

# MECHANICAL ENGINEERING - BS

## What is Mechanical Engineering?

Mechanical engineering is a highly diversified profession. The mechanical engineer designs machines, devices, various products and control systems, and works with the generation, conversion, transmission, and utilization of mechanical and thermal power. Assignments often include analysis and synthesis of mechanical, thermal, and fluid systems. Mechanical engineers are also responsible for characterization, specification, and analysis of materials used in design and manufacturing. Manufacturing systems, robotics, electromechanical devices, and control systems are also the purview of the mechanical engineer. Graduates in mechanical engineering are among the most versatile engineers and enjoy professional employment in industry, government, consulting, and research organizations. The undergraduate program in Mechanical Engineering at Texas A&M University is accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

## Where do Mechanical Engineers Work?

The work of mechanical engineers varies from general engineering to numerous, narrow specialties, as required by the wide variety of employers. A general list, though not in any way exhaustive, of the areas of professional employment opportunities available to mechanical engineers includes: design, construction, controls, materials specification and evaluation, analysis of thermal systems, fluid and solid mechanics, manufacturing, plant engineering, research and development, and technical sales. Many mechanical engineers are promoted to management and administrative positions as well.

## Mechanical Engineering at Texas A&M

Mechanical engineers should possess a thorough understanding of engineering science as well as analytical and practical skills in one of many basic mechanical engineering specialties. The mechanical engineering curriculum at Texas A&M requires students to develop and apply logical thinking, innovative approaches, and ethical standards as a prerequisite for professional competence. The curriculum consists of basic theory courses complemented by laboratory experiences in dynamic systems and controls, design, experimentation, fluid mechanics, heat transfer, manufacturing, and materials. Elective courses are offered in numerous areas including air conditioning, automotive engineering, computer-aided design, control systems, corrosion, energy conversion, internal combustion engines, manufacturing, materials, mechanical design, polymers, mechatronics, metallurgy, power generation, robotics, stress analysis, fluid mechanics, turbomachinery, and others. The selection of elective courses is dictated by the interests and goals of the student, working with departmental advisors and within the curriculum guidelines.

## Experiential Education in Mechanical Engineering

Many students enhance their education by participating in cooperative education and/or professional internships, which offer opportunities for employment in engineering positions while working toward a degree. Numerous study abroad programs are also available for gaining experience and perspectives in the international arena. Participation in student chapters of professional and honor societies provides leadership

opportunities, collegial activities, and learning experiences outside the classroom. Many students also participate in research projects through individual directed studies courses with a professor. The mechanical engineering program culminates with a senior capstone design course sequence highlighted by real-life projects sponsored by various industries. Students benefit from the challenges and gratification that come through direct interaction with practicing engineers.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

## Program Requirements

The freshman year is identical for degrees in aerospace engineering, architectural engineering, civil engineering, computer engineering, computer science, data engineering, electrical engineering, electronic systems engineering technology, environmental engineering, industrial distribution, industrial engineering, interdisciplinary engineering, manufacturing and mechanical engineering technology, mechanical engineering, multidisciplinary engineering technology, nuclear engineering, ocean engineering, and petroleum engineering (Note: not all programs listed are offered in Qatar). The freshman year is slightly different for chemical engineering, biomedical engineering and materials science and engineering degrees in that students take CHEM 119 or CHEM 107/CHEM 117 and CHEM 120. Students pursuing degrees in biological and agricultural engineering should refer to the specific curriculum for this major. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met.

### First Year

| Fall  |  | Semester Credit Hours |
|---|--|-----------------------|
| CHEM 107  | General Chemistry for Engineering Students <sup>1,4</sup>                            | 3                     |
| CHEM 117  | General Chemistry for Engineering Students Laboratory <sup>1,4</sup>                 | 1                     |
| ENGL 103<br>or ENGL 104   | Introduction to Rhetoric and Composition <sup>1</sup><br>or Composition and Rhetoric | 3                     |
| ENGR 102  | Engineering Lab I - Computation <sup>1</sup>   | 2                     |
| MATH 151  | Engineering Mathematics I <sup>1,2</sup>   | 4                     |
| University Core Curriculum ( <a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a> ) <sup>3</sup> |  | 3                     |
| <b>Semester Credit Hours</b>  |  | <b>16</b>             |
| Spring  |  |                       |
| ENGR 216/<br>PHYS 216   | Experimental Physics and Engineering Lab II - Mechanics <sup>1</sup>                 | 2                     |
| MATH 152  | Engineering Mathematics II <sup>1</sup>  | 4                     |
| PHYS 206  | Newtonian Mechanics for Engineering and Science <sup>1</sup>                         | 3                     |
| University Core Curriculum ( <a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a> ) <sup>3</sup> |  | 3                     |
| Select one of the following:  |  | 3-4                   |
| CHEM 120  | Fundamentals of Chemistry II <sup>1,4</sup>  |                       |

University Core Curriculum (<http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/>)<sup>3,5</sup>

**Semester Credit Hours 15-16**

**Total Semester Credit Hours 31-32**

<sup>1</sup> A grade of C or better is required.

<sup>2</sup> Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.

<sup>3</sup> Of the 21 hours shown as University Core Curriculum electives, 3 must be from creative arts (see AREN curriculum for more information), 3 from social and behavioral sciences (see DAEN and IDIS curriculum for more information), 3 from language, philosophy and culture (see CVEN, EVEN and PETE curriculum for more information), 6 from American history and 6 from government/political science. The required 3 hours of international and cultural diversity and 3 hours of cultural discourse may be met by courses satisfying the creative arts, social and behavioral sciences, language, philosophy and culture, and American history requirements if they are also on the approved list of international and cultural diversity (<http://catalog.tamu.edu/undergraduate/general-information/degree-information/international-cultural-diversity-requirements/>) courses and cultural discourse (<http://catalog.tamu.edu/undergraduate/general-information/degree-information/cultural-discourse-requirements/>) courses.

<sup>4</sup> BMEN, CHEN and MSEN require 8 hours of fundamentals of chemistry which are satisfied with CHEM 119 or CHEM 107/CHEM 117 and CHEM 120; Students with an interest in BMEN, CHEN and MSEN can take CHEM 120 second semester freshman year. CHEM 120 will substitute for CHEM 107/CHEM 117.

<sup>5</sup> For BS-PETE, allocate 3 hours to core communications course (ENGL 210, COMM 203, COMM 205, or COMM 243) and/or 3 hours to UCC elective. For BS-MEEN, allocate 3 hours to core communications course (ENGL 203, ENGL 210, or COMM 205) and/or 3 hours to UCC elective.

## Second Year

| Fall                         |   | Semester Credit Hours |
|------------------------------|---|-----------------------|
| ENGR 217/<br>PHYS 217        | Experimental Physics and Engineering Lab III - Electricity and Magnetism <sup>1</sup> | 2                     |
| MATH 251                     | Engineering Mathematics III <sup>1</sup>  | 3                     |
| MEEN 210                     | Geometric Modeling for Mechanical Design <sup>1</sup>                                 | 2                     |
| MEEN 225                     | Engineering Mechanics <sup>1</sup>  | 3                     |
| PHYS 207                     | Electricity and Magnetism for Engineering and Science <sup>1</sup>                    | 3                     |
| STAT 211                     | Principles of Statistics I <sup>1</sup>   | 3                     |
| <b>Semester Credit Hours</b> |   | <b>16</b>             |
| Spring                       |   |                       |
| ECEN 215                     | Principles of Electrical Engineering <sup>1</sup>                                     | 3                     |
| MATH 308                     | Differential Equations <sup>1</sup>   | 3                     |
| MEEN 223                     | Principles of Materials and Manufacturing <sup>1</sup>                                | 2                     |
| MEEN 315                     | Principles of Thermodynamics <sup>1</sup>   | 3                     |
| MEEN 260                     | Mechanical Measurements <sup>1</sup>  | 3                     |

University Core Curriculum (<http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/>)<sup>3</sup>

**Semester Credit Hours 17**

## Summer

High Impact Experience<sup>6</sup> 0

|          |   |  |
|----------|---|--|
| MEEN 399 | High Impact Experience for Mechanical Engineers |  |
|----------|---|--|

**Semester Credit Hours 0**

## Third Year

### Fall

|          |                              |   |
|----------|------------------------------|---|
| MEEN 305 | Solid Mechanics <sup>1</sup> | 3 |
|----------|------------------------------|---|

|          |                              |   |
|----------|------------------------------|---|
| MEEN 344 | Fluid Mechanics <sup>1</sup> | 3 |
|----------|------------------------------|---|

|          |   |   |
|----------|---|---|
| MEEN 345 | Fluid Mechanics Laboratory <sup>1</sup> | 1 |
|----------|---|---|

|          |  |   |
|----------|--|---|
| MEEN 357 | Engineering Analysis for Mechanical Engineers <sup>1</sup> | 3 |
|----------|--|---|

|          |                                      |   |
|----------|--------------------------------------|---|
| MEEN 363 | Dynamics and Vibrations <sup>1</sup> | 3 |
|----------|--------------------------------------|---|

|          |         |   |
|----------|---------|---|
| MEEN 381 | Seminar | 1 |
|----------|---------|---|

University Core Curriculum (<http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/>)<sup>3</sup>

**Semester Credit Hours 17**

### Spring

|          |  |   |
|----------|--|---|
| MEEN 360 | Materials and Manufacturing Selection in Design <sup>1</sup> | 3 |
|----------|--|---|

|          |   |   |
|----------|---|---|
| MEEN 361 | Materials and Manufacturing in Design Laboratory <sup>1</sup> | 1 |
|----------|---|---|

|          |   |   |
|----------|---|---|
| MEEN 364 | Dynamic Systems and Controls <sup>1</sup> | 3 |
|----------|---|---|

|          |   |   |
|----------|---|---|
| MEEN 365 | Dynamic Systems and Controls Lab <sup>1</sup> | 1 |
|----------|---|---|

|          |   |   |
|----------|---|---|
| MEEN 368 | Solid Mechanics in Mechanical Design <sup>1</sup> | 3 |
|----------|---|---|

|          |                            |   |
|----------|----------------------------|---|
| MEEN 461 | Heat Transfer <sup>1</sup> | 3 |
|----------|----------------------------|---|

|          |                                       |   |
|----------|---------------------------------------|---|
| MEEN 464 | Heat Transfer Laboratory <sup>1</sup> | 1 |
|----------|---------------------------------------|---|

**Semester Credit Hours 15**

## Fourth Year

### Fall

|          |   |   |
|----------|---|---|
| ISEN 302 | Economic Analysis of Engineering Projects | 2 |
|----------|---|---|

|          |  |   |
|----------|--|---|
| MEEN 401 | Introduction to Mechanical Engineering Design <sup>1</sup> | 3 |
|----------|--|---|

University Core Curriculum (<http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/>)<sup>3</sup>

Technical elective<sup>7</sup> 9

**Semester Credit Hours 17**

### Spring

|          |                     |   |
|----------|---------------------|---|
| MEEN 402 | Intermediate Design | 3 |
|----------|---------------------|---|

University Core Curriculum (<http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/>)<sup>3</sup>

Technical elective<sup>7</sup> 3

General elective<sup>8</sup> 3

**Semester Credit Hours 15**

**Total Semester Credit Hours 97**

- <sup>6</sup> All students are required to complete a high-impact experience in order to graduate. The list of possible high-impact experiences is available in the MEEN advising office.
- <sup>7</sup> Technical electives: See the Mechanical Engineering Academic Advisor's Office for lists of approved courses. Students must take at least three MEEN technical electives of which at least one course is from the Thermo-fluids Systems area; at least one from Data Science & Experimentation area; and at least one course is from Mechanical & Manufacturing Systems area.
- <sup>8</sup> Select from any 300-499 course.

This curriculum lists the minimum number of classes required for graduation. Additional courses may be taken.

## **Total Program Hours 128**