

BS in Applied Physics (694825) MAP Sheet

Physical and Mathematical Sciences, Physics and Astronomy

For students entering the degree program during the 2023-2024 curricular year.



| University Core and Graduation Requirements | | | | Suggested Sequence of Courses | | | |
|---|-----------------|--------------|-----------------------|--|-------------|---|-------------|
| University Core Requirements: | | | | FRESHMAN YEAR | | | |
| Requirements | #Classes | Hours | Classes | 1st Semester | | JUNIOR YEAR | |
| Religion Cornerstones | | | | 5th Semester | | | |
| Teachings and Doctrine of The Book of Mormon | 1 | 2.0 | REL A 275 | PHSCS 121 (FWSp) | 3.0 | PHSCS 245 (FW) | 2.0 |
| Jesus Christ and the Everlasting Gospel | 1 | 2.0 | REL A 250 | PHSCS 191 (F) | 0.5 | PHSCS 318 (FW) | 3.0 |
| Foundations of the Restoration | 1 | 2.0 | REL C 225 | MATH 112 (FWSpSu) | 4.0 | PHSCS 321 (FSp) | 3.0 |
| The Eternal Family | 1 | 2.0 | REL C 200 | First-year Writing | 3.0 | PHSCS 330 (FSp) | 1.0 |
| The Individual and Society | | | | General Electives | 2.0 | Social Science | 3.0 |
| American Heritage | 1-2 | 3-6.0 | from approved list | Religion Cornerstone course | 2.0 | Religion elective | 2.0 |
| Global and Cultural Awareness | 1 | 3.0 | from approved list | Total Hours | 14.5 | Total Hours | 14.0 |
| Skills | | | | 2nd Semester | | 6th Semester | |
| First Year Writing | 1 | 3.0 | from approved list | PHSCS 123 (FWSp) | 3.0 | PHSCS 430 (WSu) | 1.0 |
| Advanced Written and Oral Communications | 1 | 3.0 | PHSCS 416 or WRTG 316 | MATH 113 (FWSpSu) | 4.0 | Applied Physics Elective 1 | 3.0 |
| Quantitative Reasoning | 1 | 4.0 | MATH 112* | C S 111 (FWSp) | 3.0 | Applied Physics Elective 2 | 3.0 |
| Languages of Learning (Math or Language) | 1 | 4.0 | MATH 112* | American Heritage | 3.0 | Arts | 3.0 |
| Arts, Letters, and Sciences | | | | Religion Cornerstone course | 2.0 | Global & Cultural Awareness | 3.0 |
| Civilization 1 | 1 | 3.0 | from approved list | Total Hours | 15.0 | Religion Elective | 2.0 |
| Civilization 2 | 1 | 3.0 | from approved list | SOPHOMORE YEAR | | Total Hours | 15.0 |
| Arts | 1 | 3.0 | from approved list | 3rd Semester | | SENIOR YEAR | |
| Letters | 1 | 3.0 | from approved list | PHSCS 220 (FWSp) | 3.0 | 7th Semester | |
| Biological Science | 1 | 3-4.0 | from approved list | PHSCS 225 (FW)* | 2.0 | PHSCS 441 (FSp) | 3.0 |
| Physical Science | 1 | 3.0 | PHSCS 222* | PHSCS 230 (FW) | 1.0 | Applied Physics Elective 3 | 3.0 |
| Social Science | 1 | 3.0 | from approved list | PHSCS 291 (F) | 0.5 | Civilization 1 | 3.0 |
| Core Enrichment: Electives | | | | MATH 302 (FW)** | 4.0 | Letters | 3.0 |
| Religion Electives | 3-4 | 6.0 | from approved list | Biological Science | 3.0 | General Elective | 2.0 |
| Open Electives | Variable | Variable | personal choice | Religion Cornerstone course | 2.0 | Religion Elective | 2.0 |
| *THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (7 hours overlap) | | | | Total Hours | 15.5 | Total Hours | 16.0 |
| Graduation Requirements: | | | | 4th Semester | | 8th Semester | |
| Minimum residence hours required | | 30.0 | | PHSCS 222 (FWSp) | 3.0 | PHSCS 416 (W) | 3.0 |
| Minimum hours needed to graduate | | 120.0 | | PHSCS 240 (FW) | 2.0 | PHSCS 442 (WSu) or PHSCS 471 (WSu) or EC EN 466 (F) | 3.0 |
| | | | | MATH 303 (FW) | 4.0 | Applied Physics elective 4 | 3.0 |
| | | | | General Elective | 3.0 | PHSCS 492R or PHSCS 498R (Senior thesis or capstone credit; FWSpSu) | 2.0 |
| | | | | Religion cornerstone course | 2.0 | General Elective | 2.0 |
| | | | | Total Hours | 14.0 | Civilization 2 | 3.0 |
| | | | | | | Total Hours | 16.0 |
| | | | | 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. | | | |

Requirement 1- Complete 17 Courses

C S 111 - Intro to Computer Science 3.0
 MATH 113 - Calculus 2 4.0
 PHSCS 121 - Intro to Newtonian Mechanics 3.0
 PHSCS 123 - Intro to Waves, Optics, Thermo 3.0
 PHSCS 191 - Intro Phscs Careers & Rsrch 1 0.5
 PHSCS 220 - Intro Electricity & Magnetism 3.0
 PHSCS 222 - Modern Physics 3.0
 PHSCS 225 - Intro to Experimental Physics 2.0
 PHSCS 230 - Computational Physics Lab 1 1.0
 PHSCS 240 - Dsgn, Fabricatn, Sci Apparatus 2.0
 PHSCS 245 - Experiments in Contemp Phscs 2.0
 PHSCS 291 - Intro Phscs Careers & Rsrch 2 0.5
 PHSCS 318 - Intro Math Physics 3.0
 PHSCS 321 - Mechanics 3.0
 PHSCS 330 - Computational Physics Lab 2 1.0
 PHSCS 430 - Computational Physics Lab 3 1.0
 PHSCS 441 - Electricity & Magnetism 3.0

Requirement 2 — Complete 1 of 3 Courses

Note: Although Ec En 466 has some Ec En classes listed as prerequisites, they are often waived for Applied Physics majors. Specifically, Ec En 466 can be taken with no other prereqs as long as the student has taken Phscs 441. However, it is still recommended for students who have taken Phscs 441 to also take Phscs 442 or Ec En 462 prior to taking Ec En 466. Interested students should talk to the Ec En 466 instructor about their specific backgrounds.

EC EN 466 - Intro to Optical Engineering 2.0
 PHSCS 442 - Electrodynamics 3.0
 PHSCS 471 - Principles of Optics 3.0

Requirement 3 — Obtain confirmation from your advisement center that you have completed the following:

After gaining department advisor's approval of courses selected to define an option, complete an additional 12 hours of electives (cannot include any courses already taken above). These 12 hours must consist of a coherent set of upper-division courses with an identified educational goal. Nine hours must be upper division (300-level or above); three hours must be 200-level or above.

Requirement 4 — Complete 1 of 2 Options**Option 4.1 — Complete 2 Courses**

MATH 302 - Math for Engr 1 4.0
 MATH 303 - Math for Engineering 2 4.0

Option 4.2 — Complete 4 Courses

MATH 213 - Elementary Linear Algebra 2.0
 MATH 215 - Computational Linear Algebra 1.0
 MATH 314 - Calculus of Several Variables 3.0
 MATH 334 - Ordinary Differential Equation 3.0

Requirement 5 — Complete 2 hours

Complete a capstone project or senior thesis including the following:

A. Choose a research mentor and group as early as possible, starting with information in Phscs 191 and 291, and discussions with faculty, your advisor, and the capstone project coordinator or senior thesis coordinator. It is best to start as a freshman or sophomore. Interdisciplinary work in other departments or in internships is possible.

Option 5.1 — Complete up to 2 hours

B. Complete 2 hours of one of the following:

PHSCS 492R - Capstone in Applied Phscs - *You may take up to 2.0 credit hours* 2.0
 PHSCS 498R - Senior Thesis - *You may take up to 2.0 credit hours* 0.5

Requirement 6 — Obtain confirmation from your advisement center that you have completed the following:

Students are required to take the Physics "Major Field Test" 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: <http://www.ets.org/mft/about/content/physics>. 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.

Note 1: Students planning careers in experimental, applied, or industrial physics should complete Stat 201.

Note 2: All students will benefit, through courses or individual study, by learning programming skills and numerical methods beyond what you are taught in C S 111 and our computational physics courses. Consider the following: CS courses, Math 410, Me En 373.

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.

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 students 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.

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

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ADVISEMENT CENTER INFORMATION**Physical and Mathematical Sciences College Advisement Center**

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