Big Inspired Goal

Be recognized as the best undergraduate mechanical engineering program in the world and the alma mater for the world's most influential engineers.

Envisioned Future

- The strength of our undergraduate program will be fueled by opportunities for learning and knowledge creation that flow out of a vibrant and vital graduate research program.
- Graduates of our program (both undergraduate and graduate) will be highly sought after by top universities, corporations, and engineering enterprises and will lead many such organizations.
- Our graduates will understand the influence of the Spirit and how it applies to their profession and the creative process.
- Faculty, staff, students, and alumni will be recognized as individuals of faith and integrity.
- Our faculty will be recognized nationally and internationally as experts in their fields.
- The technology created within our department will have significant economic and societal impacts.
- Our curriculum will be exemplary; our methods and materials will be widely respected and used by others.
- We will have external partners that readily provide resources and other support necessary to fulfill our core purpose.
Introduction

The purpose of this undergraduate student guide is to provide you with information that will help you make decisions and get the most out of your BYU education. Underpinning this guide and at the foundation of our philosophy of education in the department is this principle: “You are responsible for your education.” Although we obviously have a large influence on the quality of your educational experience, you are ultimately responsible for how much you learn. We encourage and expect you to do more than “play the game” of getting grades. We want you to learn. If you wish to be a successful engineer you will need to learn for the rest of your life.

There are numerous opportunities to learn for which you will not receive a grade (although we would encourage you to document these activities in an optional portfolio). For example, we have a fine Projects Lab. A mechanical engineer should have experience in basic fabrication processes. We do not have time in the curriculum to teach you how to use the machines in the Projects Lab, so we provide opportunities to learn on your own. You should also consider getting involved in one of the student clubs or societies as an important enhancement to your classroom learning.

Everything in this guide is important. Please read it carefully and refer to it often. We will provide updates from time to time as necessary. We are glad you are interested in mechanical engineering. It is a great profession and we look forward to helping you obtain a world-class education.
Table of Contents

MECHANICAL ENGINEERING: AN OVERVIEW

• What is Mechanical Engineering?
• What do Mechanical Engineers do?
• Where do Mechanical Engineers work?
• What classes will I take?
• What are the educational objectives and program outcomes?

FREQUENTLY ASKED QUESTIONS

• How do I get into the major?
• What if my grades aren’t high enough?
• How many times can I apply?
• Do I have to take ME EN 191?
• What classes do I take each semester?
• What is Capstone?
• What classes can I take for my Technical Electives?
• Can I get an emphasis?
• Where can I go if I have questions or if I need help?

STUDENT OPPORTUNITIES

• Student Clubs and Societies
• Summer Internships
• Advantages of an Intern Experience
• How to obtain an Internship

HELPFUL RESOURCES

Career Trajectories
Mechanical Engineering: An Overview
What is Mechanical Engineering?

Engineering is the applied arm of science and therefore requires an understanding of traditional science and math, as well as an understanding of techniques and application in real world systems and devices. The mechanical engineer applies this understanding to synthesize new products that benefit humanity. In other words, engineers use math and science to come up with creative solutions to problems.

Mechanical engineering is built upon three main areas of study: thermal and fluid science, mechanical systems, and design and manufacturing.

Thermal and fluid science includes the study of thermodynamics, fluids, and heat transfer. Some examples of thermal applications are:

- Designing a rocket engine
- Predicting lift for an airplane wing
- Modeling wave action

Mechanical systems include the study of materials, dynamics, vibrations, and controls. Some examples of mechanical systems applications are:

- Building a robot
- Developing a control system for a satellite

Design and manufacturing includes computer-aided design, design, and manufacturing. Some examples of design and manufacturing applications are:

- Designing new hybrid vehicle drive trains
- Designing and testing prosthetics
What do Mechanical Engineers do?
There are many different career paths for individuals with a Mechanical Engineering degree.

- Transportation
- Manufacturing
- Communication
- Power Generation
- Computer-aided Engineering
- Agriculture
- Aerospace
- Materials
- Biomedical Engineering
- Research
- Design
- Analysis
- Testing
- Operations
- Technical Sales
- Management
- Business
- Law

A traditional engineering career can be characterized as having three phases: entry level engineer, established engineer and leading engineer. Not all engineers become CEOs of companies, but all engineers have the opportunity to be agents of change for society. Leading engineers benefit mankind through the application of their expertise or the management of others. Established engineers are the “backbone” of the engineering industry. They participate in product development and research programs that give them experience and allow them to mature into leading roles. The career of an entry level engineer usually begins under the direction of other engineers as he or she participates in product development and research programs. The undergraduate university experience prepares you for a successful engineering career. However, advancement from one level to another depends on your own work, study, and commitment.
Where do Mechanical Engineers work?


Of the 144 bachelor’s degree graduates in April 2019, (52%) were starting jobs with an average salary of about $62,098. There were 38% students who were accepted to graduate schools.

What classes will I take?

As a mechanical engineering student, you will take courses in each of the main technical areas that characterize mechanical engineering (thermal and fluid science, mechanical systems, and design and manufacturing). These courses are shown on the Flow Chart, which is available further along in this guide as well as on the ME website. You will learn fundamental phenomena associated with each area and the physical laws or principles which govern those phenomena. You will learn how to use these laws to model and predict behavior, often using the computer as a tool. Other skills are also important. An engineer must know, for example, how to communicate effectively, how to work well with others, how to learn new things, and how to define and solve problems. Thus the technical areas are only part of your education (although a very important part) that must be complimented by other skills. These other skills will also be taught as you learn the technical material.
What are the Educational Objectives and Program Outcomes?

The Mechanical Engineering Department at Brigham Young University pursues the following educational objectives:

• 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.

• 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.

• Provide practical and open-ended engineering experiences in order to develop graduates who think independently and demonstrate leadership and creativity.

• Engage students in activities to produce graduates who communicate and work effectively and ethically with people of diverse backgrounds.

The department fully supports the Aims of a BYU Education and is committed to the idea of integrating spiritual and secular learning.

To assure that the educational objectives are reached, the department has articulated seven Program Outcomes for the Bachelors Degree. Each student graduating from this program is expected to have the following skills, abilities, and traits:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

3. An ability to communicate effectively with a range of audiences.
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

6. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

7. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

8. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

All courses in the curriculum are designed to help achieve these outcomes. For further information regarding individual course outcomes, please see the University's Undergraduate Catalog.
You are in control of your education.  
Take the wheel and steer!

The introduction to this guide discusses our desire for you to take responsibility for your education. How do you do this? The best way is for you to take responsibility for your learning. In each course you take, you should strive to learn what is being taught, whether or not you see the relevance. Be an active participant, seeking to take advantage of all learning opportunities, both in and out of the classroom. In addition, you must become familiar with the department program, procedures, and course requirements. Learning and knowing this information is your responsibility.

We suggest the following ideas:

**Freshman year:**  
Take the prerequisite courses and get good grades. Apply to the program (even if you are going on a mission—your spot will be held). Fill out the application on the ME website, https://me.byu.edu/apply.

Attend the Advisement Overview to learn about program requirements. This is required as part of ME EN 191.

**Sophomore year:**  
Start a portfolio. Keep your best work from your ME classes. Include reflections on your learning activities.
Find and meet your assigned faculty advisor (assignments occur after admittance).
Start thinking about internships or doing research in a professor’s lab (meaning that you need to be proactive and learn what is available and what the professors do).

Join a club or start volunteering in a lab (again, be proactive).

**Junior year:**

Meet with your faculty advisor to plan your technical electives, discuss graduate school or career options, and show your portfolio.
Continue taking courses that will keep you on track for graduation.
Add more items to your portfolio, design/lab projects or write-ups from junior courses).

If you have had an internship or other professional experience, include this in your portfolio.
Apply for Capstone (usually this will happen in late March or early April. Watch around the department for advertisements).

**Senior year:**

Do a final graduation check with the Undergraduate Advisor.
Apply for graduation online.
Complete your Graduation Survey, and Exit Interview (these are NOT optional).
Finish Capstone.
Frequently Asked Questions
How do I get into the major?

BYU’s Mechanical Engineering major is a limited Enrollment program, which means we only admit a certain number of students per year. In order to be admitted to our program, you must complete the required application courses, and then fill out and submit the application. We admit based on the GPA of the application courses. Typically, students with a 3.3 average or higher will get into the major. The application courses are:

1. ME EN 191
2. The first physics course taken at BYU from the sequence: PHYSICS 121, PHYSICS 123, Ec En 301
3. The first math course taken at BYU from the sequence: MATH 112, 113, 302, 303, 213, 314, 334
4. The first mechanics course taken at BYU from the sequence: MeEn 101, CeEn 203, CeEn 204

For more information regarding the application process go to: http://me.byu.edu/content/applying-professional-program.

What if my grades aren’t high enough?

Remember, we are looking at the Application Courses for the GPA, so don’t panic if you get a C in American Heritage! If you are unhappy about the grades you get in the Application Courses, you may take each of those courses again one time (includes withdraws). We will use the higher grades for your application.

How many times can I apply?

You may apply more than once but be aware of University policy. Students must declare a major by the time they have earned 60 BYU credits (excluding language credit). Once a student has earned 75 BYU credits, they will not be allowed to change their major, unless special permission is granted.
Do I have to take ME EN 191?
Yes. You have to pass it before you can apply to the program.

What classes do I take each semester?
We have provided a flowchart to help you navigate your way through the program. You are not required to follow it exactly, but in order to graduate in a timely manner you should try to follow it as closely as possible, paying close attention to prerequisite requirements (see flowchart on adjacent page).

What is Capstone?
Capstone is our two-semester senior design project course (ME EN 475 and ME EN 476). All Mechanical Engineering students are required to take it. It is intended to be the culminating project of your undergraduate experience, and you will take it during your final year in the program. Please see the Capstone website for more information.

capstone.byu.edu

What Technical Electives can I take?
The Technical Electives are meant to allow you freedom to pursue courses that will give you a “specialty” in your particular areas of interest. The department has provided a list of approved Technical Electives. If a course is not on the list, you may NOT count it as a Technical Elective. You can find the current list of approved Technical Electives on p. 15-18.
### MECHANICAL ENGINEERING DEPARTMENT - BS Degree Program

**SUGGESTED GRADUATION PLAN - 2020-2021**

*Note: The Progress Report for each student lists their official requirements*

<table>
<thead>
<tr>
<th>Semester Cor</th>
<th>University Cor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester 1</strong></td>
<td><strong>Semester 2</strong></td>
</tr>
<tr>
<td>First-Year Writing Requirement</td>
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<tr>
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<tr>
<td>Math 112, Calc 1</td>
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<td><em>New Student Seminar</em> FW</td>
<td>MeEn 101 Intro to ME/Stats</td>
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<td>Bio 100 or MMBio 221 PDBio 120</td>
<td>MeEn 101</td>
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<td><em>Bio- &amp; Science</em></td>
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<td><strong>Semester 4</strong></td>
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<td>Math 302, Engr Math 1, Math 113</td>
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<td>Phscs 123</td>
<td>Engr Math 2</td>
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<td>Waves, Optics, Thermo</td>
<td>Math 302, FWSp</td>
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<td>Phscs 121, Math 112</td>
<td>Math 302, FWSp</td>
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<tr>
<td><em>Phy Sci</em> FWSp</td>
<td>MeEn 203</td>
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<tr>
<td>Mech of Materials</td>
<td>MeEn 273</td>
</tr>
<tr>
<td>MeEn 101</td>
<td>Computing</td>
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<tr>
<td><em>Mech Eng</em> FWSp</td>
<td>Math 302 or 314, p,c</td>
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<td>MeEn 204</td>
<td>Math 113</td>
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<tr>
<td>Dynamics</td>
<td>MeEn 250</td>
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<td>MeEn 101</td>
<td>Materials Science</td>
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<td><em>Phy Sci</em> FWSp</td>
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<td>MeEn 231</td>
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<td><em>Soc Sci &amp; GCA</em></td>
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<td><em>FWSp</em></td>
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</table>

| **Semester 5** | **Semester 6** |
| Math 334, Calc of Sev Variables | Math 337, Calc of Sev Variables |
| Math 213, Elem Linear Algebra | Math 337, Calc of Sev Variables |
| FWSS | FWSS |
| Chem 105 | Math 337, Calc of Sev Variables |
| *Phy Sci* FWSp | *Phy Sci* FWSp |
| MeEn 231 | Global Ldrship |
| Global Ldrship | *Soc Sci & GCA* |
| *FWSp* | *FWSp* |

| **Semester 7** | **Semester 8** |
| Math 334, Calc of Sev Variables | Math 337, Calc of Sev Variables |
| Math 213, Elem Linear Algebra | Math 337, Calc of Sev Variables |
| FWSS | FWSS |
| Chem 105 | Math 337, Calc of Sev Variables |
| *Phy Sci* FWSp | *Phy Sci* FWSp |
| MeEn 231 | Global Ldrship |
| Global Ldrship | *Soc Sci & GCA* |
| *FWSp* | *FWSp* |

### ME Professional Program (Acceptance Required)

**Credits**

- 15.5
- 16.0
- 18.0
- 16.0
- 17.0
- 17.0
- 17.0
- 14.0
- Total: 130.5

### Applying to the Program

1. Complete designated courses above or alternate courses listed on me.byu.edu
2. Following completion of courses, submit application at me.byu.edu

### Alternate Math Courses

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>Math 213 - Elem Linear Algebra</td>
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<tr>
<td>Math 314 - Calc of Sev Variables</td>
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</tr>
<tr>
<td>Math 334 - Differential Equations</td>
<td>3</td>
</tr>
</tbody>
</table>

**Technical Elective Courses**

- 4 courses (12 hrs) required
- At least 2 ME courses
- No duplicates of required courses
- 3 Credit-hr max in project classes

**TE list:**

http://me.byu.edu/technical-elective-requirements

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**Int Product & Process Design Prerequisites**

- Must be taken consecutive Fall/Winter semesters
- No more than apx. 30 hours left in the Major
- 475 pre-reqs: MeEn 382, MeEn 330, MeEn 335, MeEn 372
- 476 pre-reqs: MeEn 312, MeEn 362, MeEn 475, MeEn 340

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When Offered: FWSS
Technical Elective Requirements

1. At least 12 credit hours (4 courses)
2. At least 6 credit hours (2 courses) in Mechanical Engineering
3. No courses below 300 level
4. A maximum of 3 credits of Me En 497R or ME 494R (Global Outreach Projects), OR research projects in other departments. Research projects in other departments require prior approval by submitting a petition describing the project, to the department undergraduate advisor.
5. All courses must be selected from the following list. If a student wishes to count a course not listed, prior approval is required by submitting a petition to the department undergraduate advisor.
6. No course used to satisfy other major course requirements can be used as an elective.

Mechanical Engineering
Any Class 400 or higher

Computer Science
C S 312 - Algorithm Design and Analysis
C S 324 - Systems Programming
C S 330 - Concepts of Programming Languages
C S 340 - Software Design and Testing
C S 345 - Operating Systems Design
C S 355 - Introduction to Graphics and Image Processing
C S 356 - Designing the User Experience
C S 405 - Creating and Managing a Software Business
C S 412 - Linear Programming and Convex Optimization
C S 418 - Bioinformatics
C S 428 - Software Engineering
C S 431 - Algorithmic Languages and Compilers
C S 450 - Computer Vision
C S 452 - Database Modeling Concepts
C S 453 - Fundamentals of Information Retrieval
C S 455 - Computer Graphics
C S 456 - Introduction to User Interface Software
C S 460 - Computer Communications and Networking
C S 462 - Large-Scale Distributed System Design
C S 465 - Computer Security
C S 470 - Introduction to Artificial Intelligence
C S 478 - Tools for Machine Learning
C S 484 - Parallel Processing
C S 486 - Verification and Validation
C S 493R - Computing Competitions
C S 513 - Robust Control

Civil and Environmental Engineering
CE EN 304 - Civil Eng Materials: Metals, Woods, Composites
CE EN 306 - Civil Eng Materials: Concrete, Masonry, Asphalt
CE EN 321 - Structural Analysis
CE EN 332 - Hydraulics and Fluid Flow Theory
CE EN 341 - Elementary Soil Mechanics
CE EN 361 - Introduction to Transportation Engineering
CE EN 414 - Engineering Applications of GIS
CE EN 421 - Structural Steel Design
CE EN 424 - Reinforced Concrete Design
CE EN 427 - International Megastructures
CE EN 431 - Hydrology
CE EN 433 - Hydraulic Engineering
CE EN 439 - Water Resources Study Abroad
CE EN 442 - Foundation Engineering
CE EN 451 - Environmental Engineering Processes
CE EN 461 - Geometric Design of Highways
CE EN 467 - International Megacities
CE EN 472 - Civil Engineering Design
CE EN 500 - (CE-Me) Design and Materials Applications
CE EN 501 - (CE-Me) Stress Analysis and Design of Mechanical Structures
CE EN 503 - (CE-Me) Plasticity and Fracture
CE EN 504 - (CE-Me) Computer Structural Analysis and Optimization
CE EN 505 - Portland Cement Concrete Mixture Design and Analysis
CE EN 507 - (CE-Me) Linear Finite Element Methods
CE EN 508 - (CE-Me) Structural Vibrations
CE EN 514 - Geospatial Environmental Engineering
CE EN 521 - Seismic-Resistant Steel Buildings
CE EN 523 - (CE-Me) Aircraft Structures
CE EN 525 - Bridge Structures
CE EN 528 - Masonry Design
CE EN 529 - Timber Design
CE EN 531 - Principles of Hydrologic Modeling
CE EN 534 - Hydroinformatics
CE EN 535 - Hydraulic Design of Channels Control Structures
CE EN 540 - Geo-Environmental Engineering
CE EN 544 - Seepage and Slope Stability Analysis
CE EN 545 - Geotechnical Analysis Earthquake Phenomena
CE EN 547 - Groundwater Modeling
CE EN 551 - Water Treatment Facilities Design
CE EN 555 - Environmental Chemistry
CE EN 562 - Traffic Engineering: Characteristics/Operations  
CE EN 563 - Pavement Design  
CE EN 565 - Urban Transportation Planning  
CE EN 570 - (CE-Me) Computer-Aided Engineering Software Development  
CE EN 572 - Computer-Aided Geometric Design  
CE EN 575 - (CE-Me) Optimization Techniques in Eng.

Chemical Engineering  
CH EN 386 - Chemical Reaction Engineering  
CH EN 410 - Principles of Reservoir Engineering  
CH EN 412 - Introductory Nuclear Engineering  
CH EN 433 - Energy Engineering  
CH EN 436 - Process Control and Dynamics  
CH EN 451 - Chemical Engineering Plant Design and Process Synthesis  
CH EN 461 - Chemical Engineering Problem Solving through Experiential Learning  
CH EN 475 - Unit Operations Laboratory 1  
CH EN 476 - Separations  
CH EN 477 - Unit Operations Laboratory 2  
CH EN 479 - Unit Operations Laboratory  
CH EN 481 - Introduction to Semiconductor Processing  
CH EN 499 - Mentored Research and Thesis  
CH EN 513 - Molecular Modeling  
CH EN 518 - Biomedical Engineering Principles  
CH EN 519 - Biochemical Engineering  
CH EN 528 - Industrial Catalytic Processes  
CH EN 531 - Thermodynamics of Multicomponent Systems  
CH EN 533 - Transport Phenomena  
CH EN 535 - Kinetics and Catalysis  
CH EN 541 - Computer Design Methods  
CH EN 578 - Polymer Science and Engineering

Chemistry  
CHEM 351 - Organic Chemistry 1  
CHEM 351M - Organic Chemistry 1 - Majors  
CHEM 352 - Organic Chemistry 2  
CHEM 353 - Organic Chemistry Laboratory--Nonmajors  
CHEM 354 - Organic Chemistry Laboratory--Majors  
CHEM 355 - Organic Chemistry Laboratory 2 - Nonmajors  
CHEM 357 - Industrial Organic Chemistry  
CHEM 391 - Technical Writing Using Chemical Literature  
CHEM 455 - Synthesis and Qualitative Organic Analysis  
CHEM 462 - Physical Chemistry 1  
CHEM 463 - Physical Chemistry 2  
CHEM 464 - Physical Chemistry Laboratory 1  
CHEM 465 - Physical Chemistry Laboratory 2  
CHEM 467 - Physical Chemistry for Engineers  
CHEM 468 - Biophysical Chemistry  
CHEM 481 - Biochemistry  
CHEM 481M - Biochemistry--Majors  
CHEM 482 - Mechanisms of Molecular Biology  
CHEM 489 - Structural Biochemistry  
CHEM 514 - Inorganic Chemistry  
CHEM 518 - Advanced Inorganic Laboratory  
CHEM 521 - Instrumental Analysis Lecture  
CHEM 523 - Instrumental Analysis Laboratory  
CHEM 552 - Advanced Organic Chemistry  
CHEM 553 - Advanced Organic Chemistry  
CHEM 555 - Organic Spectroscopic Identification  
CHEM 561 - Chemical Thermodynamics  
CHEM 563 - Reaction Kinetics  
CHEM 565 - Introduction to Quantum Chemistry  
CHEM 567 - Statistical Mechanics  
CHEM 569 - Fundamentals of Spectroscopy  
CHEM 571 - Polymer and Materials Chemistry  
CHEM 581 - Advanced Biochemical Methodology 1  
CHEM 583 - Advanced Biochemical Methodology 2  
CHEM 584 - Advanced Biochemistry Methods 1  
CHEM 586 - Advanced Biochemistry Methods 2

Electrical and Computer Engineering  
EC EN 323 - Computer Organization  
EC EN 330 - Introduction to Embedded System Programming  
EC EN 340 - Electronic Circuit Design 1  
EC EN 360 - Electromagnetic Fields and Waves  
EC EN 380 - Signals and Systems  
EC EN 424 - Computer Systems  
EC EN 425 - Real-Time Operating Systems  
EC EN 427 - Embedded Systems  
EC EN 445 - Introduction to Mixed-Signal VLSI  
EC EN 446 - Power Electronics  
EC EN 450 - Introduction to Semiconductor Devices  
EC EN 452 - Experiments in Integrated Circuit Development  
EC EN 462 - Electromagnetic Radiation and Propagation  
EC EN 464 - Wireless Communication Circuits  
EC EN 466 - Introduction to Optical Engineering
EC EN 483 - (EC En-Me En 431) Design of Control Systems
EC EN 485 - Introduction to Digital Communication Theory
EC EN 487 - Introduction to Discrete-Time Signal Processing
EC EN 521 - Introduction to Algorithm Design
EC EN 523 - Computer System Reliability
EC EN 528 - Computer Architecture
EC EN 541 - Active and Passive Filter Design
EC EN 543 - CMOS Amplifier Design
EC EN 548 - Analog CMOS Circuit Design
EC EN 549 - VLSI Communication Circuit Design
EC EN 550 - (EC-Me) Microelectromechanical Systems (MEMS)
EC EN 551 - Introduction to Digital VLSI Circuits
EC EN 555 - Optoelectronic Devices
EC EN 560 - Electromagnetic Wave Theory
EC EN 562 - Optical Communication Components and Systems
EC EN 563 - Applied Computational Electromagnetics
EC EN 564 - Radar and Communication Systems
EC EN 568 - Microwave Remote Sensing
EC EN 576 - Medical Imaging and Image Reconstruction
EC EN 595 - Fundamentals of Patents and Other Intellectual Property

Math
MATH 402 - Modeling with Uncertainty and Data 1
MATH 403 - Modeling with Uncertainty and Data 1 Laboratory
MATH 404 - Modeling with Uncertainty and Data 2
MATH 405 - Modeling with Uncertainty and Data 2 Laboratory
MATH 410 - Introduction to Numerical Methods
MATH 411 - Numerical Methods
MATH 431 - Probability Theory
MATH 436 - Modeling with Dynamics and Control 1
MATH 437 - Modeling with Dynamics and Control 1 Laboratory
MATH 438 - Modeling with Dynamics and Control 2
MATH 439 - Modeling with Dynamics and Control 2 Laboratory
MATH 447 - Introduction to Partial Differential Equations
MATH 450 - Combinatorics
MATH 451 - Introduction to Topology
MATH 465 - Differential Geometry

MATH 473 - Group Representation Theory
MATH 485 - Mathematical Cryptography
MATH 487 - Number Theory
MATH 510 - Numerical Methods for Linear Algebra
MATH 511 - Numerical Methods for Partial Differential Equations
MATH 521 - Methods of Applied Mathematics 1
MATH 522 - Methods of Applied Mathematics 2
MATH 532 - Complex Analysis
MATH 534 - Introduction to Dynamical Systems 1
MATH 536 - Applied Discrete Probability
MATH 540 - Linear Analysis
MATH 541 - Real Analysis
MATH 547 - Modeling and Analysis of Partial Differential Equations
MATH 553 - Foundations of Topology 1
MATH 554 - Foundations of Topology 2
MATH 561 - Introduction to Algebraic Geometry 1
MATH 562 - Introduction to Algebraic Geometry 2
MATH 565 - Differential Geometry
MATH 570 - Matrix Analysis
MATH 571 - Algebra 1
MATH 572 - Algebra 2
MATH 586 - Introduction to Algebraic Number Theory
MATH 587 - Introduction to Analytic Number Theory

Manufacturing
MFG 331 - Metals Processes
MFG 333 - Industrial Automation
MFG 340 - Quality Systems in Manufacturing
MFG 355 - Plastics Materials and Processing
MFG 381 - Lean Manufacturing & System Design
MFG 431 - Tool Design
MFG 440 - Six Sigma for Manufacturing
MFG 456 - Introduction to Composites
MFG 531 - Advanced Computer-Aided Manufacturing Programming
MFG 532 - Manufacturing Systems
MFG 533 - Manufacturing Information Systems
MFG 574 - Advanced Tool Design
MFG 575 - Packaging Technologies
MFG 580 - Manufacturing Simulation

Physics
PHSCS 318 - Introduction to Mathematical Physics
PHSCS 321 - Mechanics
PHSCS 330 - Computational Physics Lab 2
PHSCS 360 - Statistical and Thermal Physics
PHSCS 416 - Writing in Physics
PHSCS 427 - Introduction to Astrophysics
<table>
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<tr>
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<td>Applications of Quantum Mechanics</td>
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<td>Introduction to Acoustics</td>
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<td>PHSCS 471</td>
<td>Principles of Optics</td>
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<td>PHSCS 540</td>
<td>Electrical Engineering Principles and Practices for Physicists</td>
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<td>PHSCS 561</td>
<td>(PHSCS-ME En) Fundamentals of Acoustics</td>
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<td>PHSCS 571</td>
<td>Lasers and Atoms</td>
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<td>PHSCS 581</td>
<td>Solid-State Physics</td>
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<td>PHSCS 583</td>
<td>Physics of Nanostructures, Surfaces, and Interfaces</td>
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<td>PHSCS 585</td>
<td>Thin-Film Physics</td>
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<td>PHSCS 586</td>
<td>Transmission Electron Microscopy for Physical Science and Engineering</td>
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<tr>
<td>PHSCS 587</td>
<td>Physics of Semiconductor Devices</td>
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<tr>
<td>PHSCS 588</td>
<td>Scanning Electron Microscopy (SEM) for Physical Science and Engineering</td>
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<tr>
<td>STAT 330</td>
<td>Introduction to Regression</td>
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<tr>
<td>STAT 340</td>
<td>Probability and Inference 2</td>
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<tr>
<td>STAT 381</td>
<td>Statistical Computing</td>
</tr>
<tr>
<td>STAT 420</td>
<td>Big Data Science 1</td>
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<tr>
<td>STAT 421</td>
<td>Big Data Science 2</td>
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<tr>
<td>STAT 435</td>
<td>Nonparametric Statistical Methods</td>
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<tr>
<td>STAT 451</td>
<td>Applied Bayesian Statistics</td>
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<tr>
<td>STAT 462</td>
<td>Quality Control and Industrial Statistics</td>
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<tr>
<td>STAT 466</td>
<td>Introduction to Reliability</td>
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<tr>
<td>STAT 469</td>
<td>Applied Time Series and Forecasting</td>
</tr>
<tr>
<td>STAT 475</td>
<td>Life Contingencies</td>
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<tr>
<td>STAT 511</td>
<td>Statistical Methods for Research 1</td>
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<tr>
<td>STAT 512</td>
<td>Statistical Methods for Research 2</td>
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<tr>
<td>STAT 531</td>
<td>Experimental Design</td>
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<td>STAT 535</td>
<td>Linear Models</td>
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<td>STAT 536</td>
<td>Statistical Learning and Data Mining</td>
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<tr>
<td>STAT 537</td>
<td>Mixed Model Methods</td>
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<tr>
<td>STAT 538</td>
<td>Survival Analysis</td>
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<tr>
<td>ENG T 497R</td>
<td>Global Engineering Outreach Projects (You may take up to 3 credit hours.)</td>
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<tr>
<td>EXSC 462</td>
<td>Clinical Biomechanics</td>
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<tr>
<td>GEOL 440</td>
<td>Solid Earth Geophysics</td>
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<tr>
<td>HONRS 499R</td>
<td>Honors Thesis</td>
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<tr>
<td>IT 548</td>
<td>Cyber-Physical Systems</td>
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</tbody>
</table>
Can I get an emphasis?

We offer an Emphasis in Aerospace. Learn more at: https://www.me.byu.edu/aerospace.

You can also pursue an area of focus by choosing Technical Electives in a specific direction. For example, if you are interested in Robotics, you could take ME EN 437 Kinematics, ME EN 472 Mechanical Systems Design Applications, ME EN 534 Dynamics of Mechanical Systems and/or ME EN 537 Advanced Mechanisms. The other technical elective(s) that you choose are up to you, but these classes would give you a foundation pertaining to Robotics.

Where can I go if I have questions or if I need help?

Parents, siblings, and roommates are excellent sources of advice and wisdom, but if you have questions about the ME major, please come to us.

- We have a caring and knowledgeable Undergraduate Advisor, Miriam Busch, who is always willing to help. You can contact her at mbusch@byu.edu.
- We have a Peer Advisor who has experienced the program first-hand and can help answer questions and provide support. You can contact them at me-advisement@byu.edu
- We have an excellent Advisement Center in the College. You can make an appointment there by calling 801-422-4325, or by stopping in 246 EB.
- We have a well-maintained website. Please visit us there at me.byu.edu
- Don’t hesitate to make an appointment with your faculty advisor, or a professor from one of your classes. We have a fantastic faculty who care very much about your success. You can get contact information for any of our faculty or staff from our website.
<table>
<thead>
<tr>
<th>Technical Area of Focus</th>
<th>Technical Elective Courses</th>
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<tbody>
<tr>
<td>Acoustics</td>
<td>MeEn 535 Mechanical Vibrations</td>
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<tr>
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<td>MeEn 561 Fundamentals of Acoustics</td>
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<tr>
<td>Aerospace</td>
<td>MeEn 415 Flight Vehicle Design</td>
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<td>MeEn 515 Aerodynamics</td>
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<td>MeEn 425 Internal Combustion Engines</td>
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<td>MeEn 426 Gas Turbine and Jet Engine Design</td>
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<td>MeEn 523 Aircraft Structures</td>
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<td>Automotive</td>
<td>MeEn 425 Internal Combustion Engines</td>
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<td>MeEn 501 Stress Analysis and Design of Mechanic Structures</td>
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<tr>
<td>Biomechanics</td>
<td>MeEn 552 Introduction to Neuromechanics</td>
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<td>MeEn 555 Introduction to Biomechanics</td>
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<td>ChEn  518 Biomedical Engineering Principles</td>
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<td>PDBio 305 Human Physiology and Lab</td>
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<td>Chem 351 Organic Chemistry</td>
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<td>Chem 481 Biochemistry</td>
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<tr>
<td>Computer-Aided Engineering</td>
<td>MeEn 570 CAE Software Engineering</td>
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<td>MeEn 578 CAD/CAM Applications</td>
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<td>Design/Manufacturing</td>
<td>MeEn 550 Microelectromechanical Systems (MEMS)</td>
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<td>MeEn 575 Optimization Techniques in Engineering</td>
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<td></td>
<td>MeEn 576 Product Design</td>
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<td>MeEn 578 CAD/CAM Applications</td>
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<td>MeEn 579 Global Product Development</td>
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<tr>
<td>Dynamics and Vibration</td>
<td>MeEn 415 Applied Aerodynamics and Flight Mechanics</td>
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<td>(Mechanics)</td>
<td>MeEn 437 Kinematics</td>
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<td>MeEn 508 Structural Vibrations</td>
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<td>MeEn 534 Dynamics of Mechanical Systems</td>
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<td>MeEn 535 Mechanical Vibrations</td>
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<td>MeEn 537 Advanced Mechanisms: Robotics</td>
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<td>Category</td>
<td>Courses</td>
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<tr>
<td>Fluid Mechanics</td>
<td>MeEn 510 Compressible Fluid Flow</td>
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<td>MeEn 512 Intermediate Fluid Dynamics</td>
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<td>Heat Transfer</td>
<td>MeEn 540 Intermediate Heat Transfer</td>
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<td>MeEn 541 Computational Fluid Dynamics and Heat Transfer</td>
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<tr>
<td>Instrumentation and Controls</td>
<td>MeEn 431 Design of Control Systems</td>
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<td>MeEn 570 Computer-Aided Engineering Software Development</td>
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<td>Materials</td>
<td>MeEn 500 Design and Materials Applications</td>
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<td>MeEn 452 Intermediate Materials</td>
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<td>MeEn 456 Composite Materials Design</td>
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<td>MeEn 558 Metallurgy</td>
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<td>Mechanisms, Robotics</td>
<td>MeEn 437 Kinematics</td>
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<td>MeEn 472 Mechanical Systems Design Applications</td>
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<td>MeEn 537 Advanced Mechanisms, Robotics</td>
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<td>MeEn 538 Compliant Mechanisms</td>
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<td>MeEn 570 CAE Software Engineering</td>
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<td>Stress Analysis &amp; Structures</td>
<td>MeEn 501 Stress Analysis and Design of Mechanical Structures</td>
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<td>MeEn 503 Plasticity and Fracture</td>
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<td>MeEn 506 Continuum Mechanics and Finite Element Analysis</td>
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<td>Thermodynamics</td>
<td>MeEn 422 Applied Thermodynamics</td>
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<td>MeEn 521 Intermediate Thermodynamics</td>
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<td>MeEn 522 Combustion</td>
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Student Opportunities
Student Clubs and Societies
BYU, the College, and the Department provide many interesting and exciting programs. These programs provide valuable opportunities for learning and growth, and will help you learn leadership skills, gain technical experience, and distinguish yourself as an emerging professional.

Department Sponsored Student Chapters of Professional Societies

1. American Society of Mechanical Engineers (ASME)—promotes the art, science and practice of multidisciplinary engineering and allied sciences around the globe.

2. American Institute of Aeronautics and Astronautics (AIAA)—the heart of aerospace. With more than 31,000 members, AIAA is the world’s largest professional society devoted to the progress of engineering and science in aviation, space, and defense.

3. Society of Automotive Engineers (SAE)—a global association of more than 128,000 engineers and related technical experts in the aerospace, automotive and commercial-vehicle industries. SAE International’s core competencies are life-long learning and voluntary consensus standards development.

4. Society for the Advancement of Materials and Process Engineering (SAMPE)—an international society that provides information on new materials and processing technologies through chapter technical presentations, two journal publications, symposia and commercial expositions in which professionals can exchange ideas and air their views. As the only technical society encompassing all fields of endeavor in materials and processes, SAMPE provides a unique and valuable forum for scientists, engineers, designers and academicians.
Fulton College of Engineering and Technology Sponsored Societies

1. Tau Beta Pi (Engineering Honor Society)—founded in 1885 to mark in a fitting manner those who have conferred honor upon their alma mater by distinguished scholarship and exemplary character as undergraduates in the field of engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in the engineering colleges.

2. Society of Women Engineers (SWE)—a national educational and service organization founded in 1950. SWE is the driving force that establishes engineering as a highly desirable career aspiration for women. SWE empowers women to succeed and advance in those aspirations and be recognized for their life-changing contributions and achievements as engineers and leaders.

3. Global Engineering Outreach (GEO)—this group works to solve global needs by creating community-driven development through the design and implementation of sustainable engineering projects. They work to train and involve internationally responsible engineering students.

If you are interested in getting involved in any of these groups, you can find more information on the ME website. BYU also maintains an excellent website for campus clubs at clubs.byu.edu/home.
**Summer Internships**

Another important opportunity is an internship. An internship is a career-appropriate job that you take before you have finished your education. The Mechanical Engineering Department does not require students to obtain an internship, nor do we give credit for internships; however, we strongly encourage it. You do not have to wait until you are a junior or senior—sophomores and even freshmen can get an internship.

**Advantages of an Intern Experience**

Few engineering students have a clear picture of what an engineer actually does. As an intern, you get to work alongside engineers on real-world problems and gain valuable experience. Not all jobs are equally challenging, but most companies try to find an interesting project that will benefit both the intern and the company.

Companies realize that summer internships are great recruiting tools. You get a good look at the company and they get a good look at you. If you have a good experience, you are more likely to accept an offer for permanent employment after you graduate. If they like you, they are more apt to give you a good offer than someone they don’t know.

**How to Obtain an Internship**

1. Visit the College Advisement Center (246 EB). They have information and job listings, as well as a dedicated Career Counselor.
2. The University Career Services Center (2400 WSC) has job listings. They also have many resources to help you research companies to contact.
3. Use BYU Handshake. This is an online resource that connects BYU students to employers and allows users to search job listings, apply for jobs, communicate with recruiters, and schedule on-campus interviews. Log in to handshake.byu.edu.

4. The Mechanical Engineering Department External Relations Coordinator, Lisa Barrager (350 EB), can help you identify opportunities and can also review your resume.

5. Attend the BYU STEM Career Fair. Each Fall and Winter semester, leading companies come to our campus to advertise and recruit. This is an opportunity for you to talk to a representative in person, and many will accept resumes for internships. Come prepared.

6. Talk to people, network with friends and relatives, and find out what jobs are available. Send out resumes. Make appointments for interviews. The more effort you make, the more likely you are to get an internship.

Take practical and consistent measures to obtain an internship. We have resources to assist you in finding and preparing for opportunities, but ultimately the effort and initiative required to succeed depends on you.
Helpful Resources

My Map Tools
My Map is an academic planning tool. It will give you a summary of your University progress, allows you to plan your courses, and allows you to register for classes. It contains the following additional links:

- Campus Map
- Course Catalog
- Class Schedule
- Academic Calendar
- Financial Center
- Registration Topics

https://mymap.byu.edu

College Advisement
The college advisement center is located in 246 EB and has the following resources:

- Career Counseling
- Major/Minor Selection
- Academic Counseling

https://et.byu.edu/Advisement

Learning Suite
Everything you need to stay on top of your classes

https://learningsuite.byu.edu

Math Assistance
- Math Lab: TMCB 159
- Math refresher course
  - https://mathrefresher.et.byu.edu/
Ideas for Different ME Career Trajectories*

BSc in Mechanical Engineering

Career Type:

- Technical
- MBA
- Marketing / Sales
- Managerial
- MS/MBA
- R&D
- PE
- MS
- PhD
- Professor

Freshman
- Join a student Club
- Study abroad with ME
- International experience / research
- Sign up for BYU Honors program

Sophomore
- Undergrad Project (mini-baja, high mileage vehicle, etc.)
- Pursue Internship at Eng Company
- National Lab internship / REU position
- Try some research with an Orca grant

Junior
- Attend career fairs and pursue jobs
- Pursue Internship at Eng Company
- Take on Club leadership role
- Get involved in research via 497R or as RA

Senior
- Technical
- Marketing / Sales
- Managerial
- Take Fundamentals of Engineering (FE) Exam
- Pursue Internship at Eng Company
- Take GRE (and GMAT if going for MBA)
- Apply for National Fellowships
- Publish / present research
- Pursue Internship at Eng Company
- International experience / research
- Take Fundamentals of Engineering (FE) Exam

*Meet with your faculty advisor and undergraduate advisor to develop your own personal map.