**BS in Manufacturing Engineering (396541) MAP Sheet**

**Engineering, Manufacturing Engineering**

For students entering the degree program during the 2020-2021 curricular year.

Students are taught how to be leaders in the manufacturing industry. A large majority of graduates are offered management positions within 5 years of graduation, and these managers are best prepared by a combination of a technology background in manufacturing and a solid business education. This double emphasis is inherent in the manufacturing engineering technology program.

Manufacturing graduates receive an accredited, professional, four-year BS degree in Engineering and can opt to take the classes required for a minor in Business.

- **Requirements #Classes Hours Classes**
  - Religion Cornerstones
    - Teachings and Doctrine of The Book of Mormon
    - Jesus Christ and the Everlasting Gospel
    - Foundations of the Restoration
    - The Eternal Family
  - Global and Cultural Awareness
    - American Heritage
    - First Year Writing
    - Advanced Written and Oral Communications
    - Quantitative Reasoning
    - Languages of Learning (Math or Language)
  - Skills
    - First Year Writing
    - Advanced Written and Oral Communications
    - Quantitative Reasoning
    - Languages of Learning (Math or Language)
  - Arts, Letters, and Sciences
    - Civilization
    - Arts
    - Biological Science
    - Physical Science
    - Social Science
  - Core Enrichment: Electives
    - Religion Electives
    - Open Electives

**Graduation Requirements:**
- Minimum residence hours required: 30.0
- Minimum hours needed to graduate: 120.0

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**University Core and Graduation Requirements**

<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religion Cornerstones</td>
<td>1-2</td>
<td>3-6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Global and Cultural Awareness</td>
<td>1-2</td>
<td>3.0</td>
<td>TECH 231*</td>
</tr>
<tr>
<td>First Year Writing</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Advanced Written and Oral Communications</td>
<td>1</td>
<td>3.0</td>
<td>WRTG 316*</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
<td>4.0</td>
<td>MATH 112* or ACT</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
<td>4.0</td>
<td>MATH 112*</td>
</tr>
<tr>
<td>Arts, Letters, and Sciences</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Civilization</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Arts</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Biological Science</td>
<td>1</td>
<td>3.0</td>
<td>BIO 100*</td>
</tr>
<tr>
<td>Physical Science</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Social Science</td>
<td>1</td>
<td>3.0</td>
<td>TECH 231*</td>
</tr>
<tr>
<td>Core Enrichment: Electives</td>
<td>3-4</td>
<td>6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Religion Electives</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Open Electives</td>
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**Suggested Sequence of Courses**

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>JUNIOR YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Semester</td>
<td>5th Semester</td>
</tr>
<tr>
<td>MFGEN 230</td>
<td>WRTG 316</td>
</tr>
<tr>
<td>MATH 112</td>
<td>MFGEN 331</td>
</tr>
<tr>
<td>PHSCS 121</td>
<td>MFGEN 340</td>
</tr>
<tr>
<td>First-year Writing or A HTG 100</td>
<td>MFGEN 391</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>MATH/Science Elective</td>
</tr>
<tr>
<td>Total Hours</td>
<td>15.0</td>
</tr>
<tr>
<td>2nd Semester</td>
<td>Total Hours</td>
</tr>
<tr>
<td>First-year Writing or A HTG 100</td>
<td>15.5-16.5</td>
</tr>
<tr>
<td>ME EN 272</td>
<td>6th Semester</td>
</tr>
<tr>
<td>CE EN 103</td>
<td>MFGEN 381</td>
</tr>
<tr>
<td>TECH 112</td>
<td>MFGEN 395</td>
</tr>
<tr>
<td>BIO 100</td>
<td>MATH/Science Elective</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>Civilization I</td>
</tr>
<tr>
<td>Total Hours</td>
<td>16.0</td>
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<table>
<thead>
<tr>
<th>SOPHOMORE YEAR</th>
<th>SENIOR YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Semester</td>
<td>7th Semester</td>
</tr>
<tr>
<td>CE EN 203</td>
<td>MFGEN 401</td>
</tr>
<tr>
<td>CHEM 105</td>
<td>MFGEN Technical Elective</td>
</tr>
<tr>
<td>STAT 201</td>
<td>ME EN 475</td>
</tr>
<tr>
<td>MFGEN 220</td>
<td>MFGEN 332</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>Civilizations II &amp; Arts or Letters</td>
</tr>
<tr>
<td>Total Hours</td>
<td>15.0</td>
</tr>
<tr>
<td>4th Semester</td>
<td>Total Hours</td>
</tr>
<tr>
<td>MATH 213</td>
<td>15.0-16.0</td>
</tr>
<tr>
<td>ME EN 250</td>
<td>Spring/Summer</td>
</tr>
<tr>
<td>MFGEN 230</td>
<td>MFGEN 399R</td>
</tr>
<tr>
<td>TECH 231</td>
<td>1.0</td>
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<tr>
<td>Religion Elective</td>
<td>MFGEN 305</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>Civilizations II &amp; Arts or Letters</td>
</tr>
<tr>
<td>MATH 215</td>
<td>3.0</td>
</tr>
<tr>
<td>Total Hours</td>
<td>14.5-15.5</td>
</tr>
</tbody>
</table>

**FOR UNIVERSITY CORE QUESTIONS CONTACT THE ADVISEMENT CENTER IN 246 EB**
**FOR PROGRAM QUESTIONS, CONTACT ADVISOR IN 230 SNLB**

*These classes fill both University core and program requirements (17 hours overlap)

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**FOR PROGRAM QUESTIONS, CONTACT ADVISOR IN 230 SNLB**

*These classes fill both University core and program requirements (17 hours overlap)

*Your faculty advisor can assist you in choosing technical electives

**Note:** Students are encouraged to complete an average of 15–16 credit hours each semester or 30–31 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.

**Note:** 123 credit hours are required to graduate with this degree.
BS in Manufacturing Engineering (396541)
2020-2021 Program Requirements (94 Credit Hours)

REQUIREMENT 1: Complete 12 courses
MFGEN 130 - Modern Manufacturing 3.0
MFGEN 220 - Material Removal 3.0
MFGEN 230 - Computer-Aided Manufacturing 3.0
MFGEN 291 - Manufacturing Leadership 1.0
MFGEN 331 - Metals Processes 1.0
MFGEN 333 - Industrial Automation 3.0
MFGEN 340 - Quality Systems in Manufacturing 3.0
MFGEN 355 - Plastics Materials and Processing 3.0
MFGEN 381 - Lean Manufacturing & System Design 3.0
MFGEN 391 - Senior Seminar 0.5
MFGEN 401 - Data Analysis 3.0
MFGEN 491 - Senior Seminar 0.5

REQUIREMENT 2: Complete 1 hour from the following course(s)
MFGEN 395R - Academic Internship 3.0v

You may take up to 3 credit hours.

REQUIREMENT 3: Complete 12 courses

SUPPORTING COURSES:
* BIO 100 - Principles of Biology 3.0
C S 142 - Introduction to Computer Programming 3.0
CE EN 103 - Engineering Mechanics - Statics 3.0
CHEM 105 - General College Chemistry 1 with Lab (Integrated) 4.0
*MATH 112 - Calculus 1 4.0
ME EN 250 - Science of Engineering Materials 3.0
ME EN 272 - Engineering Graphics - Principles and Applications 1.0
PHSCS 121 - Introduction to Newtonian Mechanics 3.0
STAT 201 - Statistics for Engineers and Scientists 3.0
TECH 112 - Exploration in Innovation Design Techniques 1.0
*WRTG 216 - Technical Communication 3.0

REQUIREMENT 4: Complete 1 course
ENG T 231 - (Not currently offered) 3.0
*TECH 231 - Foundations of Global Leadership 3.0

TECHNICAL ELECTIVE COURSES:
ITAC 338 - Electronics, Computers, and Manufacturing 3.0
MFGEN 372 - Design for X 3.0
MFGEN 431 - Tool Design 3.0

MFGEN 433 - Introduction to Smart Manufacturing 3.0
MFGEN 456 - Introduction to Composites 3.0
MFGEN 479 - Innovation and Entrepreneurship 3.0
MFGEN 481 - Manufacturing Systems and Simulation 3.0

REQUIREMENT 6: Complete 12.0 hours from the following course(s)

MATH, SCIENCE, AND STATISTICS SUPPORTING COURSES:
CHEM 106 - General College Chemistry 2 3.0
CHEM 351M - Organic Chemistry 1 - Majors 3.0
CHEM 357 - Industrial Organic Chemistry 3.0
MATH 113 - Calculus 2 4.0
MATH 213 - Elementary Linear Algebra 2.0
MATH 215 - Computational Linear Algebra 1.0
MATH 334 - Ordinary Differential Equations 3.0
PHSCS 123 - Introduction to Waves, Optics, and Thermodynamics 3.0
STAT 462 - Quality Control and Industrial Statistics 3.0
STAT 466 - Introduction to Reliability 3.0
STAT 511 - Statistical Methods for Research 1 3.0
STAT 512 - Statistical Methods for Research 2 3.0

REQUIREMENT 7: Complete 2 courses
ME EN 475 - Integrated Product and Process Design 1 3.0
ME EN 476 - Product Development 2 - Capstone 3.0

REQUIREMENT 8: Complete department packet and exit interview.

THE DISCIPLINE:
Manufacturing is an exciting and rewarding discipline that has significant impact on a society’s standard of living and economic independence. At BYU the manufacturing program is specifically oriented toward creating leaders in the industry. Students in manufacturing learn creative and analytical skills that will enable them to quickly diagnose and solve manufacturing problems with insight from both engineering and management perspectives. They also develop interpersonal and communication skills that will prepare them to work as part of an engineering team and effectively interact with vendors, management, and production personnel. In addition, they receive hands-on training in modern lab facilities and learn to use computers to design, analyze, implement, and control manufacturing operations. Manufacturing professionals are knowledgeable and skilled in the managing methods, technologies, equipment, and tooling needed to produce affordable products of high quality.

They are able to effectively coordinate the procurement, installation, and start-up of production equipment as well as improve the productivity of existing operations. They are also able to coordinate manufacturing and supply-chain operation in a global setting.

Graduates may further their technical and managerial skills by pursuing either a master of science in technology or a master of business administration.

RESEARCH OPPORTUNITIES:
Students can work on a variety of industry-sponsored and related projects, often working directly with manufacturing engineers in industry. Manufacturing classes sometimes integrate these projects into the course work, but other industrial projects can be done outside of class, usually for pay. The excellent equipment and facilities in the department provide the resources where industry projects can be effectively accomplished.

INTERNSHIPS:
Professional training in actual companies is required and the advisor in the department can help students who desire to complete an internship. Both domestic and international internship opportunities are available for credit (and usually some pay). Many internships lead to permanent employment with the sponsoring company. Internships also offers a great chance for students to understand how their education is actually applied and to investigate further career directions and potential focus areas in their education.

PROFESSIONAL AND HONOR SOCIETIES:
The department sponsors strong student chapters of national societies associated with manufacturing and materials including the Society of Manufacturing Engineers (SME) and the Society of the Advancement of Materials and Process Engineering (SAMPME). Students may also participate in the national engineering technology honor society, Tau Alpha Pi and other honor societies.

FINANCING:
Many students can receive financial aid from department-sponsored scholarships or part time employment. The employment can be as teaching/lab assistants, apprentice engineers working on an industry sponsored project, or research assistants under the direction of a faculty member.
CAREERS:
Career opportunities in manufacturing are plentiful and rewarding. Typical entry-level job titles include manufacturing engineer, quality manager, process engineer, tool engineer, product engineer, quality engineer, production supervisor, and account manager (technical sales). New graduates are typically hired into technical positions but have the opportunity to quickly move into management. The job outlook for manufacturing graduates is bright and should continue to be strong in the future. When one considers that everything that does not exist as part of nature is the product of some form of manufacturing, it is easy to see that manufacturing is an integral part of society and generates an ever-growing workforce. Progressive companies worldwide seek qualified individuals who can provide leadership in improving the quality and productivity of their manufacturing operations.

MAP DISCLAIMER
While every reasonable effort is made to ensure accuracy, there are some student populations that could have exceptions to listed requirements. Please refer to the university catalog and your college advisement center/department for complete guidelines.

DEPARTMENT INFORMATION
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