

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. 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 2016-2017

BS in Physics Astronomy Emphasis (770-154)			
<b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i> CS 124                   3 MATH 215               4 PH 121                   3 PH 123                   3 PH 150                   1 PH 220                   3 _____ 17  <i>Take these courses:</i> MATH 316               4 PH 228                   1 PH 250                   1 PH 279                   3 PH 295                   3 _____ 12	<i>Take these courses:</i> PH 332                   4 PH 333                   4 PH 336                   2 PH 385                   2 _____ 12  <i>Take these courses:</i> PH 412                   3 PH 433                   3 PH 473                   3 _____ 9  <i>Take 1 course:</i> PH 314                   3 PH 323                   3 PH 324                   3 PH 374*                  3 PH 375                   3 _____ 3	<b>Internship/Research Courses</b> <i>Take 1 course:</i> PH 398R                  1 PH 406                   1 _____ 1  <i>Take this course:</i> PH 488                   1 _____ 1  <b>Astronomy Emphasis Courses</b> <i>Take these courses:</i> PH 127                   3 PH 277                   2 PH 374*                  3 CHEM 105                 4 _____ 12	<b>Program Notes:</b>  • No Grade Less Than C- in Major Courses  • *PH 374 is required for the emphasis. A different upper level physics elective is required for the core requirements.  • Students with this emphasis will complete the FDSCI Option C requirement. This will be completed with FDSCI 101, CHEM 105, and Physics courses as part of the major.  • Some upper division Physics courses are offered on a rotating schedule, so please plan accordingly.
<b>Credit Requirements:</b>		<b>Tracks Available:</b>	
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

Graduation Plan BS in Physics Astronomy Emphasis (770-154)				
<b>Semester 1</b> <i>Take these courses:</i> PH 121                   3 PH 150                   1 PH 127                   3 FDMAT 112               4 FDSCI 101                2 FDREL 200                2 _____ 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215                4 PH 123                   3 CS 124                   3 FDENG 101               3 FDREL 225               2 _____ 15	<b>Semester 3</b> <i>Take these courses:</i> MATH 316                4 PH 228 *                  1 PH 220                   3 PH 250                   1 Elective Credit          4 FDREL                    2 _____ 15	<b>Semester 4</b> <i>Take these courses:</i> PH 279                   3 PH 295                   3 Elective Credit          4 FDAMF 101               3 FDREL 275               2 _____ 15	<b>Semester 5</b> <i>Take these courses:</i> PH 332                   4 PH 333                   4 PH 277                   2 Elective Credit          3 FDREL Elective         2 _____ 15
<b>Semester 6</b> <i>Take these courses:</i> PH 336                   2 PH 385                   2 *PH 374                   3 Elective Credit          3 FDENG 301                3 FDREL Elective         2 _____ 15	<b>Off-Track</b> ***Choose One: PH 398R or               1 PH 406                    1 _____ 1	<b>Semester 7</b> <i>Take these courses:</i> PH 412                   3 PH 433                   3 CHEM 105                4 Cultural Awareness      3 FDREL Elective         2 _____ 15	<b>Semester 8</b> <i>Take these courses:</i> PH 473                   3 PH 488                   1 *PH Elective            3 Cultural Awareness      3 Elective Credit          4 _____ 14	<b>Program Notes</b> * PH 374 is required for the emphasis. A different PH Elective is required for the core requirements. ^ You will be fulfilling the Option C Foundations requirement.

## Physics

Brigham Young University-Idaho 2016-2017

BS in Physics Biophysics Emphasis (770-155)					
<b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i> CS 124           3 MATH 215       4 PH 121           3 PH 123           3 PH 150           1 PH 220           3 <hr style="width: 100%;"/> 17  <i>Take these courses:</i> MATH 316       4 PH 228           1 PH 250           1 PH 279           3 PH 295           3 <hr style="width: 100%;"/> 12	<i>Take these courses:</i> PH 332           4 PH 333           4 PH 336           2 PH 385           2 <hr style="width: 100%;"/> 12  <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 314           3 PH 323           3 PH 324           3 PH 374           3 PH 375           3 <hr style="width: 100%;"/> 3	<b>Internship/Research Courses</b> <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  <b>Biophysics Emphasis Courses</b> <i>Take these courses:</i> BIO 180           4 BIO 181           4 <hr style="width: 100%;"/> 8  <i>Take 1 course:</i> BIO 375           3 BIO 376           3 <hr style="width: 100%;"/> 3	<b>Program Notes:</b>  • No Grade Less Than C- in Major Courses		
<b>Credit Requirements:</b>			<b>Tracks Available:</b>		
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

Graduation Plan BS in Physics Biophysics Emphasis (770-155)				
<b>Semester 1</b> <i>Take these courses:</i> CS 124           3 PH 121           3 PH 150           1 FDMAT 112       4 FDSCI 101       2 FDREL 200       2 <hr style="width: 100%;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215       4 PH 123           3 BIO 180           4 FDENG 101       3 FDREL 225       2 <hr style="width: 100%;"/> 16	<b>Semester 3</b> <i>Take these courses:</i> MATH 316       4 PH 220           3 PH 250           1 PH 228           1 FDAMF 101       3 FDREL 250       2 <hr style="width: 100%;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 279           3 PH 295           3 BIO 181           4 Elective Credit   3 FDREL 275       2 <hr style="width: 100%;"/> 15	<b>Semester 5</b> <i>Take these courses:</i> PH 332           4 PH 333           4 FDSCI Issues     3 Elective Credit   4 <hr style="width: 100%;"/> 15
<b>Semester 6</b> <i>Take these courses:</i> PH 336           2 PH 385           2 BIO 375 or BIO 376 3 FDENG 301       3 Cultural Awareness 3 FDREL Elective   2 <hr style="width: 100%;"/> 15	<b>Off-Track</b> ***Choose One: PH 398R or take   1 PH 406 Fall semester 1 <hr style="width: 100%;"/> 1	<b>Semester 7</b> <i>Take these courses:</i> PH 412           3 PH 433           3 Elective Credit   3 FDSCI Issues     3 FDREL Elective   2 <hr style="width: 100%;"/> 14	<b>Semester 8</b> <i>Take these courses:</i> PH 473           3 PH 488           1 PH Elective       3 Elective Credit   3 Cultural Awareness 3 Elective Credit   2 <hr style="width: 100%;"/> 15	<b>Program Notes</b>

**Physics**

Brigham Young University-Idaho 2016-2017

BS in Physics Chemistry Emphasis (770-156)				
<b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i> CS 124           3 MATH 215       4 PH 121           3 PH 123           3 PH 150           1 PH 220           3 <hr style="width: 100%;"/> 17  <i>Take these courses:</i> MATH 316       4 PH 228           1 PH 250           1 PH 279           3 PH 295           3 <hr style="width: 100%;"/> 12	<i>Take these courses:</i> PH 332           4 PH 333           4 PH 336           2 PH 385           2 <hr style="width: 100%;"/> 12  <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 314           3 PH 323           3 PH 324           3 PH 374           3 PH 375           3 <hr style="width: 100%;"/> 3	<b>Internship/Research Courses</b> <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  <b>Chemistry Emphasis Courses</b> <i>Take these courses:</i> CHEM 105           4 CHEM 106           4 CHEM 351           4 <hr style="width: 100%;"/> 12	<b>Program Notes:</b>  • No Grade Less Than C- in Major Courses  • Students with this emphasis will complete the FDSCI Option C requirement. This will be completed with FDSCI 101, CHEM 105, and Physics courses as part of the major.	
<b>Credit Requirements:</b>			<b>Tracks Available:</b>	
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

Graduation Plan BS in Physics Chemistry Emphasis (770-156)				
<b>Semester 1</b> <i>Take these courses:</i> CS 124           3 PH 121           3 PH 150           1 FDMAT 112       4 *FDSCI 101       2 FDREL 200       2 <hr style="width: 100%;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215       4 PH 123           3 CHEM 105       4 Elective Credit   2 FDREL 225       2 <hr style="width: 100%;"/> 15	<b>Semester 3</b> <i>Take these courses:</i> MATH 316       4 PH 220           3 PH 250           1 PH 228           1 FDENG 101       3 FDREL 250       2 <hr style="width: 100%;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 279           3 PH 295           3 CHEM 106       4 Elective Credit   3 FDREL 275       2 <hr style="width: 100%;"/> 15	<b>Semester 5</b> <i>Take these courses:</i> PH 332           4 PH 333           4 Elective Credit   2 FDREL Elective   2 FDMAMF 101      3 <hr style="width: 100%;"/> 15
<b>Semester 6</b> <i>Take these courses:</i> PH 336           2 PH 385           2 Elective Credit   3 FDENG 301       3 Cultural Awareness 3 FDREL Elective   2 <hr style="width: 100%;"/> 15	<b>Off-Track</b> ***Choose One: PH 398R or take   1 PH 406 Fall semester <hr style="width: 100%;"/> 1	<b>Semester 7</b> <i>Take these courses:</i> PH 412           3 PH 433           3 PH Elective       3 Elective Credit   4 FDREL Elective   2 <hr style="width: 100%;"/> 15	<b>Semester 8</b> <i>Take these courses:</i> PH 473           3 PH 488           1 CHEM 351       4 Cultural Awareness 3 Elective Credit   4 <hr style="width: 100%;"/> 15	<b>Program Notes</b>  • You will be fulfilling the Option C Foundations requirement.

## Physics

Brigham Young University-Idaho 2016-2017

### BS in Physics Computational Emphasis (770-157)

<b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i> CS 124                     3 MATH 215                 4 PH 121                     3 PH 123                     3 PH 150                     1 PH 220                     3 <hr style="width: 50%; margin-left: 0;"/> 17  <i>Take these courses:</i> MATH 316                 4 PH 228                     1 PH 250                     1 PH 279                     3 PH 295                     3 <hr style="width: 50%; margin-left: 0;"/> 12	<i>Take these courses:</i> PH 332                     4 PH 333                     4 PH 336                     2 PH 385                     2 <hr style="width: 50%; margin-left: 0;"/> 12  <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 314                     3 PH 323                     3 PH 324                     3 PH 374                     3 PH 375                     3 <hr style="width: 50%; margin-left: 0;"/> 3	<b>Internship/Research Courses</b> <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  <b>Computational Emphasis Courses</b> <i>Take these courses:</i> CS 165                     3 CS 237                     2 CS 238                     4 MATH 411                     3 <hr style="width: 50%; margin-left: 0;"/> 12	<b>Program Notes:</b> <ul style="list-style-type: none"> <li>• No Grade Less Than C- in Major Courses</li> <li>• CS 306 and CS 235 are not required, but would be beneficial and could be counted as elective credits.</li> </ul>
<b>Credit Requirements:</b>  Foundations                 40 Major                             67 Elective                         13 <hr style="width: 50%; margin-left: 0;"/> Total                             120		<b>Tracks Available:</b>  Fall-Winter                     Yes Winter-Spring (Freshman/ Sophomore)     Yes Winter-Spring (Junior/Senior)             No Spring-Fall (Freshman/Sophomore)        Yes Spring-Fall (Junior/Senior)                No	

### Graduation Plan BS in Physics Computational Emphasis (770-157)

<b>Semester 1</b> <i>Take these courses:</i> CS 124                     3 PH 121                     3 PH 150                     1 FDMAT 112                 4 *FDSCI 101                 2 FDREL 200                 2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215                 4 PH 123                     3 CS 165                     3 FDAMF 101                 3 FDREL 225                 2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 3</b> <i>Take these courses:</i> PH 220                     3 PH 250                     1 PH 228                     1 Elective Credit             4 FDENG 101                 3 FDREL 250                 2 <hr style="width: 50%; margin-left: 0;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> MATH 316                 4 PH 279                     3 PH 295                     3 Cultural Awareness         3 FDREL 275                 2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 5</b> <i>Take these courses:</i> PH 332                     4 PH 333                     4 CS 237                     2 FDENG 101                 3 FDSCI Issues                3 <hr style="width: 50%; margin-left: 0;"/> 16
<b>Semester 6</b> <i>Take these courses:</i> PH 336                     2 PH 385                     2 CS 238                     4 Elective Credit             2 Cultural Awareness         3 FDREL Elective             2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Off-Track</b> ***Choose One: PH 398R or take             1 PH 406 Fall semester        1 <hr style="width: 50%; margin-left: 0;"/> 1	<b>Semester 7</b> <i>Take these courses:</i> PH 412                     3 PH 433                     3 MATH 411                     3 Elective Credit             3 FDREL Elective             2 <hr style="width: 50%; margin-left: 0;"/> 14	<b>Semester 8</b> <i>Take these courses:</i> PH 473                     3 PH 488                     1 PH Elective                 3 Elective Credit             3 FDSCI Issues                3 FDREL Elective             2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Program Notes</b> <ul style="list-style-type: none"> <li>• CS 306 and CS 235 are not required, but would be beneficial &amp; could be counted as elective credits.</li> </ul>

## Physics

Brigham Young University-Idaho 2016-2017

### BS in Physics Engineering Emphasis (770-158)

<b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i>	<i>Take these courses:</i>	<b>Internship/Research Courses</b>	<b>Program Notes:</b>
CS 124                   3	PH 332                   4	<b>Take 1 course:</b>	• No Grade Less Than C- in Major Courses  • *There are prerequisites for ME 250, ME 360, and ME 425, but have similar physics equivalents. Students must ask for a waiver to these prerequisites, as per agreement with the ME department.  • ME 250L is not required but would be beneficial and could be counted as an elective credit.
MATH 215              4	PH 333                   4	PH 398R                1	
PH 121                 3	PH 336                   2	PH 406                 1	
PH 123                 3	PH 385                   2	1	
PH 150                 1	12	<i>Take this course:</i>	
PH 220                 3		PH 488                 1	
17	<i>Take these courses:</i>		
<i>Take these courses:</i>	PH 412                   3		
MATH 316              4	PH 433                   3		
PH 228                 1	PH 473                   3		
PH 250                 1	9	<b>Engineering Emphasis Courses</b>	
PH 279                 3	<i>Take 1 course:</i>	<i>Take these courses:</i>	
PH 295                 3	PH 314                   3	ME 142                   3	
12	PH 323                   3	ME 231                   2	
	PH 324                   3	ME 231L                1	
	PH 374                   3	ME 250*                3	
	PH 375                   3	ME 360*                3	
	3	12	
	3		

  

<b>Credit Requirements:</b>	<b>Tracks Available:</b>
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

### Graduation Plan BS in Physics Engineering Emphasis (770-158)

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5
<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take these courses:</i>
CS 124                   3	MATH 215               4	PH 220                   3	MATH 316               4	PH 332                   4
PH 121                   3	PH 123                   3	PH 250                   1	PH 279                   3	PH 333                   4
PH 150                   1	ME 142                   3	PH 228                   1	PH 295                   3	FDENG 301               3
FDMAT 112              4	FDENG 101              3	ME 250                   3	FDAMF 101              3	Cultural Awareness     3
*FDSCI 101             2	FDREL 225              2	Elective Credit         4	FDREL 275              2	Elective Credit         2
FDREL 200              2	15	FDREL 250              2	15	16
15		14		
<b>Semester 6</b>	<b>Off-Track</b>	<b>Semester 7</b>	<b>Semester 8</b>	<b>Program Notes</b>
<i>Take these courses:</i>	***Choose One:	<i>Take these courses:</i>	<i>Take these courses:</i>	*ME 250L is not required, but would be beneficial & could be counted as elective credit.
PH 336                   2	PH 398R or take       1	PH 412                   3	PH 473                   3	**ME 250, 360, & 425 all have prereq's that the ME Department will waive if you've had the physics equivalent.
PH 385                   2	PH 406 Fall semester 1	PH 433                   3	PH 488                   1	
ME 360                   3		ME 425                   3	PH Elective             3	
Elective Credit         3		Elective Credit         3	FDSCI Issues           3	
FDSCI Issues           3		FDREL Elective         2	Cultural Awareness     3	
FDREL Elective         2		14	FDREL Elective         2	
15			15	

**Physics**

Brigham Young University-Idaho 2016-2017

BS in Physics Geophysics Emphasis (770-159)			
<b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i> CS 124           3 MATH 215       4 PH 121           3 PH 123           3 PH 150           1 PH 220           3 <hr style="width: 100%;"/> 17  <i>Take these courses:</i> MATH 316       4 PH 228           1 PH 250           1 PH 279           3 PH 295           3 <hr style="width: 100%;"/> 12	<i>Take these courses:</i> PH 332           4 PH 333           4 PH 336           2 PH 385           2 <hr style="width: 100%;"/> 12  <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 314           3 PH 323           3 PH 324           3 PH 374           3 PH 375           3 <hr style="width: 100%;"/> 3	<b>Internship/Research Courses</b> <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  <b>Geophysics Emphasis Courses</b> <i>Take these courses:</i> GEOL 111           3 GEOL 111L         1 GEOL 341           1 GEOL 370           4 GEOL 445           3 <hr style="width: 100%;"/> 12	<b>Program Notes:</b>  •No Grade Less Than C- in Major Courses  •GEOL 370 has a prerequisite of GEOL 112 that per the Geology department will be waived for Physic students.  •GEOL 391 and 392, while not required, would be beneficial and could be counted as elective credits.
<b>Credit Requirements:</b>  Foundations           40 Major                   67 Elective                 13 Total                    120		<b>Tracks Available:</b>  Fall-Winter            Yes Winter-Spring (Freshman/ Sophomore)   Yes Winter-Spring (Junior/Senior)           No Spring-Fall (Freshman/Sophomore)       Yes Spring-Fall (Junior/Senior)               No	

Graduation Plan BS in Physics Geophysics Emphasis (770-159)				
<b>Semester 1</b> <i>Take these courses:</i> CS 124           3 PH 121           3 PH 150           1 FDMAT 112       4 FDSCI 101       2 FDREL 200       2 <hr style="width: 100%;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215       4 PH 123           3 GEOL 111       3 GEOL 111L      1 FDMAMF 101     3 FDREL 225       2 <hr style="width: 100%;"/> 16	<b>Semester 3</b> <i>Take these courses:</i> PH 220           3 PH 250           1 PH 228           1 FDSCI Issues     3 FDENG 101       3 Elective Credit   3 <hr style="width: 100%;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> MATH 316       4 PH 279           3 PH 295           3 GEOL 341       1 Elective Credit   2 FDREL 250       2 <hr style="width: 100%;"/> 15	<b>Semester 5</b> <i>Take these courses:</i> PH 332           4 PH 333           4 *GEOL 370       4 Elective Credit   2 FDREL 275       2 <hr style="width: 100%;"/> 16
<b>Semester 6</b> <i>Take these courses:</i> PH 336           2 PH 385           2 FDENG 301       3 Elective Credit   3 FDSCI Issues     3 FDREL Elective   2 <hr style="width: 100%;"/> 15	<b>Off-Track</b> ***Choose One: PH 398R or take   1 PH 406 Fall semester   1 <hr style="width: 100%;"/> 1	<b>Semester 7</b> <i>Take these courses:</i> PH 412           3 PH 433           3 GEOL 445       3 Cultural Awareness   3 FDREL Elective     2 <hr style="width: 100%;"/> 14	<b>Semester 8</b> <i>Take these courses:</i> PH 473           3 PH 488           1 PH Elective       3 Elective Credit     2 Cultural Awareness   3 FDREL Elective     2 <hr style="width: 100%;"/> 14	<b>Program Notes</b> *GEOL 391 & 392 are not required, but would be beneficial & could be counted as elective credits. **GEOL 370 has a prereq. of GEOL 112 that per the Geology Department will be waived for physics students.

**Physics**

Brigham Young University-Idaho 2016-2017

**BS in Physics  
Mathematical Emphasis (770-165)**

<p><b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i></p> <table> <tr><td>CS 124</td><td>3</td></tr> <tr><td>MATH 215</td><td>4</td></tr> <tr><td>PH 121</td><td>3</td></tr> <tr><td>PH 123</td><td>3</td></tr> <tr><td>PH 150</td><td>1</td></tr> <tr><td>PH 220</td><td>3</td></tr> <tr><td><b>17</b></td><td></td></tr> </table> <p><i>Take these courses:</i></p> <table> <tr><td>MATH 316</td><td>4</td></tr> <tr><td>PH 228</td><td>1</td></tr> <tr><td>PH 250</td><td>1</td></tr> <tr><td>PH 279</td><td>3</td></tr> <tr><td>PH 295</td><td>3</td></tr> <tr><td><b>12</b></td><td></td></tr> </table> <p><i>Take these courses:</i></p> <table> <tr><td>PH 332</td><td>4</td></tr> <tr><td>PH 333</td><td>4</td></tr> <tr><td>PH 336</td><td>2</td></tr> <tr><td>PH 385</td><td>2</td></tr> <tr><td><b>12</b></td><td></td></tr> </table>	CS 124	3	MATH 215	4	PH 121	3	PH 123	3	PH 150	1	PH 220	3	<b>17</b>		MATH 316	4	PH 228	1	PH 250	1	PH 279	3	PH 295	3	<b>12</b>		PH 332	4	PH 333	4	PH 336	2	PH 385	2	<b>12</b>		<p><i>Take these courses:</i></p> <table> <tr><td>PH 412</td><td>3</td></tr> <tr><td>PH 433</td><td>3</td></tr> <tr><td>PH 473</td><td>3</td></tr> <tr><td><b>9</b></td><td></td></tr> </table> <p><i>Take 1 course:</i></p> <table> <tr><td>PH 314</td><td>3</td></tr> <tr><td>PH 323</td><td>3</td></tr> <tr><td>PH 324</td><td>3</td></tr> <tr><td>PH 374</td><td>3</td></tr> <tr><td>PH 375</td><td>3</td></tr> <tr><td><b>3</b></td><td></td></tr> </table> <p><b>Internship/Research Courses</b></p> <p><i>Take 1 course:</i></p> <table> <tr><td>PH 398R</td><td>1</td></tr> <tr><td>PH 406</td><td>1</td></tr> <tr><td><b>1</b></td><td></td></tr> </table> <p><i>Take this course:</i></p> <table> <tr><td>PH 488</td><td>1</td></tr> <tr><td><b>1</b></td><td></td></tr> </table>	PH 412	3	PH 433	3	PH 473	3	<b>9</b>		PH 314	3	PH 323	3	PH 324	3	PH 374	3	PH 375	3	<b>3</b>		PH 398R	1	PH 406	1	<b>1</b>		PH 488	1	<b>1</b>		<p><b>Mathematical Emphasis Courses</b> <i>Complete 1 option:</i></p> <table> <tr><td colspan="2"><b>Option 1*</b></td></tr> <tr><td colspan="2"><i>Take these courses:</i></td></tr> <tr><td>MATH 221A, B, or C</td><td>3</td></tr> <tr><td>MATH 325</td><td>3</td></tr> <tr><td>MATH 341</td><td>3</td></tr> <tr><td colspan="2"><b>Take 1 course:</b></td></tr> <tr><td>MATH 327</td><td>3</td></tr> <tr><td>MATH 423</td><td>3</td></tr> <tr><td><b>12</b></td><td></td></tr> </table> <table> <tr><td colspan="2"><b>Option 2**</b></td></tr> <tr><td colspan="2"><i>Take these courses:</i></td></tr> <tr><td>MATH 301</td><td>3</td></tr> <tr><td>MATH 341</td><td>3</td></tr> <tr><td>MATH 441</td><td>3</td></tr> <tr><td colspan="2"><b>Take 1 course:</b></td></tr> <tr><td>MATH 442</td><td>3</td></tr> <tr><td>MATH 463</td><td>3</td></tr> <tr><td><b>12</b></td><td></td></tr> </table>	<b>Option 1*</b>		<i>Take these courses:</i>		MATH 221A, B, or C	3	MATH 325	3	MATH 341	3	<b>Take 1 course:</b>		MATH 327	3	MATH 423	3	<b>12</b>		<b>Option 2**</b>		<i>Take these courses:</i>		MATH 301	3	MATH 341	3	MATH 441	3	<b>Take 1 course:</b>		MATH 442	3	MATH 463	3	<b>12</b>		<p><b>Option 3***</b> <i>Take these courses:</i></p> <table> <tr><td>MATH 301</td><td>3</td></tr> <tr><td>MATH 461</td><td>3</td></tr> <tr><td colspan="2"><b>Take 2 courses:</b></td></tr> <tr><td>MATH 462</td><td>3</td></tr> <tr><td>MATH 463</td><td>3</td></tr> <tr><td>MATH 472</td><td>3</td></tr> <tr><td><b>12</b></td><td></td></tr> </table>	MATH 301	3	MATH 461	3	<b>Take 2 courses:</b>		MATH 462	3	MATH 463	3	MATH 472	3	<b>12</b>		<p><b>Program Notes:</b></p> <ul style="list-style-type: none"> <li>•No Grade Less Than C- in Major Courses</li> <li>•*Choose Option 1 if your interest is in Statistical Mechanics and Thermodynamics.</li> <li>**Choose Option 2 if your interest is in Solid State Physics, or Particle Physics, or Quantum Field Theory.</li> <li>***Choose Option 3 if your interest is in gaining a better understanding of how mathematics is used in physics.</li> </ul>
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**Graduation Plan**

**BS in Physics Mathematical Emphasis (770-165)**

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## Physics

Brigham Young University-Idaho 2016-2017

BS in Physics Medical Physics Emphasis (770-166)			
<b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i> CS 124                    3 MATH 215                4 PH 121                    3 PH 123                    3 PH 150                    1 PH 220                    3 ----- 17  <i>Take these courses:</i> MATH 316                4 PH 228                    1 PH 250                    1 PH 279                    3 PH 295                    3 ----- 12	<i>Take these courses:</i> PH 332                    4 PH 333                    4 PH 336                    2 PH 385                    2 ----- 12  <i>Take these courses:</i> PH 412                    3 PH 433                    3 PH 473                    3 ----- 9  <i>Take 1 course:</i> PH 314                    3 PH 323                    3 PH 324                    3 PH 374                    3 PH 375                    3 ----- 3	<b>Internship/Research Courses</b> <i>Take 1 course:</i> PH 398R                    1 PH 406                    1 ----- 2  <i>Take this course:</i> PH 488                    1 ----- 1  <b>Medical Physics Emphasis Courses</b> <i>Take these courses:</i> CHEM 105                    4 BIO 230*                    4 PH 324**                    3 ----- 11	<b>Program Notes:</b>  • No Grade Less Than C- in Major Courses  • BIO 230 is offered on a rotating schedule, so take care to fit it in early. BIO 264 & 265 are not required, but would be beneficial.  • **PH 324 is required for the emphasis. A different upper level physics elective is required for the core requirements.  • Students with this emphasis will complete the FDSCI Option C requirement. This will be completed with FDSCI 101, CHEM 105, and Physics courses as part of the major.
<b>Credit Requirements:</b>		<b>Tracks Available:</b>	
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

Graduation Plan BS in Physics Medical Physics Emphasis (770-166)				
<b>Semester 1</b> <i>Take these courses:</i> CS 124                    3 PH 121                    3 PH 150                    1 FDMAT 112                4 ^FDSCI 101                2 FDREL 200                2 ----- 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215                4 PH 123                    3 Elective Credit            3 FDENG 101                3 FDREL 225                2 ----- 15	<b>Semester 3</b> <i>Take these courses:</i> PH 220                    3 PH 250                    1 PH 228                    1 *BIO 230                    4 FDAMF 101                3 FDREL 250                2 ----- 14	<b>Semester 4</b> <i>Take these courses:</i> MATH 316                4 PH 279                    3 PH 295                    3 Elective Credit            3 FDREL 275                2 ----- 15	<b>Semester 5</b> <i>Take these courses:</i> PH 332                    4 PH 333                    4 Elective Credit            3 Cultural Awareness        3 FDREL Elective            2 ----- 16
<b>Semester 6</b> <i>Take these courses:</i> PH 336                    2 PH 385                    2 FDENG 301                3 Cultural Awareness        3 Elective Credit            3 FDREL Elective            2 ----- 15	<b>Off-Track</b> ***Choose One: PH 398R or take            1 PH 406 Fall semester      1 ----- 1	<b>Semester 7</b> <i>Take these courses:</i> PH 324                    3 PH 412                    3 PH 433                    3 Elective Credit            3 FDREL Elective            2 ----- 14	<b>Semester 8</b> <i>Take these courses:</i> PH 473                    3 PH 488                    1 PH Elective                3 CHEM 105                    4 Elective Credit            4 ----- 15	<b>Program Notes</b>  • BIO 230 is offered on a rotating schedule, so take care to fit it in early.  • You will be fulfilling the Option C Foundations requirement.

**BS in Physics**  
**Pre-Medical Emphasis (770-167)**

<b>Core Courses</b> <i>Take these courses during your first 3 semesters:</i> CS 124                   3 MATH 215               4 PH 121                   3 PH 123                   3 PH 150                   1 PH 220                   3 <hr style="width: 50%; margin-left: 0;"/> 17  <i>Take these courses:</i> MATH 316               4 PH 228                   1 PH 250                   1 PH 279                   3 PH 295                   3 <hr style="width: 50%; margin-left: 0;"/> 12	<i>Take these courses:</i> PH 332                   4 PH 333                   4 PH 336                   2 PH 385                   2 <hr style="width: 50%; margin-left: 0;"/> 12  <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 314                   3 PH 323                   3 PH 324                   3 PH 374                   3 PH 375                   3 <hr style="width: 50%; margin-left: 0;"/> 3	<b>Internship/Research Courses</b> <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  <b>Pre-Medical Emphasis Courses</b> <i>Take these courses:</i> CHEM 105                   4 CHEM 106                   4 BIO 180                   4 <hr style="width: 50%; margin-left: 0;"/> 12	<b>Program Notes:</b> <ul style="list-style-type: none"> <li>• No Grade Less Than C- in Major Courses</li> <li>• BIO 181 is not required but would be beneficial and could be counted as elective credits.</li> <li>• Students with this emphasis will complete the FDSCI Option C requirement. This will be completed with FDSCI 101, CHEM 105, and Physics courses as part of the major.</li> </ul>
<b>Credit Requirements:</b>		<b>Tracks Available:</b>	
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

**Graduation Plan**  
**BS in Physics Pre-Medical Physics Emphasis (770-167)**

<b>Semester 1</b> <i>Take these courses:</i> CS 124                   3 PH 121                   3 PH 150                   1 FDMAT 112               4 ^FDSCI 101               2 FDREL 200               2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215               4 PH 123                   3 Elective Credit           3 FDENG 101               3 FDREL 225               2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 3</b> <i>Take these courses:</i> PH 220                   3 PH 250                   1 PH 228                   1 CHEM 105               4 Elective Credit           3 FDREL 250               2 <hr style="width: 50%; margin-left: 0;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> MATH 316               4 PH 279                   3 PH 295                   3 FDAMF 101               3 FDREL 275               2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 5</b> <i>Take these courses:</i> PH 332                   4 PH 333                   4 Cultural Awareness       3 Elective Credit           3 FDREL Elective           2 <hr style="width: 50%; margin-left: 0;"/> 16
<b>Semester 6</b> <i>Take these courses:</i> PH 336                   2 PH 385                   2 BIO 180                   4 FDENG 301               3 Elective Credit           3 <hr style="width: 50%; margin-left: 0;"/> 14	<b>Off-Track</b> ***Choose One: PH 398R or take           1 PH 406 Fall semester     1 <hr style="width: 50%; margin-left: 0;"/> 1	<b>Semester 7</b> <i>Take these courses:</i> PH 412                   3 PH 433                   3 Elective Credit           3 CHEM 106               4 FDREL Elective           2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 8</b> <i>Take these courses:</i> PH 473                   3 PH 488                   1 PH Elective               3 Cultural Awareness       3 Elective Credit           3 FDREL Elective           2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Program Notes</b> <ul style="list-style-type: none"> <li>• BIO 181 is not required, but would be beneficial &amp; could be counted as elective credits.</li> <li>• You will be fulfilling the Option C Foundations requirement.</li> </ul>

## Physics

Brigham Young University-Idaho 2016-2017

### BS in Physics Education (870)

Education Core	Physics Core	Complete 1 option:	Take these courses:	Program Notes:
<i>Take these courses:</i>	<i>Take these courses during your first 3 semesters:</i>	<i>Option A</i>	<i>MATH 113</i>	<ul style="list-style-type: none"> <li>• No Grade Less Than C- in Major Courses</li> <li>• Some Physics courses are offered on a rotating schedule, so plan accordingly.</li> </ul>
ED 200           2	PH 121           3	FDMAT 112       4	PH 127           3	
ED 242           2	PH 123           3	<i>Option B</i>	PH 277           2	
ED 304           3	PH 150           1	MATH 109 and   5	PH 279           3	
ED 461           3	PH 220           3	FDMAT 112       4	PH 311           3	
ED 492           10	PH 250           1	<i>Option C</i>	PH 314           3	
PH 305           2	11	FDMAT 110 and   3	PH 403           2	
SPED 360       2		MATH 111 and   2	PH 411           2	
24		FDMAT 112       4	21	
		4		
<b>Credit Requirements:</b>		<b>Tracks Available:</b>		
Foundations	40	Fall-Winter		Yes
Major	36	Winter-Spring (Freshman/ Sophomore)		Yes
Education Core	24	Winter-Spring (Junior/Senior)		No
Education Minor	20	Spring-Fall		Yes
Total	120			

Graduation Plan				
BS in Physics Education (870)				
Semester 1	Semester 2	Semester 3	Semester 4	Program Notes
<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take these courses:</i>	<ul style="list-style-type: none"> <li>• Take care to plan out the required PH courses, as many are Fall only, on rotating schedules, etc.</li> <li>• Per agreement with the ED Department, PH 305 will sub for the co-req of ED 361 for ED 304.</li> </ul>
PH 121           3	PH 123           3	PH 220           3	PH 279           3	
PH 150           1	MATH 113       3	PH 250           1	PH 305           2	
PH 127*          3	ED Minor Course 2	ED 200           2	ED 242           2	
FDMAT 112       4	FDENG 101       3	PH 311*          3	FDAMF 101       3	
FDSCI 101       2	FDREL 225       2	ED Minor Courses 6	FDREL 275       2	
FDREL 200       2	FDSCI Issues     3	FDREL 250       2	FDENG 101       3	
15	16	17	15	
<b>Semester 5</b>	<b>Semester 6</b>	<b>Semester 7</b>	<b>Semester 8</b>	
<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take these courses:</i>	
PH 277*          2	PH 314           3	PH 411*          2	ED 492           10	
ED 304^          3	ED 461           3	PH 403           2	10	
SPED 360        2	ED Minor Courses 5	ED Minor Courses 6		
Cultural Awareness 3	FDSCI Issues     3	Cultural Awareness 3		
ED Minor Courses 4	FDREL Elective  2	FDREL Elective  2		
16	16	15		

Minor in Physics (104)		
Core Courses	Take 6 credits	Program Notes:
<i>Take these courses:</i>		<ul style="list-style-type: none"> <li>• No Double Counting of Minor Courses</li> </ul>
MATH 215       4	PH 314           3	
PH 121           3	PH 323           3	
PH 123           3	PH 324           3	
PH 150           1	PH 374           3	
PH 220           3	PH 375           3	
PH 250           1	PH 433           3	
PH 279           3	6	
18		
<b>Credit Requirements:</b>		<b>Tracks Available:</b>
Total	24	Fall-Winter       Yes
		Winter-Spring    Yes
		Spring-Fall       Yes

**Physics**

Brigham Young University-Idaho 2016-2017

**Minor in Physics Education (178)**

<b>Core Courses</b> <i>Take these courses:</i> PH 121           3 PH 123           3 PH 150           1 PH 220           3 PH 250           1 PH 279           3 PH 311           3 PH 314           3 <hr style="width: 50px; margin-left: 0;"/> 20	<b>Program Notes:</b> •No Double Counting of Minor Courses
<b>Credit Requirements:</b>  Total                   20	<b>Tracks Available:</b>  Fall-Winter        Yes Winter-Spring     No Spring-Fall         Yes

**Minor in Physical Science Education (182)**

<i>Take these courses:</i> CHEM 105       4 CHEM 106       4 PH 105           4 PH 106           4 <hr style="width: 50px; margin-left: 0;"/> 16	<i>Take 1 course:</i> CHEM 150       5 CHEM 220       5 CHEM 351       4 <hr style="width: 50px; margin-left: 0;"/> 4	<b>Program Notes:</b> •No Double Counting of Minor Courses
<b>Credit Requirements:</b>  Total                   20		<b>Tracks Available:</b>  Fall-Winter        Yes Winter-Spring     Yes Spring-Fall         Yes

**Physics Concentration (D 129)**

<b>Core Courses</b> <i>Take these courses:</i> 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 <hr style="width: 50px; margin-left: 0;"/> 32	<b>Interdisciplinary Courses</b> <i>Take these courses:</i> IDS 398R       1-3 IDS 499           2 <hr style="width: 50px; margin-left: 0;"/> 3	<b>Program Notes:</b> •No Double Counting of Concentration Courses
<b>Credit Requirements:</b>  Total                   35		<b>Tracks Available:</b>  Fall-Winter                                Yes Winter-Spring (Freshman/Sophomore)   Yes Winter-Spring (Junior/Senior)         No Spring-Fall (Freshman/Sophomore)     Yes Spring-Fall (Junior/Senior)            No

Physics Predefined 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
<b>Total Credits</b>		<b>12</b>

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
<b>Total Credits</b>		<b>14</b>

Physical Science and Mathematics		6800
<i>Take 12 credits from at least 2 of the following areas:</i>		
<b>Chemistry</b>		
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)		
<b>Physics</b>		
Take any Physics class numbered 105 or higher		0-10
<b>Geology</b>		
Take any Geology class numbered 111 and 111L or higher		0-10
<b>Mathematics</b>		
Take any Mathematics class numbered 111 or higher		0-10
<b>Total Credits</b>		<b>12</b>

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  
 Co-requisites: MATH 113 or MATH 215  
 This course is the second semester of the calculus-based Principles of Physics sequence. It is designed for students majoring in physics, chemistry, geology, civil engineering, and mathematics. The course covers topics in waves, thermodynamics, and optics. These areas of study are important in a wide variety of scientific disciplines and in engineering. For example, an understanding of wave properties is essential in applications such as wireless communications 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 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 in a historical context.  
 (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  
 Co-requisites: 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 305 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 228 Physics Career Development (1:0:3:0)**  
 Prerequisite: PH 220  
 This course will focus on professionalism and career development in physics. Students will learn about resume writing, interviewing skills, networking skills, seeking out internship opportunities, exploring different fields in physics, and getting involved in on-campus student research projects.  
 (Fall)

## Physics

Brigham Young University-Idaho 2016-2017

<p><b>PH 250 Intermediate Physics Lab</b> (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)</p>	<p><b>PH 328 Introduction to Physics Research</b> (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><b>PH 277 Contemporary Issues in Astronomy</b> (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><b>PH 332 Classical Mechanics</b> (4:4:0:0)            Prerequisites: PH 220 and MATH 316            This is a junior level course applying Newton's Laws of Motion in a wide variety of applications.            (Fall)</p>
<p><b>PH 279 Modern Physics</b> (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><b>PH 333 Electricity and Magnetism</b> (4:4:0:0)            Prerequisites: PH 220 and MATH 316            This is a junior level course which covers electromagnetic theory.            (Fall)</p>
<p><b>PH 291 Wave Physics</b> (2:2:0:0)            Co-requisites: PH 279 and MATH 316            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><b>PH 336 Advanced Physics Lab</b> (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><b>PH 295 Mathematical and Computational Methods</b> (3:2:2:0)            Prerequisites: CS 124 and MATH 316            This course is designed to prepare students for the mathematical rigors of upper division physics and help them apply computational programming skills to modeling physics phenomenon and solving physics equations.            (Winter, Spring)</p>	<p><b>PH 374 Astrophysics</b> (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><b>PH 305 Science Teaching Principles</b> (2:1:1:0)            Course equivalent to BIO 305, CHEM 305, and PH 305            Prerequisites: ED 200 and PH 220            This course is designed to be taken in the first semester of the junior year. Students in this class receive experience to lesson preparation and teaching of general science topics. This class is based on a mix of classroom discussion on various aspects of science teaching, and preparation, and execution of mentor-directed teaching experiences.            (Fall, Winter)</p>	<p><b>PH 375 Principles of Optics</b> (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><b>PH 311 Physics by Inquiry I</b> (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)</p>	<p><b>PH 385 Numerical Modeling in Physics</b> (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. One or more of the following program languages will be used in this course: MATLAB, PYTHON, C, or FORTRAN.            (Winter)</p>
<p><b>PH 314 History and Philosophy of Science</b> (3:3:0:0)            Course equivalent to PHIL 314            Prerequisite: FDSCI 101            Course Requirement: Junior and Seniors Only            Discusses the philosophical assumptions of modern science, criteria for theory selection, and traces their historical development. Describes the historical development of basic ideas in science.            (Fall, Winter)</p>	<p><b>PH 390R Special Topics in Physics</b> (1:0:2:0)            Repeatable Course: May earn maximum of 2 credits            Prerequisite: PH 121            This special topics course is 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 in specialized software, instrumentation, journal readings, etc., which is specific to a chosen topic.            (Winter)</p>
<p><b>PH 323 Solid State Physics</b> (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><b>PH 398R Physics Internship</b> (1:0:0:0)            Repeatable Course: May earn maximum of 2 credits            Internship Fees: \$81.50 (LDS) \$163 (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.            (Fall, Winter, Spring)</p>
<p><b>PH 324 Nuclear and Particle Physics</b> (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>	

- PH 403 Methods of Physics Teaching (2:2:0:0)**  
 Course equivalent to BIO 405, CHEM 405, and GEOL 405  
 Prerequisites: PH 279 and PH 314  
 This course uncovers of the methods and philosophy of teaching physics principles in a secondary school setting.  
 (Fall, Winter, Spring)
- PH 406 Physics Senior Research (1:1:0:0)**  
 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)
- 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.
- 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  
 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)**  
 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)