BS in APPLIED PHYSICS (694825) MAP Sheet

Department of Physics and Astronomy

For students entering the degree program during the 2016–2017 curricular year.

UNIVERSITY CORE AND GRADUATION REQUIREMENTS

UNIVERSITY CORE REQUIREMENTS

Requirements	#Classes	Hours	Classes
Religion Cornerstones			
Teachings and Doctrine, Book of Mormon	1	2.0	Rel A 275
Jesus Christ & the Everlasting Gospel	1	2.0	Rel A 250
Foundations of the Restoration	1	2.0	Rel C 225
The Eternal Family	1	2.0	Rel C 200
The Individual and Society			
Citizenship			
American Heritage	1–2	3–6.0	from approved list
Global & Cultural Awareness	1	3.0	from approved list
Skills			
Effective Communication			
First-Year Writing	1	3.0	from approved list
Adv Written & Oral Communication	1	3.0	Phscs 416 or Engl 316
Quantitative Reasoning	1	4.0	Math 113*
Languages of Learning (Math or Language)	1	4.0	Math 113*
Arts, Letters, and Sciences			
Civilization 1 and 2	2	6.0	from approved list
Arts	1	3.0	from approved list
Letters	1	3.0	from approved list
Scientific Principles & Reasoning			
Biological Science	1–2	3–5.0	from approved list
Physical Science	1	3.0	Phscs 222*
Social Science	1	3.0	from approved list
Core Enrichment: Electives			
Religion Electives	3–4	6.0	from approved list
Open Electives	Variable	Variable	personal choice

GRADUATION REQUIREMENTS:

Minimum residence hours required	30.0
Minimum hours needed to graduate	120.0

PROGRAM REQUIREMENTS (61–65 total hours)

No more than 3 hours of D credit is allowed in major courses.

Consult with a faculty advisor as early as possible to choose electives.

Complete the following:

C S	142	Introduction to Computer Programming	3.0
Phscs	121	Introduction to Newtonian Mechanics	3.0
Phscs	123	Intro to Waves, Optics, & Thermodynamics	3.0
Phscs	140	Electronics Lab	1.0
Phscs	145	Experimental Methods in Physics	1.0
Phscs	191	Intro to Physics Careers & Research 1	0.5
Phscs	220	Intro to Electricity & Magnetism	3.0
Phscs	222*	Modern Physics	3.0
Phscs	230	Computational Physics Lab 1	1.0
Phscs	240	Design, Fabrication, & Use of Scientific Apparatus	2.0
Phscs	245	Experiments in Contemporary Physics	2.0
Phscs	291	Intro to Physics Careers & Research 2	0.5
Phscs	318	Intro to Mathematical 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	Electrostatics and Magnetism	3.0

Note: Phscs 191 should be taken the first semester as a freshman. Phscs 291 should be taken first semester as a sophomore.

Complete one course from the following:

EC En	466	Introduction to Optical Engineering	2.0
Phscs	442	Electrodynamics	3.0
Phscs	471	Principles of Optics	3.0

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.

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Complete one of the following options:

Either

Math	113*	Calculus 2	4.0
Math	302	Mathematics for Engineering 1	4.0

Or

Math	113*	Calculus 2	4.0
Math	313	Elementary Linear Algebra	3.0
Math	314	Calculus of Several Variables	3.0

Complete one course from the following:

Math	303	Mathematics for Engineering 2	4.0
Math	334	Ordinary Differential Equations	3.0

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 & 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 depts or in internships is possible.

b. Complete 2 hours of one of the following:

Phscs	492R	Capstone Project in Applied Physics	2.0
Phscs	498R	Senior Thesis	3.0V

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 142 and our computational physics courses. Consider the following: CS courses , Math 410, Me En 373.

Sample Elective Courses

There is great flexibility in choosing elective courses. As soon as possible, meet with the assistant chair to define an emphasis and choose 12 credit hours of electives that meet career goals. The tracks below are only suggested. Students are free to design their own tracks or modify those below.

Acoustics: Phscs 461 and choices from EC En 380, 487, Me En 312, 335, 363.

Aerospace Engineering (preparation for graduate school in engineering): CE En 103, 203, Me En 415; consider capstone project with engineering research group.

Biophysics: biology, biochemistry, PDBio 568.

(Continued on next page.)

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

FOR UNIVERSITY CORE OR MAJOR QUESTIONS CONTACT THE ADVISEMENT CENTER
Physical and Mathematical Sciences College Advisement Center
N-181 ESC
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FACULTY ADVISORS ASSIGNED BY LAST TWO DIGITS OF BYU ID NUMBER, CONTACT::
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Computer Science/Computer Engineering/Scientific Computing: Courses in computer programming, information technology, networks, numerical analysis (math), computer engineering that fit career goals.

Electrical Engineering (graduate school preparation): EC En 320, 380, and 400-level courses. Consider capstone project with engineering research group.

Materials Science (graduate school preparation): Phscs 451, 452, 581; Chem 105; Chem 106 or 111; Chem 112.

Microelectronics/Semiconductor Devices: Chem 105; Phscs 281 or 581; EC En 450 or Phscs 587; Stat 201.

Nuclear Physics (power generation for industry or Navy): Phscs 360, 451, 452, Me En 422.

Optical Communication Engineering: Phscs 471, 571, EC En 380, 466, 555, 562.

Optical/Laser Engineering: Phscs 442; Phscs 471 and /or 571; EC En 466; EC En 555 and /or 562.

Premedicine, Prelaw (including patent law), Prebusiness: Courses in specialty.

Suggested Sequence of Courses:

FRESHMAN YEAR

1st Semester

First-year Writing	3.0
or A Htg 100	(3.0)
Math 113 (FWSpSu)	4.0
Phscs 121 (FWSp)	3.0
Phscs 191 (F)	0.5
Religion Cornerstone course	2.0
General electives	2.0
Total Hours	**14.5**

2nd Semester

A Htg 100	3.0
or First-year Writing	(3.0)
Math 302 (FW)	4.0
Phscs 123 (FWSp)	3.0
Phscs 140 (WSp)	1.0
Religion Cornerstone course	2.0
C S 142	3.0
Total Hours	**16.0**

SOPHOMORE YEAR

3rd Semester

Phscs 145 (FSu)	1.0
Phscs 220 (FWSu)	3.0
Phscs 230 (FW)	1.0
Phscs 291 (F)	0.5
Biological Science	3.0
Religion Cornerstone course	2.0
Social Science	3.0
General Elective	2.0
Total Hours	**15.5**

4th Semester

Math 303 (FW)	4.0
Phscs 222 (FW)	3.0
Phscs 240 (FW)	2.0
Religion Cornerstone course	2.0
General Elective	3.0
Total Hours	**14.0**

JUNIOR YEAR

5th Semester

Phscs 245 (FW)	2.0
Phscs 318 (FWSp)	3.0
Phscs 321 (FSp)	3.0
Phscs 330 (FSp)	1.0
Global and Cultural Awareness	3.0
Religion Elective	2.0
Total Hours	**14.0**

6th Semester

Phscs 430 (WSu)	1.0
Physics Elective	3.0
Physics Elective	3.0
Arts	3.0
Religion Elective	2.0
General Elective	3.0
Total Hours	**15.0**

SENIOR YEAR

7th Semester

Phscs 441 (FSp)	3.0
Phscs 492R or Phscs 498R (FWSpSu)	2.0
Physics Elective	3.0
Civilization 1	3.0
Letters	3.0
Religion Elective	2.0
Total Hours	**16.0**

8th Semester

Phscs 416 (W)	3.0
Phscs 442 (WSu)	3.0
Or Phscs 471 (WSu)	(3.0)
Civilization 2	3.0
Physics Elective	3.0
General Elective	3.0
Total Hours	**15.0**

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 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 examples, 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 experience can provide excellent preparation for employment of 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.

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.

Department of Physics and Astronomy

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