Department of
Mechanical Engineering

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Department of Mechanicl Engineering

The Mechanical Engineering Department has two engineering 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)

These programs are available to students entering Brigham Young University—Idaho on any admission track. These engineering programs are designed to provide students with the competencies necessary to work in a variety of exciting fields within engineering. These majors offer excellent placement potential, professional job satisfaction, and substantial salaries. Students entering either of these two programs can expect a well designed and rigorous curriculum based on industry standards. The 2-year associate program also 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.

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 (PE).

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.

Mathematics and physical sciences are critical components of any engineering curriculum. The normal entry level mathematics class for engineering is Calculus I (Math 112). 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 engineering students the normal entry level chemistry course is General Chemistry (Chem 105).

These engineering programs are specialized degrees at Brigham Young University-Idaho. The BSME degree is designed for completion in the 120 credit hours, and the AASE degree in 63-69 credits hours. It is imperative that students develop and follow a plan of study that will allow them to complete all the required courses within these credit hour limits. Due to the credit hours limit, no minor programs are available within the Mechanical Engineering program. Courses in the ME curriculum have prerequisite courses that must be taken. Specific general education courses are required for the engineering majors. Each student must consult with his/her advisor early to make sure his/her educational plan is correct. The Advising Center and each faculty advisor have a sample curriculum flow chart than can be used as an example plan.

Program Educational Objectives

The program objectives for the baccalaureate degree 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 program educational objectives, the following outcomes will be measured during the course of study within the program. Assesment 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 the 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.

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AAS in Engineering

Basic Education Requirements

I. Communication:		II. Computation:		III. Human Relations:		IV. Related Skills:		Religion Requirement:	
Take 1 course:		***Take 1 course:***		***Take 1 course:***		***Take 1 course:***		***Take these courses:***	
ENG 111	3	MATH 112	4	AMHER 170	3	ENG 316	3	REL 121	2
ENG 111C	3					ENG 316C	3	REL 122	2
								OR	
								Take this course:	
								REL 221	4
								AND	
								Take 3 credits:	
								REL 100	2
								REL 130	2
								REL 211	3
								REL 234	2
								REL 261	2
								REL 264	2
								REL 301	3
								REL 301H	3
								REL 302	3
								REL 302H	3
								REL 324	3
								REL 333	2
								REL 341	2
								REL 342	3
								REL 351	2
								REL 352	2
								REL 370	2
								REL 431	2
								REL 471	3
								REL 475	2

Total GE Credits=20

Major Requirements

No Double Counting of Major Courses - No Grade Less Than C- in Major Courses

Take these Courses:		Select One Option							
Chem 105	4	**Chemical Engineering Option**		**Civil Engineering Option**		**Electrical Engineering Option**		**Mechanical Engineering Option**	
Math 113	3								
Math 214	3								
Math 371	3	Take these Courses:		Take these Courses:		Take these Courses:		Take these Courses:	
Ph 220	3	Chem 106	4	Const 340	3	CS 124	3	CS 144	3
	16	Chem 351	4	CS 144	3	CS 165	3	ME 131	3
		Chem 352	4	ME 172	3	CS 235	3	ME 172	3
		CS 144	3	ME 201	2	CS 236	4	ME 201	2
Take 1 Course:		ME 242	3	ME 202	3	CompE 224	3	ME 202	3
Math 321	3	Ph 121	3	ME 204	3	CompE 250	5	ME 204	3
Math 341	3	*Technical Electiv	3	ME 218	1	Ph 121	3	ME 218	1
	3		24	ME 242	3		24	ME 242	3
				ME 250	3			ME 250	3
		**Choose any 200 level or higher course with Math, ME, Chem, CS, or Ph prefix*		Ph 123	3			Ph 123	3
					27				27
								Take 1 Course:	
								ME 132A	3
								ME 132B	3
									3

Total Major Credits=43

This major is available on the following tracks:

Fall-Winter---- YES Winter-Summer---- YES Summer-Fall---- YES

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BS in Mechanical Engineering

General Education Requirements

I. Reading and Writing:

Take 1 course:

ENG 111	3
ENG 111C	3

AND

Take 1 course:

ENG 316	3
ENG 316C	3

II. MATHematics:

Take 1 course:

MATH 112	4

III. Basic Skills:

Take 1 course:

CS 144	3

IV. Arts:

Take 1 course:

ART 101	3
ART 104	3
ART 160	3
ART 201	3
ART 202	3
DANCE 101	3
HFED 140	3
HORT 230	3
HUM 101	3
HUM 201	3
HUM 202	3
MUSIC 100	3
MUSIC 101	3
TA 115	3
TA 117	3

AND

Take this course:

FA 100	0-1

V. Letters:

Take 1 course:

CHIN 347	3
ENG 250	3
ENG 251	3
ENG 331	3
ENG 332	3
ENG 333	3
ENG 334	3
ENG 335	3
ENG 351	3
ENG 352	3
ENG 353	3
ENG 354	3
ENG 362	3
ENG 373	3
FR 202	3
GER 202	3
LANG 202	3
PH 314	3
PHIL 110	3
PHIL 201	3
PHIL 202	3
PHIL 313	3
PHIL 314	3
PHIL 315	3
RUSS 340	3
SPAN 202	3
SPAN 302	3

VI. Biological Science:

Take 4 credits:

AGRON 122	4
AGRON 270	4
BIO 100	3
BIO 102	1
BIO 118	4
BIO 120	4
BIO 130	4
BIO 150	3
BIO 150L	1
BIO 176	4
BIO 200	4
BIO 202	4
BIO 208	4
BIO 221	3
BIO 222	1
BIO 230	4
BIO 250	4
BIO 264	4
BIO 265	4
BIO 268	8

VII. Physical Science:

Take 4 credits:

CHEM 105	4

VIII. American Institutions:

Take 1 course:

AMHER 170	3
ECON 111	3
ECON 112	3
HIST 120	3
HIST 121	3
POLSC 110	3

IX. Social Science:

Take 1 course:

ANTH 101	3
CHILD 210	3
ECON 111	3
ECON 112	3
ED 270	3
GEOG 120	3
HIST 201	3
HIST 202	3
PHIL 203	3
PHIL 204	3
POLSC 110	3
POLSC 170	3
PSYCH 111	3
PSYCH 201	3
SOC 111	3
SOC 112	3
SOC 210	3

Religion Requirement:

(Book of Mormon)

Take these courses:

REL 121	2
REL 122	2

OR

Take this course:

REL 221	4

AND

(Scripture Based Courses)

Take 6 credits:

REL 211	3
REL 212	2
REL 301	3
REL 301H	3
REL 302	3
REL 302H	3
REL 324	3

AND

(Other Religion Courses)

Take 4 credits:

REL 100	2
REL 130	2
REL 215	2
REL 234	2
REL 235	2
REL 261	2
REL 264	2
REL 333	2
REL 341	2
REL 342	3
REL 351	2
REL 352	2
REL 360	4
REL 370	2
REL 431	2
REL 471	3
REL 475	2

Total GE Credits=47

Major Requirements

No Double Counting of Major Courses - No Grade Less Than C- in Major Courses

Take these courses:

COMPE 305	3
MATH 215	4
MATH 316	4
ME 131	3
ME 172	3
ME 201	2
ME 202	3
ME 204	3
ME 218	1
ME 242	3

ME 250	3
ME 315	3
ME 322	4
ME 330	3
ME 360	3
ME 370	3
ME 380	3
ME 423	3
ME 480	3
PH 123	3
PH 220	3
	63

Take 7 credits:

ME 337	3
ME 398	1-3
ME 422	3
ME 425	3
ME 438	3
ME 445	3
ME 460	3
ME 470	3
ME 482	3
ME 490	1-3
ME 495R	1-3
COMPE 470	3
	7

Take 1 course:

ME 132A	3
ME 132B	3
	3

Program Notes:

Total Major Credits=73

This major is available on the following tracks:

Fall-Winter---- YES Winter-Summer---- YES Summer-Fall---- YES

Course Descriptions Credits*

ME 105 Essentials of Welding (4:2:4)
A course in joining processes that includes welding, standard fasteners (nuts, bolts), non-standard fasteners (inserts, blind fasteners), adhesives, foam tapes and epoxies and other processes.
(Fall, Winter)

ME 115 Computerized Technical Illustration (2:2:0)
This course will explore the basic system of technical illustration, the use of construction aids and grids, and special techniques in rendering an animation. The instruction will introduce students to 3D Solids modeling and rendering using the computer software (3D Studio VIZ 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).
(Fall, Summer)

ME 131 Manufacturing Processes I (3:2:2)
Prerequisite: Math 101
Integration of manufacturing processes. Emphasis on principles of mechanical mass reducing and surface finishing processes, machining parameters, measurement, and material selection.
(Fall, Winter, Summer)

ME 132A Manufacturing Processes II - CNC Lab Emphasis (3:2:2)
Prerequisite: ME 131, ME 172
Integration of manufacturing and engineering design. Introduction to the engineering design process through the development of industry related engineering projects. In-depth instruction on manufacturing processes with major focus on CNC and CAM.
(Fall, Winter, Summer)

ME 132B Manufacturing Processes II - Joining Processes Lab Emphasis(3:2:2)
Prerequisite: ME 131
Integration of manufacturing and engineering design. Introduction to the engineering design process through the development of industry related engineering projects. In-depth instruction on manufacturing processes with major focus on joining processes.
(Fall, Winter, Summer)

ME 172 Visualization in Engineering Design (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, Summer)

ME 201 Engineering Mechanics: Statics (2:2:0)
Prerequisite: Math 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, Summer)

ME 202 Strength of Materials (3:3:0)
Prerequisite: ME 201
Review of equations of static equilibrium; introduction to engineering stress and strain; thermal loading; stress distributions resulting from axial, torsional, and transverse (beam) loadings; combined loading problems; stress and strain transformation, Mohr's circle; deflection of axial members, torsional members, and beams including statically indeterminate structures; column buckling
(Fall, Winter, Summer)

ME 218 Materials Lab (1:0:2)
Prerequisite: ME 202
Laboratory investigations in materials science and strength of materials.
(Fall, Winter, Summer)

ME 242 Numerical Methods (3:3:0)
Prerequisite: CS 144
Introduces the use of numerical methods for solving engineering problems. Covers several specific techniques such as finding roots of an equation, solving linear algebraic systems, fitting data points to a curve, performing numerical integration, and solving ordinary differential equations. Numerical techniques are implemented using MATLAB.
(Fall, Winter, Summer)

ME 250 Materials Science (3:3:0)
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 software.
(Fall, Winter, Summer)

ME 315 Dynamic Systems and Instrumentation (3:3:2)
Prerequisite: Math 316 or Math 371, ME 204, PH 220
This course provides an introduction to dynamic system modeling and analysis. Basic instrumentation and data acquisition techniques are also presented. Major topics covered in this course include lumped parameter models of dynamic systems, derivation of state equations, analytical and numerical solution of state equations, frequency response analysis, instrumentation, and data aquisition. Professional software is used in obtaining numerical solutions of state equations and in performing data acquistion.
(Fall, Winter, Summer)

ME 322 Thermodynamics I (4:4:1)
Prerequisite: ME 201, Math 215 or Math 113
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, Summer)

ME 330 Engineering Statistics (3:3:0)
Prerequisite: Math 215
Introduction to statistical methods for assuring quality in engineered products. Review of basic statistical concepts of central tendency and dispersion of data. Introduces statistical process control, design of experiments, statistical tolerance analysis, and concepts of six sigma quality.
(Fall, Winter, Summer)

ME 337 Kinematics (3:3:0)
Prerequisite: ME 204
Relative motion of links in mechanisms; velocities and accelerations of machine parts; rolling contact; cams; synthesis of mechanisms. Includes computer-aided engineering techniques.
(As Necessary)

ME 360 Fluid Mechanics (3:3:2)
Prerequisite: Math 316 or Math 371, ME 204, Ph 123
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, Summer)

ME 370 Mechanical Systems Design (3:3:2)
Prerequisite: ME 172, ME 202, ME 204, ME 250
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, Summer)

ME 380 Mechanical Engineering Design (3:3:0)
Prerequisite: ME 132A or ME 132B, ME 172, ME 242, ME 330
This course inroduces a structured design methodology for product development. The methodology includes such topics as product specification, 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, Summer)

ME 398 Internship (1-3:0:0)
Prerequisite: Consent of Department Chair, Junior Standing
Industrial work experience.
(Fall, Winter, Summer)

ME 422 Thermodynamics II (3:3:1)
Prerequisite: ME 322
Application of principles of thethermodynamics 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 involing 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 (3:3:0)
Prerequisite: Math 316, ME 322, ME 360, PH 123
Fundamentals of conduction, convection, and radiant modes of heat transfer; fundamental equations for steady and unsteady conduction; heat exchanger analysis and design; design of systems involving multi-mode heat transfer.
(Fall, Winter, Summer)

ME 425 Fluid Mechanics II (3:3:2)
Prerequisite: ME 360, ME 322
This course is a follow-on course to the introductory fluid mechanics course. Some topics including integral momentum, modeling and similitude, and analysis of piping systems from the introductory course will be explored in greater depth and detail. New topics that will be covered include potential flow, compressible flow, computational fluid dynamics, and turbulence. This course will incorporate solving more involved and design problems.
(As needed)

ME 438 CAE Modeling and Digital Simulation (3:3:0)
Prerequisite: Senior standing or consent of instructor.
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, project management, advanced solids modeling techniques, kinematic analysis, digital simulation techniques, and customization techniques.
(As needed)

ME 445 Mechanics of Composite Materials (3:3:0)
Prerequisite: ME 202, ME 242, 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 (3:3:0)
Prerequisite: Math 316, ME 202, ME 242
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 the commercial software.
(As needed)

ME 470 Mechatronics (3:3:0)
Prerequisite: ME 315
This course provides an introduction to systems that contain both electrical and mechanical elements. Methods for modeling and controlling the behavior of such systems are discussed. Several computer-based methods and tools are presented, including the use of programmable logic controllers and data acquisition software.
(As needed)

ME 480 Capstone Project I (3:2:2)
Prerequisite: Senior Standing, ME 370, ME 380
Comprehensive one-semester integrated design experience using the engineering design process and skills gained in engineering science classes. Product conception, development, design, and manufacture.
(Fall, Winter, Summer)

ME 482 Capstone Project II (3:2:2)
Prerequisite: Senior standing, ME 480
Second semester of an integrated design experience using the engineering design process and skills gained in engineering science classes. Product conception, development, design, and manufacture.
(As needed)

ME 490 Special Problems in Mechanical Engineering (1-3:1:0)
Prerequisite: Consent of Instructor
Students complete individual major projects or research in engineering, under the supervision of a faculty member.
(Fall, Winter, Summer)

ME 495R Special Topics in Mechanical Engineering (1-3:1-3:0)
Prerequisite: Consent of Instructor
A one-semester course emphasizing current topics in engineering.
(As needed)