



**BS in MECHANICAL ENGINEERING (394950) MAP Sheet**  
 Department of Mechanical Engineering  
 For students entering the degree program during the 2016–2017 curricular year.

This is a limited-enrollment program requiring departmental admissions approval. Please see the college advisement center or department office for information regarding requirements for admission to this major.

UNIVERSITY CORE AND GRADUATION REQUIREMENTS				PROGRAM REQUIREMENTS (101.5-102.5 total hours)	
<b>UNIVERSITY CORE REQUIREMENTS</b>				<b>Complete the following Basic Science Core:</b>	
<u>Requirements</u>	<u>#Classes</u>	<u>Hours</u>	<u>Classes</u>	Bio 100* Principles of Biology	3.0
				Chem 105 Gen College Chemistry	4.0
				Phscs 121 Intro to Newtonian Mechanics	3.0
				Phscs 123 Intro to Waves, Optics, & Thermodynam.	3.0
<b>Religion Cornerstones</b>				<b>Complete one of the following Mathematics Core sequences:</b>	
Teachings and Doctrine, Book of Mormon	1	2.0	Rel A 275	a. Math 112* Calculus 1	4.0
Jesus Christ & the Everlasting Gospel	1	2.0	Rel A 250	Math 113 Calculus 2	4.0
Foundations of the Restoration	1	2.0	Rel C 225	Math 302 Mathematics for Engineering 1	4.0
The Eternal Family	1	2.0	Rel C 200	Math 303 Mathematics for Engineering 2	4.0
<b>The Individual and Society</b>				<b>Or</b>	
Citizenship				b. Math 112* Calculus 1	4.0
American Heritage	1–2	3–6.0	from approved list	Math 113 Calculus 2	4.0
Global & Cultural Awareness	1	3.0	Eng T 231*	Math 313 Elementary Linear Algebra	3.0
<b>Skills</b>				Math 314 Calculus of Several Variables	3.0
Effective Communication				Math 334 Ordinary Differential Equations	3.0
First-Year Writing	1	3.0	from approved list	<b>Complete the following preprofessional engineering courses:</b>	
Adv Written & Oral Communication	1	3.0	Engl 316*	CE En 203 Engineering Mechanics—Materials	3.0
Quantitative Reasoning	0–1	0–3.0	from approved list	CE En 204* Engineering Mechanics—Dynamics	3.0
Languages of Learning (Math or Language)	1	4.0	Math 112*	EC En 301 Elements of Electrical Engineering	3.0
<b>Arts, Letters, and Sciences</b>				Me En 101 Static Systems in Mechanical Eng.	3.0
Civilization 1 and 2	2	6.0	from approved list	Me En 191 New Student Seminar	0.5
Arts	1	3.0	from approved list	<b>Complete the following professional Me En Core:</b>	
Letters	1	3.0	from approved list	Me En 250 Science of Engineering Materials	3.0
Scientific Principles & Reasoning				Me En 272 Engineering Graphics—Principles & Apps	3.0
Biological Science	1	3.0	Bio 100*	Me En 273 Intro to Sci Comp & Comp-Aided Eng	3.0
Physical Science	1	3.0	CE En 204*	Me En 312 Fluid Mechanics	3.0
Social Science	1	3.0	Eng T 231*	Me En 321 Thermodynamics	3.0
<b>Core Enrichment: Electives</b>				Me En 330 Design of Mechatronic Systems	3.0
Religion Electives	3–4	6.0	from approved list	Me En 335 Dynamic System Modeling & Analysis	3.0
Open Electives	Variable	Variable	personal choice	Me En 340 Heat Transfer	3.0
<b>GRADUATION REQUIREMENTS:</b>				Me En 362 Engineering Measurements	2.0
Minimum residence hours required		30.0		Me En 372 Mechanical System Design Fundmntls	3.0
Minimum hours needed to graduate		120.0		Me En 382 Manufacturing Processes	3.0
				Me En 393 Professional Skills in Me En	1.0
				Me En 475 Integrated Product & Process Design 1	3.0
				Me En 476 Integrated Product & Process Design 2	3.0
				<b>Complete the following supporting courses:</b>	
				Eng T 231* Foundations of Global Leadership	3.0
				Engl 316* Technical Communication	3.0
				Stat 201 Statistics for Engineers & Scientists	3.0
				<b>Complete 12 hours (four courses) of technical electives.</b> The purpose of these courses is to strengthen the engineering education of the student by a) deepening the student's understanding of engineering and/or science fundamentals, b) helping the student learn to apply engineering fundamentals in specific areas of interest, and/or c) helping the student to develop critical skills related to engineering practice.	
				The technical electives are normally 400-level or higher mechanical engineering courses, but other courses may be used as long as the following requirements are met:	
				<ul style="list-style-type: none"> <li>■ At least two courses (6 credit hours) must be in mechanical engineering.</li> <li>■ No courses may be below the 300-level.</li> <li>■ A maximum of three credit hours in Me En 497R or other independent project courses may be applied to meet technical elective requirements.</li> <li>■ All courses must be of an acceptable level from mechanical engineering, civil engineering, chemical engineering, computer engineering, electrical engineering, mathematics, statistics, physics, chemistry, or computer science, or be on the approved elective list in the department office. If a student wishes to count a course outside these areas as an elective, approval must be granted <i>before</i> the course is taken. Approval is requested by submitting a one-page petition to the department undergraduate committee that lists all of the proposed electives and demonstrates how the proposed exception meets the purpose described above.</li> <li>■ No course used to satisfy other major requirements for graduation may be used as an elective.</li> </ul>	
				<p>A. <i>General Elective Option</i>            Complete a total of 12 elective hours from the following:</p> <ol style="list-style-type: none"> <li>1. Complete a minimum of 6 hours from 400- or 500-level mechanical engineering courses.</li> <li>2. Complete a maximum of 6 hours of acceptable electives outside of mechanical engineering.</li> </ol>	
				<p>B. <i>Manufacturing Option</i>            The Society of Manufacturing Engineers has identified four areas of competency for manufacturing engineering as follows: (1) materials and manufacturing processes; (2) process, assembly and product engineering; (3) manufacturing competitiveness; and (4) manufacturing systems design.</p>	
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An option in manufacturing engineering is available. It may be completed by taking the following 12 hours of technical electives:

**1. Complete 3 hours from the following:**

Me En 585	Mfg Competitiveness: Qual & Prod	3.0
Mfg 532	Manufacturing Systems	3.0

**2. Complete 3 hours from the following:**

Me En 482	Mfg. Systems Analysis & Design	3.0
Me En 486	Automation	3.0
Me En 537	Advanced Mechanisms, Robotics	3.0

**3. Complete 3 hours from the following:**

Me En 452	Intermediate Materials	3.0
Me En 456	Composite Material Design	3.0
Me En 477	Design for Manufacture/Assembly	3.0
Me En 558	Metallurgy	3.0
Me En 584	Mfg Process Machine Design	3.0

**4. Complete 3 additional hours from the manufacturing electives list.**

When combined with required courses for all mechanical engineering majors related to manufacturing, namely Me En 250, 382, 475/476, and Stat 201, this option provides a strong foundation in manufacturing engineering.

**Suggested Sequence of Courses:**

**FRESHMAN YEAR**

1st Semester

First-Year Writing or A Htg	3.0
Bio 100	3.0
Phscs 121 (FWSp)	3.0
Math 112 (FWSpSu)	4.0
Me En 191 (FW)	0.5
Religion Cornerstone course	2.0
<b>Total Hours</b>	<b>15.5</b>

2nd Semester

Chem 105 (FWSpSu)	4.0
Math 113 (FWSpSu)	4.0
Me En 101 (FWSp)	3.0
First-Year Writing or A Htg	3.0
Religion Cornerstone course	2.0
<b>Total Hours</b>	<b>16.0</b>

**SOPHOMORE YEAR**

3rd Semester

CE En 203 (FWSp)	3.0
CE En 204 (FWSu)	3.0
Eng T 231 (FWSp)	3.0
Phscs 123 (FWSp)	3.0
Math 302 (FW)	4.0
Religion Cornerstone course	2.0
<b>Total Hours</b>	<b>18.0</b>

4th Semester

Ec En 301 (FWSp)	3.0
Me En 250 (FWSp)	3.0
Me En 272 (FWSp)	3.0
Me En 273 (FWSp)	3.0
Math 303 (FW)	4.0
<b>Total Hours</b>	<b>16.0</b>

**JUNIOR YEAR**

5th Semester

Stat 201 (FWSu)	3.0
Me En 321 (FWSp)	3.0
Me En 330 (FWSp)	3.0
Me En 335 (FWSp)	3.0
Me En 382 (FWSu)	3.0
Religion Cornerstone course	2.0
<b>Total Hours</b>	<b>17.0</b>

6th Semester

Engl 316	3.0
Me En 312 (FWSu)	3.0
Me En 362 (FWSu)	2.0
Me En 372 (FWSp)	3.0
Me En 393 (FW)	1.0
Letters GE	3.0
Religion elective	2.0
<b>Total Hours</b>	<b>17.0</b>

**SENIOR YEAR**

7th Semester

Me En 340 (FWSp)	3.0
Me En 475 (F)	3.0
Technical elective	3.0
Technical elective	3.0
University Core Civilization 1 elective	3.0
Religion elective	2.0
<b>Total Hours</b>	<b>17.0</b>

8th Semester

Me En 476 (W)	3.0
Technical elective	3.0
Technical elective	3.0
University Core Civilization 2: Arts elective	3.0
Religion elective	2.0
<b>Total hours</b>	<b>14.0</b>

**THE DISCIPLINE:**

Mechanical engineers work with concepts, ideas, and products that are primarily mechanical or energy related. Mechanical engineering is a broad discipline that prepares a person to contribute in a wide range of fields such as aerospace, computer graphics, power generation, machine tools, petroleum, agricultural and construction equipment, medicine, government, and all types of transportation. A mechanical engineer may work in research, design, analysis, manufacturing, testing, operations, sales, or management. Engineers use critical problem-solving methods and basic principles of mathematics and science to creatively solve problems.

**EDUCATIONAL OBJECTIVES:**

The objectives of the undergraduate Bachelors of Science program in the Department of Mechanical Engineering at Brigham Young University are to:

1. Teach the fundamental concepts of math, science, and mechanical engineering in order to produce graduates who demonstrate technical excellence and provide service to their profession, community, family, and church.
2. Instill a desire and ability to learn continuously, both through study and faith, to enable graduates to meet the changing demands of their profession and personal life.
3. Provide practical and open-ended engineering experiences in order to develop graduates who think independently and demonstrate leadership and creativity.
4. Engage students in activities to produce graduates who communicate and work effectively and ethically with people of diverse backgrounds.

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**Note:** Students are encouraged to complete an average of 16–17 credit hours each semester or 32–34 credit hours each year, which could include spring and/or summer terms. Taking fewer credits substantially increases the cost and the number of semesters to graduate.

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**BS in MECHANICAL ENGINEERING (394950)**  
2016–2017

**Learning Outcomes**

To assure that these objectives are reached, the department has articulated twelve outcomes of the BS program. Each student graduating from this program is expected to have:

1. A basic understanding of fundamental physical phenomena and governing principles.
2. The ability to develop and solve mathematical models of fundamental physical phenomena and apply them to predict the behavior of engineering systems.
3. The ability to use engineering principles to design an innovative system, component, or process to meet desired needs.
4. The expertise to plan and conduct an experimental program and evaluate the results.
5. The ability to use modern engineering tools and techniques in engineering practice.
6. An understanding of manufacturing processes and planning.
7. Effective oral and written communication skills.
8. The ability to work with and lead others to accomplish goals.
9. An appreciation of history, philosophy, literature, science, and the fine arts and how they influence the culture and behavior of societies.
10. Personal behavior demonstrating and practicing high moral and ethical standards.
11. The ability to practice engineering in a global environment.
12. A desire for and commitment to lifelong learning and service.

All courses in the curriculum are designed to help achieve these outcomes.

The curriculum in mechanical engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc. (ABET).

**CAREER OPPORTUNITIES:**

A bachelor of science degree in mechanical engineering provides widely recognized professional training for careers in industry, government, and other areas. Most industrial companies hire some mechanical engineers. Companies that make mechanical or energy-related products may hire mostly mechanical engineers. As a result, many mechanical engineering positions are available worldwide. Mechanical engineers have job opportunities in companies involved in such areas as aircraft and spacecraft design; manufacturing processes; product safety and reliability; solar energy; electronic equipment packaging and cooling; power plant design; jet, train, truck, and automobile engines; environmental protection; artificial intelligence; robotics; medical and hospital equipment; new material development and applications; and technical writing. Increasing numbers of positions utilize foreign language experience.

A graduate in mechanical engineering is prepared for advanced studies in the field as well as in a variety of other disciplines, including law, medicine, and business administration. Perhaps most important to graduates are the problem-solving strategies and thinking processes acquired in the study of mechanical engineering that help one to succeed in any area of endeavor.

**UNDERGRADUATE ADMITTANCE REQUIREMENTS:**

Any student may choose to major in mechanical engineering and to enroll in all classes in the preprofessional program (Basic Science Core and Mathematics Core Requirements).

**Professional Program Acceptance:**

Students must be accepted into the professional program before they may take the professional Me En core or technical electives. To apply, students must have completed the following four courses at a college or university (neither AP nor Concurrent Enrollment credit meet this requirement):

1. Phscs 121
2. One course (first course taken) from the Mathematics Core.
3. Me En 101 from the preprofessional course list (item 3 in the major requirements).
4. Me En 191 from the preprofessional course list (item 3 in the major requirements).

Acceptance is based on the GPA (equally weighted) from the three graded courses listed above. The GPA cut-off is determined by fixing the number of students admitted to the program and will vary from year to year. The current limit of students admitted per year is 220 and the GPA cut off for the past year was 3.33. Both the limit and the GPA cut-off are subject to change.

Only one repeat of each course is allowed for purposes of determining professional program acceptance. If a student has taken more than three professional application courses or has repeated any of these courses, only the grades of each of the first three courses taken or the highest grade when a course is retaken will be considered. Transfer students from institutions that do not have accredited engineering programs will be considered for provisional admission for one semester based on transferred courses but will be retained or denied based on three courses taken at BYU. The courses used will be the next three courses on the engineering flow chart following courses 1-3 listed above.

Normal application deadlines are July 1, October 1 and February 1. Applications from transfer students who have been admitted to the university may be considered at other times.

Professional program application forms are available in the college advisement center, on the ME website, and in the department office.

**ACADEMIC STANDARDS AND CONTINUANCE:**

On gaining acceptance into the professional program, students must maintain a minimum university cumulative grade point average of 2.0. No more than 6 credit hours of grades below C– in required program courses (including preprofessional and professional) may be applied toward graduation. A professional program course may not be retaken more than once.