BIOMEDICAL ENGINEERING - BS

Program Requirements

The freshman year is identical for degrees in aerospace engineering, architectural engineering, civil engineering, computer engineering, computer science, 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/CHEN 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students (Note: not all programs listed are offered in Qatar)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students (Note: not all programs listed are offered in Qatar)</td>
<td>1</td>
</tr>
<tr>
<td>ENGL 103</td>
<td>Introduction to Rhetoric and Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 102</td>
<td>Engineering Lab I - Computation</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
</tr>
</tbody>
</table>

Second Year

Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMEN 101</td>
<td>Introduction to Biomedical Engineering</td>
<td>1</td>
</tr>
<tr>
<td>BMEN 207</td>
<td>Computing for Biomedical Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 217</td>
<td>Experimental Physics and Engineering Lab</td>
<td>2</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 207</td>
<td>Electricity and Magnetism for Engineering and Science</td>
<td>3</td>
</tr>
<tr>
<td>VTPP 434</td>
<td>Physiology for Bioengineers I</td>
<td>4</td>
</tr>
</tbody>
</table>

Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMEN 211</td>
<td>Biomedical Applications of Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMEN 253</td>
<td>Medical Device Design I</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>VTPP 435</td>
<td>Physiology for Bioengineers II</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following:

- CHEM 120  Fundamentals of Chemistry II 4
- University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) 3,5

Total Semester Credit Hours 31-32
ENGL 210  |  Technical and Business Writing | Semester Credit Hours
---|---|---

### Third Year

#### Fall

- BMEN 305  |  Bioinstrumentation  
- BMEN 321  |  Biomedical Electronics  
- BMEN 341  |  Biofluid Mechanics  
- BMEN 343  |  Introduction to Biomaterials  
- BMEN 350  |  Statistics for Biomedical Engineering  
- University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curruculum/)  
- High Impact Experience  
- BMEN 399  |  Engineering Professional Development

#### Spring

- BMEN 344  |  Biological Responses to Medical Devices  
- BMEN 345  |  Biomedical Devices Lab  
- BMEN 353  |  Medical Device Design II  
- BMEN 361  |  Biosolid Mechanics  
- BMEN 420  |  Medical Imaging  
- University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)  
- Technical electives

### Fourth Year

#### Fall

- BMEN 452  |  Mass and Energy Transfer in Biosystems  
- BMEN 453  |  Analysis and Design Project I  
- BMEN 465  |  Biomechanics Experiential Learning Lab  
- University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)  
- Technical electives

#### Spring

- BMEN 450  |  Case Studies  
- BMEN 454  |  Analysis and Design Project II  
- University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)  
- Technical electives

### Total Semester Credit Hours

- Total Program Hours 128
- Bioinstrumentation
  - Required courses
  - BMEN 322  |  Biosignal Analysis  
  - BMEN 401  |  Principles and Analysis of Biological Control Systems  
  - BMEN 428/CSCE 461  |  Embedded Systems for Medical Applications

### Biomaterials

- Select from the following:
  - BMEN 480  |  Biomedical Engineering of Tissues  
  - BMEN 482  |  Polymeric Biomaterials  
  - BMEN 483  |  Polymer Biomaterial Synthesis  
  - BMEN 486  |  Biomedical Nanotechnology  
  - BMEN 487  |  Drug Delivery

### Biomechanics

- Select from the following:
  - BMEN 291  |  Research  
  - BMEN 491  |  Research

### Technical Electives

- Technical electives are to be selected from the course list below. Students must select one of the following tracks and take 15 hours from within that track: Bioinstrumentation, Biomaterials, Biomechanics, or Biomolecular & Cellular Engineering. Course selection should be done in consultation with student’s advisor and track coordinator.

### Writing Intensive Courses

- Writing intensive course.

### High Impact Experience

- All students are required to complete a high-impact experience in order to graduate. A list of possible high-impact experiences is available in the BMEN advising office.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMEN 432</td>
<td>Molecular and Cellular Biomechanics</td>
</tr>
<tr>
<td>BMEN 457</td>
<td>Orthopedic Biomechanics</td>
</tr>
<tr>
<td>BMEN 458</td>
<td>Motion Biomechanics</td>
</tr>
<tr>
<td>BMEN 461</td>
<td>Cardiac Mechanics</td>
</tr>
<tr>
<td>BMEN 463</td>
<td>Soft Tissue Mechanics and Finite Element Methods</td>
</tr>
<tr>
<td>BMEN 468</td>
<td>Advanced Biomechanics</td>
</tr>
<tr>
<td>BMEN 471</td>
<td>Numerical Methods in Biomedical Engineering</td>
</tr>
<tr>
<td>MEEN 363</td>
<td>Dynamics and Vibrations</td>
</tr>
<tr>
<td>MEEN 368</td>
<td>Solid Mechanics in Mechanical Design</td>
</tr>
<tr>
<td>MEEN 440</td>
<td>Bio-inspired Engineering Design</td>
</tr>
<tr>
<td>MEEN 441</td>
<td>Design of Mechanical Components and Systems</td>
</tr>
<tr>
<td>MEEN 442</td>
<td>Computer Aided Engineering</td>
</tr>
<tr>
<td>MEEN 444</td>
<td>Finite Element Analysis in Mechanical Engineering</td>
</tr>
</tbody>
</table>

**Biomolecular and Cellular Engineering**

**Required courses**  
6

- BMEN 431 Biomolecular Engineering
- BMEN 433 Biomolecular and Cellular Engineering Laboratory

**Select from the following:**  
6-9

- BMEN 291 Research  
  or BMEN 471 Numerical Methods in Biomedical Engineering  
  or BIOL 350 or Computational Genomics
- BMEN 432 Molecular and Cellular Biomechanics

**Select up to one course from the following:**

- BMEN 480 Biomedical Engineering of Tissues
- BMEN 486 Biomedical Nanotechnology
- BMEN 487 Drug Delivery

**Select from the following to apply to any of the tracks above:**  
0-3

- ACCT 640 Accounting Concepts and Procedures I
- BMEN 400/ VTPP 401 History of Human and Veterinary Medicine in Europe
- BMEN 404 FDA Good Laboratory and Clinical Practices
- BMEN 469 Entrepreneurial Pathways in Medical Devices
- CHEM 228 Organic Chemistry II
- VTPB 410 Cell Mechanisms of Disease

400-Level BMEN with department approval  
(http://catalog.tamu.edu/undergraduate/course-descriptions/bmen/)