**University Core and Graduation Requirements**

### University Core Requirements:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Religion Cornerstones</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teachings and Doctrine of The Book of Mormon</td>
<td>1</td>
<td>2.0</td>
<td>REL A 275</td>
</tr>
<tr>
<td>Jesus Christ and the Everlasting Gospel</td>
<td>1</td>
<td>2.0</td>
<td>REL A 250</td>
</tr>
<tr>
<td>Foundations of the Restoration</td>
<td>1</td>
<td>2.0</td>
<td>REL C 225</td>
</tr>
<tr>
<td>The Eternal Family</td>
<td>1</td>
<td>2.0</td>
<td>REL C 200</td>
</tr>
<tr>
<td><strong>The Individual and Society</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Heritage</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</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td></td>
<td></td>
<td></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>PHSCS 416 or ENGL 316</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
<td>4.0</td>
<td>MATH 113*</td>
</tr>
<tr>
<td>Languages of Learning (Math or Language)</td>
<td>1</td>
<td>4.0</td>
<td>MATH 113*</td>
</tr>
<tr>
<td><strong>Arts, Letters, and Sciences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civilization 1</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Civilization 2</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>Letters</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Biological Science</td>
<td>1</td>
<td>3-4.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Physical Science</td>
<td>1</td>
<td>3.0</td>
<td>PHSCS 222*</td>
</tr>
<tr>
<td>Social Science</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td><strong>Core Enrichment: Electives</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion Electives</td>
<td>3-4</td>
<td>6.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Open Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
</tr>
</tbody>
</table>

*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (7 hours overlap)*

### Graduation Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum residence hours required</td>
<td>30.0</td>
</tr>
<tr>
<td>Minimum hours needed to graduate</td>
<td>120.0</td>
</tr>
</tbody>
</table>

**Suggested Sequence of Courses**

### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Semester</td>
<td>15.0</td>
</tr>
<tr>
<td>First-year Writing</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 112 (FWSpSu)</td>
<td>4.0</td>
</tr>
<tr>
<td>PHSCS 227 (F)</td>
<td>3.0</td>
</tr>
<tr>
<td>PHSCS 230 (FW)</td>
<td>1.0</td>
</tr>
<tr>
<td>MATH 302</td>
<td>4.0</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td>15.0</td>
</tr>
</tbody>
</table>

### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Semester</td>
<td>15.5</td>
</tr>
<tr>
<td>PHSCS 220 (FWSu)</td>
<td>3.0</td>
</tr>
<tr>
<td>PHSCS 227 (F)</td>
<td>3.0</td>
</tr>
<tr>
<td>PHSCS 230 (FW)</td>
<td>1.0</td>
</tr>
<tr>
<td>MATH 302</td>
<td>4.0</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
</tr>
<tr>
<td>General Electives</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td>15.5</td>
</tr>
</tbody>
</table>

### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Semester</td>
<td>15.0</td>
</tr>
<tr>
<td>PHSCS 222 (FW)</td>
<td>3.0</td>
</tr>
<tr>
<td>PHSCS 228 (W)</td>
<td>3.0</td>
</tr>
<tr>
<td>Biological Science</td>
<td>3.0</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td>15.0</td>
</tr>
</tbody>
</table>

### SENIOR YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th Semester</td>
<td>16.0</td>
</tr>
<tr>
<td>PHSCS 318 (FWSp)</td>
<td>3.0</td>
</tr>
<tr>
<td>PHSCS 321 (FSp)</td>
<td>3.0</td>
</tr>
<tr>
<td>Civilization 1</td>
<td>3.0</td>
</tr>
<tr>
<td>Social Science</td>
<td>3.0</td>
</tr>
<tr>
<td>Religion Elective</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td>16.0</td>
</tr>
</tbody>
</table>

**Note:** Students are encouraged to complete an average of 15 credit hours each semester or 30 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.
**BS in Physics and Astronomy (694832)**

**2018-2019 Program Requirements (68 - 69 Credit Hours)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No more than 3 hours of D credit is allowed in major courses.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>REQUIREMENT 1</strong></td>
<td>Complete 1 option</td>
</tr>
<tr>
<td><strong>OPTION 1.1</strong></td>
<td>Complete 20 courses</td>
</tr>
<tr>
<td>C S 142 - Introduction to Computer Programming</td>
<td>3.0</td>
</tr>
<tr>
<td>*MATH 113 - Calculus 2</td>
<td>4.0</td>
</tr>
<tr>
<td>PHCS 121 - Introduction to Newtonian Mechanics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 123 - Introduction to Waves, Optics, and Thermodynamics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 127 - Descriptive Astronomy</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 191 - Introduction to Physics Careers and Research 1</td>
<td>0.5</td>
</tr>
<tr>
<td>PHCS 220 - Introduction to Electricity and Magnetism</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 222 - Modern Physics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 227 - Solar System Astronomy</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 228 - Stellar and Extragalactic Astronomy</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 230 - Computational Physics Lab 1</td>
<td>1.0</td>
</tr>
<tr>
<td>PHCS 291 - Introduction to Physics Careers and Research 2</td>
<td>0.5</td>
</tr>
<tr>
<td>PHCS 318 - Introduction to Mathematical Physics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 321 - Mechanics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 329 - Observational Astronomy</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 330 - Computational Physics Lab 2</td>
<td>1.0</td>
</tr>
<tr>
<td>PHCS 427 - Introduction to Astrophysics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 428 - Introduction to Astrophysics</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 441 - Electrostatics and Magnetism</td>
<td>3.0</td>
</tr>
<tr>
<td>PHCS 451 - Quantum Mechanics</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**REQUIREMENT 2 Complete 2 courses**

- PHCS 360 - Statistical and Thermal Physics | 3.0
- PHCS 442 - Electrodynamics | 3.0
- PHCS 452 - Applications of Quantum Mechanics | 3.0
- PHCS 471 - Principles of Optics | 3.0

**REQUIREMENT 3 Complete 1 option**

<table>
<thead>
<tr>
<th>OPTION 3.1</th>
<th>Complete 2 courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 302 - Mathematics for Engineering 1</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH 303 - Mathematics for Engineering 2</td>
<td>4.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION 3.2</th>
<th>Complete 3 courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 313 - Elementary Linear Algebra</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 314 - Calculus of Several Variables</td>
<td>3.0</td>
</tr>
<tr>
<td>MATH 334 - Ordinary Differential Equations</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**REQUIREMENT 4 Complete 1 option**

**SENIOR THESIS:**

- Complete a senior thesis, including the following:
  - **A.** Choose a research mentor and group as early as possible, starting with information in Phscs 191 and 192, and discussions with faculty, your advisor, and the senior thesis coordinator. It is best to start as a freshman or sophomore. Some internships may qualify for your project.
  - **OPTION 4.1 Complete 2.0 hours from the following course(s)**
    - PHCS 498R - Senior Thesis
      - You may take up to 2 credit hours.

<table>
<thead>
<tr>
<th>REQUIREMENT 5</th>
<th>Students are required to take the Physics &quot;Major Field Test&quot; the last semester before they graduate. The test is a standardized assessment of undergraduate physics written by ETS (Educational Testing Service). The ETS website contains a description of the exam and sample problems: <a href="http://www.ets.org/mft/about/content/physics">http://www.ets.org/mft/about/content/physics</a>. Results of the exam do not appear on the transcript or affect the GPA. Students should contact the Physics undergraduate secretary to make arrangements for taking the exam; typically it’s done in the Testing Center before mid-semester.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: Phscs 191 should be taken the first semester as a freshman. Phscs 291 should be taken the first semester as a sophomore.</td>
<td></td>
</tr>
</tbody>
</table>

**THE DISCIPLINE:**

Over the centuries physicists and astronomers have studied the fundamental principles that govern the structure and dynamics of matter and energy in the physical world, from subatomic particles to the cosmos. Physicists also apply this understanding to the development of new technologies. For example, physicists invented the first lasers and semiconductor electronic devices.

Physics and astronomy students learn to approach complex problems in science and technology from a broad background in mechanics, electricity and magnetism, statistical and thermal physics, quantum mechanics, relativity, and optics. The tools they develop at BYU include problem solving by mathematical and computational modeling, as well as experimental discovery and analysis. All students gain professional experience in a research, capstone, or internship project, usually in close association with faculty. Together these experiences can provide excellent preparation for employment or for graduate studies in physics, other sciences, engineering, medicine, law, or business.

Most physicists and astronomers work in research and development in industrial, government, or university labs to solve new problems in technology and science. They also share the beauty discovered in our physical universe by teaching in high schools, colleges, and universities.

**CAREER OPPORTUNITIES:**

A degree in physics or physics-astronomy can provide:

1. Preparation for those who intend to enter industrial or governmental service as physicists or astronomers.
2. Education for those who intend to pursue graduate work in physics or astronomy.
3. Education in the subject matter of physics for prospective teachers of the physical sciences.
4. Undergraduate education for those who will pursue graduate work in the professions: business (e.g., an MBA), law, medicine, etc.
5. Fundamental background for other physical sciences and engineering, in preparation for graduate study in these fields.
6. Physics fundamentals required by the biological science, medical, dental, nursing, and related programs.

For more information, see www.physics.byu.edu/undergraduate/careers.

**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

FACULTY ADVISORS ASSIGNED BY LAST TWO DIGITS OF BYU ID NUMBER. CONTACT:

Department of Physics and Astronomy
Brigham Young University
N-283 ESC
Provo, UT 84602
Telephone: (801) 422-4361

ADVISEMENT CENTER INFORMATION

Physical and Mathematical Sciences College Advisement Center
Brigham Young University
N-181 ESC
Provo, UT 84602
Telephone: (801) 422-2674