
WELD 123	Advanced Welding Processes	3
Take 6 credits:		
ME 172	Engineering Graphics	3
ME 231	Manufacturing Processes I	2
ME 231L	Manufacturing Processes I Lab	1
WELD 100	Introduction to Welding	1
WELD 120	Gas Tungsten Arc Welding	3
WELD 229	Code, Certification & Inspection	3
WELD 280	Welding Fabrication	3
	Total Credits	**12**

Fabrication		6303
Take these courses:		
ME 172	Engineering Graphics	3
ME 231	Manufacturing Processes I	2
ME 231L	Manufacturing Processes I Lab	1
WELD 101	Welding Fundamentals	3
Take 3 credits:		
ME 331	Manufacturing Processes II	3
ME 332	Computer Numerical Control (CNC)	3
WELD 100	Introduction to Welding	1
WELD 120	Gas Tungsten Arc Welding	3
WELD 123	Advanced Welding Processes	3
	Total Credits	**12**

Course Descriptions — Credits*

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

ME 142 Engineering Computation I (3:3:0:0)
Corequisite: 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 162 Computer-Aided Draft and Design (3:3:0:0)
Computer aided drafting and design using AutoCAD software. Topics include coordinate systems, display control, basic geometric construction and editing, scales, layer, annotation and dimensions, blocks, attributes, plotting. Applications in mechanical, civil, electrical, and architectural disciplines.
(Fall, Winter, Spring)

ME 172 Engineering Graphics (3:2:0:0)
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 (2:2:1:0)
Corequisite: 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. All students enrolled/planning to enroll in ME 201 will be required to demonstrate proficiency in math fundamentals by achieving a minimum score of 80% in the *ALEKS Math Prep for College Physics* course.
(Fall, Winter, Spring)

ME 202 Strength of Materials (3:3:0:0)
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 (3:3:0:0)
Prerequisites: ME 201 and PH 121
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 (2:1:3:0)
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 231 Manufacturing Processes I (2:2:0:0)
Prerequisite: ME 172
Concurrent requisite: ME 231L
Introduction to manufacturing processes. Topics include: mass reduction processes (milling, turning, drilling, sawing), casting and polymer/composite processes, joining processes, deformation processes, and measuring tools.
(Fall, Winter, Spring)

ME 231L Manufacturing Processes I Lab (1:0:2:0)
Prerequisite: ME 172
Hands-on laboratory to gain experience in using various machines and processes to fabricate parts.
(Fall, Winter, Spring)

ME 250 Materials Science (3:3:0:0)
Prerequisites: (CHEM 105 and ME 202) or CHEM 101
Concurrent Requisite: ME 250L
Atomic structure 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 (1:0:2:0)
Laboratory investigations in materials science and strength of materials. Introduction to technical writing.
(Fall, Winter, Spring)

ME 272 Advanced CADD (3:3:0:0)
Prerequisite: ME 172
Applications of computer aided drafting and design using SolidWorks software. Topics include ANSI and ISO drafting standards, geometric dimensioning and tolerancing, sheet metal, weldments, and working drawings.
(Fall, Winter, Spring)

ME 280 ME Design I: Mechanical Design (3:2:2:0)
Prerequisites: ME 142 and ME 202 and ME 231 and ME 231L
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 (1:1:0:0)
Course Requirement: Instructor Approval Required
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 Competency Exam- Fundamentals of Engineering Competency 1
Competency Exam required of all Mechanical and Civil Engineering majors prior to taking upper division engineering classes. Topics on the exam include statics (ME 201), mechanics of materials (ME 202), and dynamics (ME 204). Students should wait until they have completed these courses before they take the exam. The exam is offered the 1st, 9th, and 11th week of each semester.
(Fall, Winter, Spring)

ME 310 Electro-Mechanical Devices II (2:1:3:0)
Prerequisite: ME 210
Corequisite: MATH 316
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 I (3:3:0:0)
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.
(Fall, Winter, Spring)

ME 331 Manufacturing Processes II (3:2:2:0)
Prerequisite: ME 231 and ME 231L
Integration of manufacturing processes. Half of the class will focus on a continued emphasis in mechanical reduction, deformation and consolidation processes, with additional focus on joining processes. The other half of the class will focus on polymer material properties and manufacturing methods, (i.e. injection molding, thermoforming, casting, etc.) as well as properties and manufacturing methods for composites.
(Winter)

ME 332 Computer Numerical Control (CNC) (3:2:2:0)
Prerequisite: ME 231 and ME 231L
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)

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

ME 340 Manufacturing Quality (3:3:0:0)
Prerequisite: MATH 330
Students of this course will develop a broad understanding of Lean/Six Sigma principles and practices, build capability to implement Lean/Six sigma initiatives in manufacturing operations, and learn to operate with awareness of Lean/Six Sigma at the enterprise level.
(Fall, Winter)

ME 342 Engineering Computation II (3:3:0:0)
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 topics in numerical methods and computer programming are covered. Computational techniques and tools are applied to engineering problems through the implementation and solution of numerical methods.
(Winter)

ME 360 Fluid Mechanics (3:3:2:0)
Prerequisites: ME 142 and ME 250L and MATH 316 and (ME 322 or CE 321)
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, turbo machinery, and open channel flow. Flow measurement lab included.
(Fall, Winter, Spring)

ME 370 Machine Design (3:3:2:0)
Prerequisites: (ME 280 and ME 250L) or CE 321
Analysis, modeling and design of mechanical components and systems, materials, processes and structural analysis, static and dynamic failure theories.
(Fall, Winter, Spring)

ME 380 ME Design II: Product Design (3:2:2:0)
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 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 (1:0:0:0)
Repeatable Course: may earn maximum of 2 credits
Internship Fees: $78 (LDS) $156 (non-LDS) per credit
Exempt from tuition, but charged this independent course fee
Industrial work experience.
(Fall, Winter, Spring)

ME 410 System Dynamics (3:3:2:0)
Prerequisites: ME 204 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 II (3:3:2:0)
Prerequisite: ME 322
Application of principles of thermodynamics to air standard cycles (Otto, Diesel, Brayton, Sterling, and Ericsson), steam power cycles (Rankine, combined and cogeneration), 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)

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

ME 423 Heat Transfer (3:3:2:0)
Prerequisites: ME 322 and ME 360
Fundamentals of conduction, convection, and radiation modes of heat transfer, fundamental equations for steady and unsteady conduction, convection correlations, environmental radiation and radiation properties, heat exchanger analysis and design, and design of systems involving multi-mode heat transfer. Heat transfer lab included.
(Fall, Winter, Spring)

ME 425 Computational Fluid Dynamics (3:2:3:0)
Corequisite: 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 Sim (3:3:0:0)
Prerequisite: ME 380
A study of advanced CAD 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 (3:2:2:0)
Prerequisites: ME 142 and 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.
(Winter)

ME 460 Fundamentals of Finite Element Analysis (3:3:0:0)
Prerequisites: ME 142 and (ME 370 or CE 321)
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 (3:2:2:0)
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.
(Fall)

ME 470 Mechatronics (3:3:2:0)
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.
(Winter)

ME 480 Mechanical Engineering Design III: Capstone Design (3:2:2:0)
Prerequisite: ME 380
Course Requirement: Seniors Only
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 (1:1:0:0)
Repeatable Course: may earn maximum of 2 credits
Course Requirement: Instructor Approval Required
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 (3:2:2:0)
Repeatable Course: may earn maximum of 9 credits
Course Requirement: Instructor Approval Required
A one-semester course emphasizing current topics in engineering.
(Fall, Winter, Spring)

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