## ELECTRICAL ENGINEERING - BS

Electrical engineering is a challenging but exciting and rewarding field of study. It is a rich and rapidly advancing field that plays a significant role in shaping all facets of modern society. This includes generating, transmitting and storing electrical energy; developing and utilizing wired and wireless technologies for broadband communications; controlling complex systems; and developing hardware and software systems that are at the core of most devices we interact with on a daily basis. The rapid industrialization and computerization of Qatar’s economy create a need for highly skilled electrical and computer engineers capable to plan, design, implement and manage this transformation. Studying electrical and computer engineering prepares students for assuming key roles with high ethical responsibility in developing and managing the information, communication, and electrical energy infrastructures of Qatar and the world economy.

The program curriculum is designed to prepare graduates for work in the highly diverse electrical engineering profession. A solid foundation in physics, chemistry, and mathematics is used to support courses in the fundamentals of electrical engineering.

The program facilitates the integrated use of computers throughout the curriculum, while laboratory work allows students hands-on experience and to apply basic concepts to a wide range of engineering problems. After their exposure to the most recent analytical techniques and technological developments, students will implement engineering concepts using state-of-the-art computers and laboratory equipment. After foundation studies in analog and digital circuits, signals and systems, electronics, electromagnetic fields, and computer architecture during the sophomore and junior years, students have access to two main elective tracks in the senior year, namely, electric power systems and communications.

The electric power systems track is designed to train students in the theory and techniques related to electromechanical energy conversion systems, electric power, renewable energy, and power electronic systems. The communication track is designed to prepare students to address challenges in the area of digital and wireless communication systems. Both tracks present similar requirements and provide a broad and rigorous educational experience. The program offers additional electives from computer engineering, control, and biomedical engineering areas.

For more information, please visit the Electrical Engineering Program’s website at www.qatar.tamu.edu/programs/ecen (https://www.qatar.tamu.edu/programs/ecen/).

### Program Requirements

The freshman year is identical for degrees in electrical engineering, mechanical engineering, petroleum engineering. The freshman year is slightly different for chemical engineering in that students take CHEM 119 or CHEM 107/CHEM 117 and CHEM 120. 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

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CHEM 107 &amp; CHEM 117</td>
<td>General Chemistry for Engineering Students and General Chemistry for Engineering Students Laboratory</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ENGR 102</td>
<td>Engineering Lab I - Computation</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 151</td>
<td>Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>University Core Curriculum</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Semester Credit Hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>ENGR 216/PHYS 216</td>
<td>Experimental Physics and Engineering Lab I - Mechanics</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHYS 206</td>
<td>Newtonian Mechanics for Engineering and Science</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>University Core Curriculum</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Semester Credit Hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Semester Credit Hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. A grade of C or better is required.
2. 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.
3. Of the 21 hours shown as University Core Curriculum electives, 3 must be from language, philosophy and culture, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 3 hours from international and cultural diversity and 3 hours from cultural discourse may be met by courses satisfying the language, philosophy and culture, creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity or cultural discourse courses.
4. CHEN requires 8 hours of freshman chemistry, which may be satisfied by CHEM 119 or CHEM 107/CHEM 117 and CHEM 120; Credit by Examination (CBE) for CHEM 119 or CHEM 107/CHEM 117 plus CHEM 120.

### Second Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>ECEN 209</td>
<td>Introduction to Computer Programming and Algorithms</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECEN 248</td>
<td>Introduction to Digital Systems Design</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>ENGR 217/PHYS 217</td>
<td>Experimental Physics and Engineering Lab III - Electricity and Magnetism</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
</tr>
</tbody>
</table>
Electrical Engineering - BS

PHYS 207  Electricity and Magnetism for Engineering and Science  3

Semester Credit Hours  15

Spring
ECEN 214  Electrical Circuit Theory  4
ECEN 250  Machine Learning for Electrical Engineering  3
MATH 308  Differential Equations  3
MATH 311  Topics in Applied Mathematics I  3
PHYS 222  Modern Physics for Engineers  3

Semester Credit Hours  16

Third Year
Fall
ECEN 314  Signals and Systems  3
ECEN 322  Electric and Magnetic Fields  3
ECEN 325  Electronics  4
ECEN 340  Electric Energy Conversion  3
ENGL 210  Technical and Professional Writing  3

Semester Credit Hours  16

Spring
ECEN 303  Random Signals and Systems  3
ECEN 350/CSCE 350  Computer Architecture and Design  4
ECEN 370  Electronic Properties of Materials  3
University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)  3
Technical electives  3

Semester Credit Hours  16

Fourth Year
Fall
ECEN 403  Electrical Design Laboratory I  3
University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)  6
ECEN elective  9
High Impact Experience  6
ECEN 399  High Impact Professional Development

Semester Credit Hours  18

Spring
ECEN 404  Electrical Design Laboratory II  3
University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)  3
ECEN elective  10

Semester Credit Hours  16

Total Semester Credit Hours  97

5 Select from ASTR 314, CSCE 313, CSCE 314, ESET 352, MATH 414, MATH 442, MATH 470, MATH 471, MEEN 221, MEEN 222/MSEN 222, MEEN 315, MSEN 325, PHYS 221.

6 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 advising office.

7 Select from ECEN 326, ECEN 333, ECEN 338, ECEN 410-480 (http://catalog.tamu.edu/undergraduate/course-descriptions/ecen/), ECEN 489.

Total Program Hours 128