

Department of
Physics



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Introduction

“The most incomprehensible thing about the universe is that it is comprehensible.” - Albert Einstein

Physics is devoted to the study of matter and energy on a range of scales extending from the subatomic scale to the size of the entire universe. Advances in our understanding of matter and its interactions have led to great scientific and technological progress. This progress will continue in the future as physicists refine their tools and techniques of inquiry.

A background in Physics opens up a wide variety of career opportunities in such fields as acoustics, astronomy, biophysics, atomic physics, geophysics, nanotechnology, nuclear physics, optics, particle physics, solid state, and quantum physics. For example, solid state physicists are involved in the semiconductor industry and the development of a wide range of materials such as superconductors and conducting polymers. Nuclear physicists are in high demand in nuclear energy and nuclear medicine, now used extensively for diagnosis and treatment. A background in optics can be applied to fiber optic communication and the design of optical instruments for astronomy and the aerospace industry. In addition, physics is applied in a variety of other fields like engineering, medicine, law, biology, and chemistry.

The Bachelor of Science (B.S.) degree in physics at BYU-Idaho offers students a solid foundation in both classical and modern physics. Students take a range of introductory and advanced classes in mechanics, electricity and magnetism, quantum mechanics, and thermal physics. Laboratory courses are an important component of the physics program. These courses give students valuable skills and knowledge in experimental physics, extensive experience in modeling and simulations, computer control of devices, data acquisition, and analysis.

The knowledge and skills that students gain in the physics program at BYU-Idaho can be applied to a number of different career paths. These skills include (but are not limited to) critical thinking, reading, and writing skills, mathematical and conceptual reasoning, computer skills, leadership and communication skills, problem solving, creativity, synthesizing results, and applying theory to real world problems.

After completing their B.S. in physics from BYU-Idaho, students will have a wide range of opportunities. These include the following:

- Graduate school: students can continue their studies in physics or a number of other disciplines
- Professional school: students can go on to medical school, dental school, business school, or law school
- Industry: Physicists are hired by a number of companies and government labs throughout the country

The Bachelor of Science in Physics Education at BYU-Idaho prepares students to teach physics in high school. Each Physics Education major must complete the Secondary Education Core and carefully select an approved education minor. Please discuss your choice of an Education minor with your advisor.

Minor/Emphasis Options

Students pursuing a B.S. in physics are required to choose one out of nine emphasis areas. Each emphasis area consists of 11 or 12 credit hours in an applied area of physics and will help prepare students for graduate school and/or careers. For many of the emphasis areas (e.g. mathematics, chemistry, and geology) students can take additional courses and receive a minor in that area. Students are encouraged to meet with their faculty mentor as they decide on the emphasis area that will help them meet their career goals.

If your emphasis area requires one of the upper level physics electives (PH 323, 324, 374, 375), you will be required to take an additional upper level physics elective to fulfill the physics core requirement.

Supported Tracks

The physics department supports all three tracks (FW, WS, SF) during the freshman and sophomore years. Before the junior year, a student will need to switch to the FW track.

Scheduling Note

If a semester is needed as you begin the program to prepare for the math requirement, PH 121 and PH 123 can be taken together (with instructor permission) the next semester. This will help facilitate keeping you on schedule with your grad plan.

Physics

Brigham Young University-Idaho 2015-2016

BS in Physics Chemistry Emphasis (770-156)			
Core Courses <i>Take these courses during your first 3 semesters:</i> MATH 215 4 PH 121 3 PH 123 3 PH 150 1 PH 220 3 <hr style="width: 100%;"/> 14 <i>Take these courses:</i> MATH 316 4 PH 250 1 PH 279 3 PH 291 2 PH 314 3 <hr style="width: 100%;"/> 13	<i>Take these courses:</i> PH 328 2 PH 332 4 PH 333 4 PH 336 2 PH 385 2 <hr style="width: 100%;"/> 14 <i>Take these courses:</i> PH 412 3 PH 433 3 PH 473 3 <hr style="width: 100%;"/> 9 <i>Take 1 course:</i> PH 323 3 PH 324 3 PH 374 3 PH 375 3 <hr style="width: 100%;"/> 3	Internship/Research Courses <i>Take 1 course:</i> PH 398R 1 PH 406 1 <hr style="width: 100%;"/> 1 <i>Take this course:</i> PH 488 1 <hr style="width: 100%;"/> 1 Chemistry Emphasis Courses <i>Take these courses:</i> CHEM 105 4 CHEM 106 4 CHEM 351 4 <hr style="width: 100%;"/> 12	Program Notes: •No Grade Less Than C- in Major Courses
Credit Requirements:		Tracks Available:	
Foundations	40	Fall-Winter	Yes
Major	67	Winter-Spring (Freshman/ Sophomore)	Yes
Elective	13	Winter-Spring (Junior/Senior)	No
Total	120	Spring-Fall (Freshman/Sophomore)	Yes
		Spring-Fall (Junior/Senior)	No

BS in Physics Computational Emphasis (770-157)			
Core Courses <i>Take these courses during your first 3 semesters:</i> MATH 215 4 PH 121 3 PH 123 3 PH 150 1 PH 220 3 <hr style="width: 100%;"/> 14 <i>Take these courses:</i> MATH 316 4 PH 250 1 PH 279 3 PH 291 2 PH 314 3 <hr style="width: 100%;"/> 13	<i>Take these courses:</i> PH 328 2 PH 332 4 PH 333 4 PH 336 2 PH 385 2 <hr style="width: 100%;"/> 14 <i>Take these courses:</i> PH 412 3 PH 433 3 PH 473 3 <hr style="width: 100%;"/> 9 <i>Take 1 course:</i> PH 323 3 PH 324 3 PH 374 3 PH 375 3 <hr style="width: 100%;"/> 3	Internship/Research Courses <i>Take 1 course:</i> PH 398R 1 PH 406 1 <hr style="width: 100%;"/> 1 <i>Take this course:</i> PH 488 1 <hr style="width: 100%;"/> 1 Computational Emphasis Courses <i>Take these courses:</i> CS 124 3 CS 165 3 CS 237 2 MATH 411 3 <hr style="width: 100%;"/> 11	Program Notes: •No Grade Less Than C- in Major Courses •CS 306 and CS 235 are not required, but would be beneficial and could be counted as elective credits.
Credit Requirements:		Tracks Available:	
Foundations	40	Fall-Winter	Yes
Major	66	Winter-Spring (Freshman/ Sophomore)	Yes
Elective	14	Winter-Spring (Junior/Senior)	No
Total	120	Spring-Fall (Freshman/Sophomore)	Yes
		Spring-Fall (Junior/Senior)	No

Physics

Brigham Young University-Idaho 2015-2016

BS in Physics Mathematical Emphasis (770-165)			
Core Courses <i>Take these courses during your first 3 semesters:</i> MATH 215 4 PH 121 3 PH 123 3 PH 150 1 PH 220 3 ----- 14 <i>Take these courses:</i> MATH 316 4 PH 250 1 PH 279 3 PH 291 2 PH 314 3 ----- 13 <i>Take these courses:</i> PH 328 2 PH 332 4 PH 333 4 PH 336 2 PH 385 2 ----- 14	<i>Take these courses:</i> PH 412 3 PH 433 3 PH 473 3 ----- 9 <i>Take 1 course:</i> PH 323 3 PH 324 3 PH 374 3 PH 375 3 ----- 3 Internship/Research Courses <i>Take 1 course:</i> PH 398R 1 PH 406 1 ----- 1 <i>Take this course:</i> PH 488 1 ----- 1	Mathematical Emphasis Courses <i>Choose 1 option:</i> Option 1* <i>Take these courses:</i> MATH 221A, B, or C 3 MATH 325 3 MATH 341 3 <i>Take 1 course:</i> MATH 327 3 MATH 423 3 ----- 12 Option 2** <i>Take these courses:</i> MATH 301 3 MATH 341 3 MATH 441 3 <i>Take 1 course:</i> MATH 442 3 MATH 463 3 ----- 12 Option 3*** <i>Take these courses:</i> MATH 301 3 MATH 461 3 <i>Take 2 courses:</i> MATH 462 3 MATH 463 3 MATH 472 3 ----- 12	Program Notes: •No Grade Less Than C- in Major Courses •*Choose Option 1 if your interest is in Statistical Mechanics and Thermodynamics; or if you have an interest in experimental physics and/or signal processing applications. •**Choose Option 2 if your interest is in Solid State Physics (including semiconductor device physics), or Particle Physics, or Quantum Field Theory. •***Choose Option 3 if you are interested in a more rigorous mathematical background, and understanding the details of the mathematics often used in physics. • Some of the upper division math courses are offered on a rotating schedule, so please plan accordingly.
Credit Requirements:		Tracks Available:	
Foundations	40	Fall-Winter	Yes
Major	67	Winter-Spring (Freshman/ Sophomore)	Yes
Elective	13	Winter-Spring (Junior/Senior)	No
Total	120	Spring-Fall (Freshman/Sophomore)	Yes
		Spring-Fall (Junior/Senior)	No

BS in Physics Medical Physics Emphasis (770-166)			
Core Courses <i>Take these courses during your first 3 semesters:</i> MATH 215 4 PH 121 3 PH 123 3 PH 150 1 PH 220 3 ----- 14 <i>Take these courses:</i> MATH 316 4 PH 250 1 PH 279 3 PH 291 2 PH 314 3 ----- 13	<i>Take these courses:</i> PH 328 2 PH 332 4 PH 333 4 PH 336 2 PH 385 2 ----- 14 <i>Take these courses:</i> PH 412 3 PH 433 3 PH 473 3 ----- 9 <i>Take 1 course:</i> PH 323 3 PH 324 3 PH 374 3 PH 375 3 ----- 3	Internship/Research Courses <i>Take 1 course:</i> PH 398R 1 PH 406 1 ----- 1 <i>Take this course:</i> PH 488 1 ----- 1 Medical Physics Emphasis Courses <i>Take these courses:</i> CHEM 105 4 BIO 230* 4 PH 324** 3 ----- 11	Program Notes: •No Grade Less Than C- in Major Courses •*BIO 264 & 265, while not required, are suggested courses & may be used to substitute for BIO 230. •**PH 324 is required for the emphasis. A different upper level physics elective is required for the core requirements. • Some courses are offered on a rotating schedule, so please plan accordingly.
Credit Requirements:		Tracks Available:	
Foundations	40	Fall-Winter	Yes
Major	66	Winter-Spring (Freshman/ Sophomore)	Yes
Elective	14	Winter-Spring (Junior/Senior)	No
Total	120	Spring-Fall (Freshman/Sophomore)	Yes
		Spring-Fall (Junior/Senior)	No

BS in Physics			
Pre-Medical Emphasis (770-167)			
Core Courses <i>Take these courses during your first 3 semesters:</i> MATH 215 4 PH 121 3 PH 123 3 PH 150 1 PH 220 3 <hr style="width: 50%; margin-left: 0;"/> 14 <i>Take these courses:</i> MATH 316 4 PH 250 1 PH 279 3 PH 291 2 PH 314 2 <hr style="width: 50%; margin-left: 0;"/> 13	<i>Take these courses:</i> PH 328 2 PH 332 4 PH 333 4 PH 336 2 PH 385 2 <hr style="width: 50%; margin-left: 0;"/> 14 <i>Take these courses:</i> PH 412 3 PH 433 3 PH 473 3 <hr style="width: 50%; margin-left: 0;"/> 9 <i>Take 1 course:</i> PH 323 3 PH 324 3 PH 374 3 PH 375 3 <hr style="width: 50%; margin-left: 0;"/> 3	Internship/Research Courses <i>Take 1 course:</i> PH 398R 1 PH 406 1 <hr style="width: 50%; margin-left: 0;"/> 1 <i>Take this course:</i> PH 488 1 <hr style="width: 50%; margin-left: 0;"/> 1 Pre-Medical Emphasis Courses <i>Take these courses:</i> CHEM 105 4 CHEM 106 4 BIO 180 4 <hr style="width: 50%; margin-left: 0;"/> 12	Program Notes: •No Grade Less Than C- in Major Courses •BIO 181 is not required but would be beneficial and could be counted as elective credits.
Credit Requirements:		Tracks Available:	
	Foundations	40	Fall-Winter
	Major	67	Winter-Spring (Freshman/ Sophomore)
	Elective	13	Winter-Spring (Junior/Senior)
	Total	120	Spring-Fall (Freshman/Sophomore)
			Spring-Fall (Junior/Senior)
			Yes
			Yes
			No
			Yes
			No

BS in Physics Education (870)			
Education Core <i>Take these courses:</i> BIO 305 2 ED 200 2 ED 242 2 ED 304 3 ED 461 3 ED 492 10 SPED 360 2 <hr style="width: 50%; margin-left: 0;"/> 24	Physics Core <i>Take these courses during your first 3 semesters:</i> PH 121 3 PH 123 3 PH 150 1 PH 220 3 PH 250 1 <hr style="width: 50%; margin-left: 0;"/> 11	<i>Take these courses:</i> FDMAT 112 4 MATH 113 3 PH 127 3 PH 277 2 PH 279 3 PH 311 3 PH 314 3 PH 403 2 PH 411 2 <hr style="width: 50%; margin-left: 0;"/> 25	Program Notes: •No Grade Less Than C- in Major Courses •Some Physics courses are offered on a rotating schedule, so plan accordingly.
Credit Requirements:		Tracks Available:	
	Foundations	40	Fall-Winter
	Major	36	Winter-Spring (Freshman/ Sophomore)
	Education Core	24	Winter-Spring (Junior/Senior)
	Education Minor	20	Spring-Fall
	Total	120	Yes
			Yes
			No
			Yes

Minor in Physics (104)			
Core Courses <i>Take these courses:</i> MATH 215 4 PH 121 3 PH 123 3 PH 150 1 PH 220 3 PH 250 1 PH 279 3 <hr style="width: 50%; margin-left: 0;"/> 18	<i>Take 6 credits</i> PH 311 3 PH 314 3 PH 323 3 PH 324 3 PH 374 3 PH 433 3 <hr style="width: 50%; margin-left: 0;"/> 6	Program Notes: •No Double Counting of Minor Courses	
Credit Requirements:		Tracks Available:	
	Total	24	Fall-Winter
			Winter-Spring
			Spring-Fall
			Yes
			Yes
			Yes

Physics

Brigham Young University-Idaho 2015-2016

Minor in Physics Education (178)

<p>Core Courses <i>Take these courses:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>PH 121</td><td align="right">3</td></tr> <tr><td>PH 123</td><td align="right">3</td></tr> <tr><td>PH 150</td><td align="right">1</td></tr> <tr><td>PH 220</td><td align="right">3</td></tr> <tr><td>PH 250</td><td align="right">1</td></tr> <tr><td>PH 279</td><td align="right">3</td></tr> <tr><td>PH 311</td><td align="right">3</td></tr> <tr><td>PH 314</td><td align="right">3</td></tr> <tr><td></td><td align="right"><u>3</u></td></tr> <tr><td>Total</td><td align="right">20</td></tr> </table>	PH 121	3	PH 123	3	PH 150	1	PH 220	3	PH 250	1	PH 279	3	PH 311	3	PH 314	3		<u>3</u>	Total	20	<p><i>Program Notes:</i></p> <ul style="list-style-type: none"> •No Double Counting of Minor Courses
PH 121	3																				
PH 123	3																				
PH 150	1																				
PH 220	3																				
PH 250	1																				
PH 279	3																				
PH 311	3																				
PH 314	3																				
	<u>3</u>																				
Total	20																				
<p>Credit Requirements:</p> <p>Total 20</p>	<p>Tracks Available:</p> <table style="width: 100%;"> <tr><td>Fall-Winter</td><td align="right">Yes</td></tr> <tr><td>Winter-Spring</td><td align="right">No</td></tr> <tr><td>Spring-Fall</td><td align="right">Yes</td></tr> </table>	Fall-Winter	Yes	Winter-Spring	No	Spring-Fall	Yes														
Fall-Winter	Yes																				
Winter-Spring	No																				
Spring-Fall	Yes																				

Minor in Physical Science Education (182)

<p><i>Take these courses:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>CHEM 105</td><td align="right">4</td></tr> <tr><td>CHEM 106</td><td align="right">4</td></tr> <tr><td>PH 105</td><td align="right">4</td></tr> <tr><td>PH 106</td><td align="right">4</td></tr> <tr><td></td><td align="right"><u>4</u></td></tr> <tr><td>Total</td><td align="right">16</td></tr> </table>	CHEM 105	4	CHEM 106	4	PH 105	4	PH 106	4		<u>4</u>	Total	16	<p><i>Take 1 course:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>CHEM 150</td><td align="right">5</td></tr> <tr><td>CHEM 220</td><td align="right">5</td></tr> <tr><td>CHEM 351</td><td align="right">4</td></tr> <tr><td></td><td align="right"><u>4</u></td></tr> <tr><td>Total</td><td align="right">4</td></tr> </table>	CHEM 150	5	CHEM 220	5	CHEM 351	4		<u>4</u>	Total	4	<p><i>Program Notes:</i></p> <ul style="list-style-type: none"> •No Double Counting of Minor Courses
CHEM 105	4																							
CHEM 106	4																							
PH 105	4																							
PH 106	4																							
	<u>4</u>																							
Total	16																							
CHEM 150	5																							
CHEM 220	5																							
CHEM 351	4																							
	<u>4</u>																							
Total	4																							
<p>Credit Requirements:</p> <p>Total 20</p>	<p>Tracks Available:</p> <table style="width: 100%;"> <tr><td>Fall-Winter</td><td align="right">Yes</td></tr> <tr><td>Winter-Spring</td><td align="right">Yes</td></tr> <tr><td>Spring-Fall</td><td align="right">Yes</td></tr> </table>	Fall-Winter	Yes	Winter-Spring	Yes	Spring-Fall	Yes																	
Fall-Winter	Yes																							
Winter-Spring	Yes																							
Spring-Fall	Yes																							

Physics Concentration (D 129)

<p>Core Courses <i>Take these courses:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>MATH 215</td><td align="right">4</td></tr> <tr><td>MATH 316</td><td align="right">4</td></tr> <tr><td>PH 121</td><td align="right">3</td></tr> <tr><td>PH 123</td><td align="right">3</td></tr> <tr><td>PH 150</td><td align="right">1</td></tr> <tr><td>PH 220</td><td align="right">3</td></tr> <tr><td>PH 250</td><td align="right">1</td></tr> <tr><td>PH 279</td><td align="right">3</td></tr> <tr><td>PH 332</td><td align="right">4</td></tr> <tr><td>PH 333</td><td align="right">4</td></tr> <tr><td>PH 336</td><td align="right">2</td></tr> <tr><td></td><td align="right"><u>2</u></td></tr> <tr><td>Total</td><td align="right">32</td></tr> </table>	MATH 215	4	MATH 316	4	PH 121	3	PH 123	3	PH 150	1	PH 220	3	PH 250	1	PH 279	3	PH 332	4	PH 333	4	PH 336	2		<u>2</u>	Total	32	<p>Interdisciplinary Courses <i>Take these courses:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>IDS 398R</td><td align="right">1-3</td></tr> <tr><td>IDS 499</td><td align="right">2</td></tr> <tr><td></td><td align="right"><u>3</u></td></tr> <tr><td>Total</td><td align="right">3</td></tr> </table>	IDS 398R	1-3	IDS 499	2		<u>3</u>	Total	3	<p><i>Program Notes:</i></p> <ul style="list-style-type: none"> •No Double Counting of Concentration Courses
MATH 215	4																																			
MATH 316	4																																			
PH 121	3																																			
PH 123	3																																			
PH 150	1																																			
PH 220	3																																			
PH 250	1																																			
PH 279	3																																			
PH 332	4																																			
PH 333	4																																			
PH 336	2																																			
	<u>2</u>																																			
Total	32																																			
IDS 398R	1-3																																			
IDS 499	2																																			
	<u>3</u>																																			
Total	3																																			
<p>Credit Requirements:</p> <p>Total 35</p>	<p>Tracks Available:</p> <table style="width: 100%;"> <tr><td>Fall-Winter</td><td align="right">Yes</td></tr> <tr><td>Winter-Spring (Freshman/Sophomore)</td><td align="right">Yes</td></tr> <tr><td>Winter-Spring (Junior/Senior)</td><td align="right">No</td></tr> <tr><td>Spring-Fall (Freshman/Sophomore)</td><td align="right">Yes</td></tr> <tr><td>Spring-Fall (Junior/Senior)</td><td align="right">No</td></tr> </table>	Fall-Winter	Yes	Winter-Spring (Freshman/Sophomore)	Yes	Winter-Spring (Junior/Senior)	No	Spring-Fall (Freshman/Sophomore)	Yes	Spring-Fall (Junior/Senior)	No																									
Fall-Winter	Yes																																			
Winter-Spring (Freshman/Sophomore)	Yes																																			
Winter-Spring (Junior/Senior)	No																																			
Spring-Fall (Freshman/Sophomore)	Yes																																			
Spring-Fall (Junior/Senior)	No																																			

Physics Pre-approved Clusters

Technical Physics	6400
<i>Take 12 Credits :</i>	
PH 121 Principles of Physics I	3
PH 123 Principles of Physics II	3
PH 150 Beginning Physics Lab	1
PH 220 Principles of Physics III	3
PH 250 Intermediate Physics Laboratory for Physics and Physical Science	1
PH 279 Modern Physics	3
PH 311 Physics by Inquiry I	3
PH 314 History/Philosophy of Science	3
Total Credits	12
<hr/>	
Physics Exposure	6401
<i>Take 14 credits:</i>	
PH 105 Introductory Applied Physics I	4
PH 106 Introductory Applied Physics II	4
PH 311 Physics by Inquiry I	3
PH 314 History/Philosophy of Science	3
Total Credits	14

Physical Science and Mathematics	6800
<i>Take 12 credits from at least 2 of the following areas:</i>	
Chemistry	
Take any Chemistry class numbered 105 or higher	0-10
(Chem 150 and Chem 153 cannot be taken with Chem 351 and/or Chem 352)	
Physics	
Take any Physics class numbered 105 or higher	0-10
Geology	
Take any Geology class numbered 111 and 111L or higher	0-10
Mathematics	
Take any Mathematics class numbered 111 or higher	0-10
Total Credits	12

Course Descriptions

Credits*

- PH 101 Fundamentals of Physics (4:3:3:0)**
 This course covers the principles of classical and modern physics as they relate to current concepts of the physical environment. The course includes a lab component.
 (Fall even years)
- PH 105 Introductory Applied Physics I (4:3:4:0)**
 Prerequisites: MATH 109 or FDMAT 112 or (FDMAT 110 and MATH 111)
 This is an introductory general physics course, including a lab component. Also, target students for this course include those interested in pre-med, dental, physical therapy, construction management, and so on.
 (Fall, Winter, Spring)
- PH 106 Introductory Applied Physics II (4:3:4:0)**
 Prerequisite: PH 105
 This is the second course in an introductory physics sequence that targets students who are interested in pre-med, dental, physical therapy, construction management, and so on. This course includes a lab component.
 (Fall, Winter, Spring)
- PH 117 Descriptive Acoustics (3:2:2:0)**
 This is an introductory acoustics course surveying the physical principles underlying the production and perception of sound, music, and speech. The course addresses basic measurements, vibrations, wave properties, superposition and spectra, perception and measurement, and room properties. Emphasis is placed on experience, reasoning, and observations. This course includes a lab component.
- PH 121 Principles of Physics I (3:2:3:0)**
 Corequisite: FDMAT 112
 This course is the first semester of the calculus-based Principles of Physics sequence. The course is designed for students majoring in physics, engineering, chemistry, and mathematics. The course centers on mechanics, the study of forces and motion as described through Newton's three laws of motion and the concept of energy.
 (Fall, Winter, Spring)
- PH 123 Principles of Physics II (3:2:3:0)**
 Prerequisite: PH 121
 Corequisites: MATH 113 or MATH 215
 This course is the second semester of the Principles of Physics sequence. It is designed for students majoring in physics, chemistry, and mathematics. The course covers topics in waves, thermodynamics, and optics. These areas of study are important in a wide variety of scientific disciplines. For example, an understanding of wave properties is essential in applications such as wireless communication as well as all aspects of acoustics. Thermodynamics has a variety of applications in engine design and heat transfer. Finally, principles of optics are involved in fiber-optic communication, instrument design, scanners, surveillance, etc.
 (Fall, Winter, Spring)

- PH 127 Introduction to Astronomy (3:2:2:0)**
 Astronomy is the study of the heavens and the Earth as a planet. This course introduces students to the wonders of the heavens and the fundamental observations, concepts, and theories of modern astronomy. Students also learn how scientists discover this information.
 (Fall, Spring)
- PH 150 Beginning Physics Lab (1:0:3:0)**
 Corequisite: PH 121
 This course introduces students to the basics of experimental physics. It is designed to help students learn to think analytically and to gain experience in doing common experiments in physics. It teaches students how to analyze data and numerically model common physics problems.
 (Fall, Winter, Spring)
- PH 220 Principles of Physics III (3:2:3:0)**
 Prerequisite: PH 121
 Corequisites: MATH 113 or MATH 215
 This course is third of a four semester sequence. Principles of electricity and magnetism with emphasis on combining intuition and past experience with mathematics to understand the laws of electricity and magnetism. (Principles of Physics III is intended for students majoring in Physics, Physics Education, Chemistry, Engineering, and Mathematics/Computer Science majors.)
 (Fall, Winter, Spring)
- PH 223 Engineering Physics (4:3:2:0)**
 Prerequisites: PH 121 and ME 210 and (MATH 113 or MATH 215)
 This course is designed for students majoring in mechanical engineering. It is a one-semester calculus based physics course covering topics in waves, electricity, magnetism, and optics. These areas of study are important in a wide variety of engineering applications. For example, an understanding of wave properties is essential in the proper design of structures. A knowledge of electric and magnetic fields is required for any system that involves transmission of electrons for either communication or power generation purposes. Finally, principles of optics are involved in fiber-optic communication, instrument design, scanners, surveillance, etc.
 (Fall, Winter, Spring)
- PH 250 Intermediate Physics Lab (1:0:3:0)**
 Prerequisite: PH 150
 Corequisite: PH 220
 This Intermediate Physics Laboratory is for Physics and Physical Science teaching majors, as well as experimental investigations into electricity and magnetism.
 (Fall, Winter, Spring)

Physics

Brigham Young University–Idaho 2015-2016

<p>PH 277 Contemporary Issues in Astronomy (2:2:0:0) Prerequisite: PH 127 This 2 credit course explores areas of current research in astronomy. It builds on the principles of astronomy learned previously in PH 127. A working knowledge of college algebra is assumed. (Fall)</p>	<p>PH 333 Electricity and Magnetism (4:4:0:0) Prerequisites: PH 220 and MATH 316 or MATH 371 This is a junior level course which covers electromagnetic theory. (Fall)</p>
<p>PH 279 Modern Physics (3:2:3:0) Prerequisite: PH 123 Corequisite: PH 220 This course is the fourth in the Principles of Physics sequence. It is an introductory course dealing with the fundamental topics of modern physics, including special relativity, elementary quantum mechanics, nuclear physics, and some particle physics. (Winter, Spring)</p>	<p>PH 336 Advanced Physics Lab (2:0:6:0) Prerequisites: PH 250 This course prepares students to do experimental work for their internship and/or research. It focuses on analyzing experimental data, but also covers other aspects of experimental design in common equipment used in physics experiments. (Winter)</p>
<p>PH 291 Wave Physics (2:2:0:0) Corequisites: PH 279 and MATH 316 or MATH 371 This course reviews mathematical methods in the context of wave phenomena. It prepares students for the mathematical rigors of upper division physics. (Winter, Spring)</p>	<p>PH 374 Astrophysics (3:3:0:0) Prerequisites: PH 279 and PH 332 A junior level mathematically based course designed to introduce students to the field of astrophysics. (Winter even years)</p>
<p>PH 311 Physics by Inquiry I (3:2:3:0) Prerequisite: Instructor Permission This hands-on course addresses selected topics in physics with emphasis on the depth of understanding and developing skills essential to the scientific process. These skills include observation, interpretation, reasoning, generalizing predicting, questioning, and related communication skills. It provides an experience in education by inquiry and background for teaching as a process of inquiry. (Fall odd years)</p>	<p>PH 375 Principles of Optics (3:3:0:0) Prerequisites: PH 291 and (MATH 316 or MATH 472) This course covers the fundamental principles of optics. Beginning with Maxwell's Equations, the electromagnetic theory of light is studied. Fundamentals of geometric optics are revisited using electromagnetic theory. Phenomena such as lens aberrations, polarization, interference, diffraction, and coherence are discussed. (Winter odd years)</p>
<p>PH 314 History and Philosophy of Science (3:3:0:0) Course equivalent to PHIL 314 Prerequisite: Both FDSCI Issues Courses Course Requirement: Junior and Seniors Only This course describes modern science as a tool for studying the physical universe. It addresses three main philosophical questions: What is science? What ideas/concepts do we take for granted in science? How do scientists establish their claims? It uses the history of science, which shows how science actually developed, to address these critical questions. Successful completion of the course allows students to understand better and appreciate the nature of science, the purposes of scientific theory, and how science developed historically. This study helps students place the theories of modern science into proper historical and intellectual context. (Fall, Winter)</p>	<p>PH 385 Numerical Modeling in Physics (2:1:3:0) Prerequisites: PH 279 and PH 291 A lab course that applies numerical modeling and methods to a variety of modern topics in physics. MATLAB is used in this course. (Winter)</p>
<p>PH 323 Solid State Physics (3:3:0:0) Prerequisites: MATH 316 and PH 279 This course introduces the basic mathematical and conceptual tools necessary to study the structural, electrical, thermal, and mechanical properties of matter in the solid state. (Fall odd years)</p>	<p>PH 390R Special Topics in Physics (1:0:2:0) Repeatable Course: May earn maximum of 2 credits Prerequisite: PH 121 In order for students to be more competitive for internships, REUS, employment, and entrance into graduate schools, they need to be exposed to some type of research, and in many cases learn specialized skills. This special topics course is a one credit, repeatable course that can be tailored to student mentored research projects. It is an elective course for those who express interest in learning more about a specific topic in physics or astronomy. These topics can be centered on faculty-driven research projects or development of research/computational skills. The course will be more of a lab type experience, where students are given a project/activity to do (learning specialized software, instrumentation, journal readings, etc.) that is specific to a chosen topic. This can be in preparation for an actual research experience or just to further their skills in a specific area. (Winter)</p>
<p>PH 324 Nuclear and Particle Physics (3:3:0:0) Prerequisite: PH 279 This is a junior level survey course which introduces the physics of atomic nuclei and elementary particles. (Fall even years)</p>	<p>PH 398R Physics Internship (1:0:0:0) Repeatable Course: May earn maximum of 2 credits Internship Fees: \$78 (LDS) \$156 (non-LDS) per credit Exempt from tuition, but charged this independent course fee This course consists of a professional internship providing the student with job experience in a physics-related field. (Spring)</p>
<p>PH 328 Introduction to Physics Research (2:2:0:0) Prerequisites: FDENG 301 and PH 279 This course acquaints students with possible career tracks in physics. It introduces topics associated with becoming a member of a professional community, including presentation and other written communication. Students begin developing skills for job or graduate school applications and interviews. This course introduces students to the research process in physics by beginning the senior thesis or internship process. (Fall)</p>	<p>PH 403 Methods of Physics Teaching (2:2:0:0) Prerequisites: PH 279 and PH 314 This course uncovers of the methods and philosophy of teaching physics principles in a secondary school setting. (Fall)</p>
<p>PH 332 Classical Mechanics (4:4:0:0) Prerequisites: PH 291 and (MATH 316 or MATH 371) This is a junior level course applying Newton's Laws of Motion in a wide variety of applications. (Fall)</p>	<p>PH 406 Physics Senior Research (1:1:0:0) Prerequisite: Instructor Permission Course Requirement: Instructor Approval Required In this course students propose, develop the background for, and execute a research project culminating in production of a thesis (written in PH 488), either individually or in cooperation with other students. This project is in lieu of (or in addition to with approval) a professional internship. (Fall, Spring)</p>

PH 411 Physics by Inquiry II (2:1:3:0)

Prerequisite: PH 311

This hands-on course continues coverage in selected topics in physics with emphasis on depth of understanding and developing skills essential to the scientific process. These skills include observation, interpretation, reasoning, generalizing predicting, questioning, and related communication skills. It provides an experience in education by inquiry and background for teaching as a process of inquiry. Students will develop a personal set of lesson plans/teachers guide for students own portfolio. Students may have the opportunity to develop questioning strategies and practice them by acting as staff and practice appropriate questioning skills by assisting with checkouts.

(Fall odd years)

PH 412 Thermal and Statistical Physics (3:3:0:0)

Prerequisite: PH 332

This is a senior level course covering classical thermodynamics and statistical mechanics.

This course builds upon and expands some of the material that was covered in PH 123.

(Fall)

PH 433 Quantum Mechanics (3:3:0:0)

Prerequisites: PH 279 and PH 291 and (MATH 316 or MATH 371)

This is a senior-level course which covers an introduction to the theory of quantum mechanics.

(Fall)

PH 473 Atomic Physics (3:3:0:0)

Prerequisite: PH 433

This is a senior-level course which covers applications of the theory of quantum mechanics to atomic and solid state physics topics.

(Winter)

PH 488 Senior Thesis (1:1:0:0)

Prerequisite: Instructor Permission

Course Requirement: Instructor Approval Required

This is a course focused on bringing a student's research experience to conclusion by writing the formal thesis and presenting its contents to the faculty and other students.

(Winter)