

Department of  
**Physics**

**Stephen Turcotte, Department Chair**

*Richard Hatt, Evan Hansen, Jon Johnson, Kevin Kelley, Todd Lines, Stephen McNeil, Ryan Nielson, David Oliphant, Brian Poyer, Brian Tonks, Stephen Turcotte  
Melanie Nelson, Secretary (208) 496-7730  
<http://www.byui.edu/Physics>*

**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 size of the atom 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. Solid state physicists are involved in the semiconductor industry and the development of a wide range of materials such as superconductors, ceramics, and conducting polymers. Nuclear physicists are in high demand in nuclear medicine, now used extensively for diagnosis and treatment. The nuclear energy industry is poised to experience rapid growth in the next few years. A background in optics can be applied in fiber optic communication and the design of optical instruments for astronomy and the aerospace industry. In addition, physics is applied in a variety of scientific and engineering fields including astronomy, biology, geology, and acoustics.

Physicists have the scientific and technological versatility that allows them to work in a wide range of levels and disciplines. In recent years, physicists have been utilized in areas outside of science. 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 and data acquisition.

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.

# Physics

Brigham Young University-Idaho 2013-2014

<b>BS in Physics</b>			
<b>Astronomy Emphasis (770-154)</b>			
Take required Foundations courses			
Major Requirements			
<i>No Grade Less Than C- in Major Courses</i>			
<b>Core Courses</b> <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: 50px; margin-left: 0;"/> 14  <i>Take these courses:</i> MATH 316      4 PH 250        1 PH 279        3 PH 291        2 PH 314        3 <hr style="width: 50px; 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: 50px; margin-left: 0;"/> 14	<b>Take these courses:</b> PH 412        3 PH 433        3 PH 473        3 <hr style="width: 50px; margin-left: 0;"/> 9  <b>Take 1 course:</b> PH 323        3 PH 324        3 PH 374*       3 PH 375        3 <hr style="width: 50px; margin-left: 0;"/> 3  <b>Internship/Research Courses</b> <b>Take 1 course:</b> PH 398R       1-3 PH 406        1 <hr style="width: 50px; margin-left: 0;"/> 1  <b>Take this course:</b> PH 488        1 <hr style="width: 50px; margin-left: 0;"/> 1	<b>Astronomy Emphasis Courses</b> <b>Take these courses:</b> PH 127        3 PH 277        2 PH 374*       3 CHEM 105      4 <hr style="width: 50px; margin-left: 0;"/> 12	<b>Program Notes:</b>  *PH 374 is required for the emphasis. A different upper level physics elective is required for the core requirements.
<b>Total Major Credits=67</b>			
<b>Additional Elective Credits Required for Graduation=13</b>			
This major is available on the following tracks:			
Fall-Winter---- YES                      Winter-Spring/Spring-Fall----                      Freshman Sophomore YES/Junior Senior NO			

<b>Graduation Plan</b>				
<b>BS in Physics - Astronomy Emphasis (770-154)</b>				
<b>Semester 1</b> <i>Take these courses:</i> PH 150        1 PH 121        3 PH 127        3 FDSCI 101     2 FDMAT 112    4 FDREL 121 or 122   2 <hr style="width: 50px; margin-left: 0;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215      4 PH 123        3 CHEM 105      4 FDENG 101     3 FDREL 121 or 122   2 <hr style="width: 50px; margin-left: 0;"/> 16	<b>Semester 3</b> <i>Take these courses:</i> MATH 316      4 PH 220        3 PH 250        1 FDAMF 101     3 FDREL 200     2 FDMAT 108T    1-3 <hr style="width: 50px; margin-left: 0;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 291        2 PH 279        3 PH 277*       2 FDSCI Issues   3 FDREL Scripture   2 FDENG 201     3 <hr style="width: 50px; margin-left: 0;"/> 15	<b>Semester 5</b> <i>Take these courses:</i> PH 333        4 PH 328        2 PH 332        4 Elective Credit   3 FDREL Scripture   2
<b>Semester 6</b> <i>Take these courses:</i> PH 385        2 PH 336        2 PH 314        3 PH 374**      3 FDCA/FDWLD   2-3 FDSCI Issues   2 <hr style="width: 50px; margin-left: 0;"/> 14	<b>Off-Track</b> <b>***Choose 1:</b> PH 398R or     1 PH 406 fall semester   1	<b>Semester 7</b> <i>Take these courses:</i> PH 406***     1 PH 433        3 PH 412        3 PH Elective    3 FDCA/FDWLD   2-3 FDREL Elective   2 <hr style="width: 50px; margin-left: 0;"/> 14	<b>Semester 8</b> <i>Take these courses:</i> PH 473        3 PH 488        1 FDCNC 350     2 Elective Credit   4 Elective Credit   3 FDREL Elective   2 <hr style="width: 50px; margin-left: 0;"/> 15	<b>Program Notes</b> *PH 277 is a fall only course and a pre-req to PH 374 **PH 374 is offered in the Winter, in even years.



# Physics

Brigham Young University-Idaho 2013-2014

<b>BS in Physics</b>			
<b>Chemistry Emphasis (770-156)</b>			
Take required Foundations courses			
Major Requirements			
<i>No Grade Less Than C- in Major Courses</i>			
<b>Core Courses</b> <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  <b>Internship/Research Courses</b> <i>Take 1 course:</i> PH 398R           1-3 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	<i>Program Notes:</i>
<b>Total Major Credits=67</b>			
<b>Additional Elective Credits Required for Graduation=13</b>			
This major is available on the following tracks:			
Fall-Winter---- YES                                      Winter-Spring/Spring-Fall----                                      Freshman Sophomore YES/Junior Senior NO			

<b>Graduation Plan</b>				
<b>BS in Physics - Chemistry Emphasis (770-156)</b>				
<b>Semester 1</b> <i>Take these courses:</i> PH 150             1 PH 121             3 FDSCI 101         2 FDMAT 112         4 FDREL 121 or 122 2 Elective Credit   3 <hr style="width: 100%;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215           4 PH 123             3 CHEM 105           4 FDENG 101         3 FDREL 121 or 122 2 <hr style="width: 100%;"/> 16	<b>Semester 3</b> <i>Take these courses:</i> MATH 316           4 PH 220             3 PH 250             1 FDAMF 101         3 FDREL 200         2 FDMAT 108T       1-3 <hr style="width: 100%;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 291             2 PH 279             3 CHEM 106           4 FDSCI Issues       2 FDREL Scripture   2 FDENG 201         3 <hr style="width: 100%;"/> 16	<b>Semester 5</b> <i>Take these courses:</i> PH 333             4 PH 328             2 PH 332             4 PH Elective       3 FDREL Scripture   2 <hr style="width: 100%;"/> 15
<b>Semester 6</b> <i>Take these courses:</i> PH 385             2 PH 336             2 PH 314             3 FDCA/FDWLD       2-3 FDSCI Issues       3 Elective Credit   3 <hr style="width: 100%;"/> 15	<b>Off-Track</b> ***Choose 1: PH 398R or           1 PH 405 fall semester	<b>Semester 7</b> <i>Take these courses:</i> ***PH 406           1 PH 433             3 PH 412             3 FDCA/FDWLD       2-3 FDREL Elective     2 PH Elective         4 <hr style="width: 100%;"/> 15	<b>Semester 8</b> <i>Take these courses:</i> PH 473             3 PH 488             1 CHEM 351           4 FDCNC 350          2 FDREL Elective     2 Elective Credit     3 <hr style="width: 100%;"/> 15	<b>Program Notes</b>

# Physics

Brigham Young University-Idaho 2013-2014

<b>BS in Physics</b>			
<b>Computational Emphasis (770-157)</b>			
Take required Foundations courses			
Major Requirements			
<i>No Grade Less Than C- in Major Courses</i>			
<b>Core Courses</b> <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        3 <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  <b>Internship/Research Courses</b> <i>Take 1 course:</i> PH 398R      1-3 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 124        3 CS 165        3 CS 237        3 MATH 411      3 <hr style="width: 50%; margin-left: 0;"/> 12	<i>Program Notes:</i>
<b>Total Major Credits=67</b>			
<b>Additional Elective Credits Required for Graduation=13</b>			
This major is available on the following tracks:			
Fall-Winter---- YES                      Winter-Spring/Spring-Fall----                      Freshman Sophomore YES/Junior Senior NO			

<b>Graduation Plan</b>				
<b>BS in Physics - Computational Emphasis (770-157)</b>				
<b>Semester 1</b> <i>Take these courses:</i> PH 150        1 PH 121        3 CS 124        3 FDSCI 101    2 FDMAT 112   4 FDREL 121 or 122   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 FDENG 101    3 FDREL 121 or 122   2 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 3</b> <i>Take these courses:</i> MATH 316      4 PH 220        3 PH 250        1 FDAMF 101    3 FDREL 200    2 FDMAT 108T   1-3 <hr style="width: 50%; margin-left: 0;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 291        2 PH 279        3 CS 237        3 FDSCI Issues   2 FDCA/FDWLD   2-3 FDENG 201    3 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 5</b> <i>Take these courses:</i> PH 333        4 PH 328        2 PH 332        4 PH Elective    3 FDREL Scripture   2 <hr style="width: 50%; margin-left: 0;"/> 15
<b>Semester 6</b> <i>Take these courses:</i> PH 385        2 PH 336        2 PH 314        3 FDREL Scripture   2 FDSCI Issues    3 Elective Credit   4 <hr style="width: 50%; margin-left: 0;"/> 16	<b>Off-Track</b> ***Choose 1: PH 398R or      1 PH 405 fall semester   1 <hr style="width: 50%; margin-left: 0;"/> 1	<b>Semester 7</b> <i>Take these courses:</i> ***PH 406      1 PH 433        3 PH 412        3 MATH 411      3 FDREL Elective   2 Elective Credit   4 <hr style="width: 50%; margin-left: 0;"/> 16	<b>Semester 8</b> <i>Take these courses:</i> PH 473        3 PH 488        1 FDCNC 350      2 FDCA/FDWLD   2-3 FDREL Elective   2 Elective Credit   5 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Program Notes</b>



# Physics

Brigham Young University-Idaho 2013-2014

<b>BS in Physics</b>			
<b>Geophysics Emphasis (770-159)</b>			
Take required Foundations courses			
Major Requirements			
<i>No Grade Less Than C- in Major Courses</i>			
<b>Core Courses</b> <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        3 <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	<b>Take these courses:</b> PH 412        3 PH 433        3 PH 473        3 <hr style="width: 50%; margin-left: 0;"/> 9  <b>Take 1 course:</b> 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> <b>Take 1 course:</b> PH 398R       1-3 PH 406        1 <hr style="width: 50%; margin-left: 0;"/> 1  <b>Take this course:</b> PH 488        1 <hr style="width: 50%; margin-left: 0;"/> 1	<b>Geophysics Emphasis Courses</b> <b>Take these courses:</b> GEOL 111      3 GEOL 111L    1 GEOL 140      1 GEOL 445      3 <hr style="width: 50%; margin-left: 0;"/> 8  <b>Take one option:</b> GEOL 391      2 GEOL 392      2 OR GEOL 370      4 <hr style="width: 50%; margin-left: 0;"/> 4	<b>Program Notes:</b> GEOL 391 and GEOL 392 are offered in spring semesters only. GEOL 370 is offered in fall semester only.
<b>Total Major Credits=67</b>			
<b>Additional Elective Credits Required for Graduation=13</b>			
This major is available on the following tracks:			
Fall-Winter---- YES                      Winter-Spring/Spring-Fall----                      Freshman Sophomore YES/Junior Senior NO			

<b>Graduation Plan</b>				
<b>BS in Physics - Geophysics Emphasis (770-159)</b>				
<b>Semester 1</b> <i>Take these courses:</i> PH 150        1 PH 121        3 FDSCI 101    2 FDMAT 112   4 FDREL 121 or 122 2 Elective Credit 3 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215      4 PH 123        3 GEOL 111      3 GEOL 111L    1 FDENG 101    3 FDREL 121 or 122 2 <hr style="width: 50%; margin-left: 0;"/> 16	<b>Semester 3</b> <i>Take these courses:</i> MATH 316      4 PH 220        3 PH 250        1 FDAMF 101    3 FDREL 200    2 FDMAT 108T   1-3 <hr style="width: 50%; margin-left: 0;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 291        2 PH 279        3 GEOL 140      1 FDSCI Issues   3 FDREL Scripture 2 FDENG 201    3 Elective Credit 2 <hr style="width: 50%; margin-left: 0;"/> 16	<b>Semester 5</b> <i>Take these courses:</i> PH 333        4 PH 328        2 PH 332        4 FDCA/FDWLD   2-3 FDREL Scripture 2 <hr style="width: 50%; margin-left: 0;"/> 14
<b>Semester 6</b> <i>Take these courses:</i> PH 385        2 PH 336        2 PH 314        3 PH Elective   3 FDSCI Issues   2 Elective Credit 4 <hr style="width: 50%; margin-left: 0;"/> 16	<b>Off-Track</b> ***Choose 1: PH 398R or      1 PH 406 fall semester <b>Take these courses:</b> GEOL 391*      2 GEOL 392*      2 <hr style="width: 50%; margin-left: 0;"/> 5	<b>Semester 7</b> <i>Take these courses:</i> ***PH 406      1 PH 433        3 PH 412        3 GEOL 370*      4 FDCA/FDWLD   2-3 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 GEOL 445      3 FDCNC 350      2 FDREL Elective 2 Elective Credit 4 <hr style="width: 50%; margin-left: 0;"/> 15	<b>Program Notes</b> *Choose either GEOL 391 & 392 or GEOL 370. *Geol 391 & 392 are Spring only and Geol 370 is Fall only.

# Physics

Brigham Young University-Idaho 2013-2014

<b>BS in Physics</b>			
<b>Mathematical Emphasis (770-165)</b>			
Take required Foundations courses			
Major Requirements			
<i>No Grade Less Than C- in Major Courses</i>			
<b>Core Courses</b> <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  <b>Internship/Research Courses</b> <i>Take 1 course:</i> PH 398R        1-3 PH 406         1 <hr style="width: 100%;"/> 1  <i>Take this course:</i> PH 488         1 <hr style="width: 100%;"/> 1	<b>Mathematical Emphasis Courses</b> <i>Take these courses:</i> MATH 221B     3 MATH 341       3 MATH 423       3 MATH 472       3 <hr style="width: 100%;"/> 12	<b>Program Notes:</b> Math 423 & 472 are Winter classes only.
<b>Total Major Credits=67</b>			
<b>Additional Elective Credits Required for Graduation=13</b>			
This major is available on the following tracks:			
Fall-Winter---- YES                      Winter-Spring/Spring-Fall----                      Freshman Sophomore YES/Junior Senior NO			

<b>Graduation Plan</b>				
<b>BS in Physics - Mathematical Emphasis (770-165)</b>				
<b>Semester 1</b> <i>Take these courses:</i> PH 150         1 PH 121         3 FDSCI 101      2 FDMAT 112     4 FDREL 121 or 122 2 Elective Credit 4 <hr style="width: 100%;"/> 16	<b>Semester 2</b> <i>Take these courses:</i> MATH 215      4 PH 123         3 MATH 221B     3 FDENG 101      3 FDREL 121 or 122 2 <hr style="width: 100%;"/> 15	<b>Semester 3</b> <i>Take these courses:</i> MATH 316      4 PH 220         3 PH 250         1 FDAMF 101      3 FDREL 200      2 FDMAT 108T    1-3 <hr style="width: 100%;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 291         2 PH 279         3 MATH 341       3 FDSCI Issues    2 FDREL Scripture 2 FDENG 201      3 <hr style="width: 100%;"/> 15	<b>Semester 5</b> <i>Take these courses:</i> PH 333         4 PH 328         2 PH 332         4 Elective Credit 4 FDREL Scripture 2 <hr style="width: 100%;"/> 16
<b>Semester 6</b> <i>Take these courses:</i> PH 385         2 PH 336         2 PH 314         3 MATH 423*      3 FDCA/FDWLD    2-3 FDSCI Issues    3 <hr style="width: 100%;"/> 15	<b>Off-Track</b> ***Choose 1: PH 398R or      1 PH 405 fall semester      1 <hr style="width: 100%;"/> 1	<b>Semester 7</b> <i>Take these courses:</i> ***PH 406      1 PH 433         3 PH 412         3 PH Elective     3 FDCA/FDWLD    2-3 FDREL Elective 2 <hr style="width: 100%;"/> 14	<b>Semester 8</b> <i>Take these courses:</i> PH 473         3 PH 488         1 FDCNC 350      2 MATH 472*      3 Elective Credit 4 FDREL Elective 2 <hr style="width: 100%;"/> 15	<b>Program Notes</b> *Math 423 & 472 are Winter classes only.



# Physics

Brigham Young University-Idaho 2013-2014

<b>BS in Physics</b>			
<b>Medical Physics Emphasis (770-166)</b>			
Take required Foundations courses			
Major Requirements			
<i>No Grade Less Than C- in Major Courses</i>			
<b>Core Courses</b> <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	<b>Take these courses:</b> PH 412          3 PH 433          3 PH 473          3 <hr style="width: 100%;"/> 9  <b>Take 1 course:</b> PH 323          3 PH 324          3 PH 374          3 PH 375          3 <hr style="width: 100%;"/> 3  <b>Internship/Research Courses</b> <b>Take 1 course:</b> PH 398R        1-3 PH 406          1 <hr style="width: 100%;"/> 1  <b>Take this course:</b> PH 488          1 <hr style="width: 100%;"/> 1	<b>Medical Physics Emphasis Courses</b> <b>Take these courses:</b> CHEM 105        4 BIO 230          4 PH 324          3 <hr style="width: 100%;"/> 11	<b>Program Notes:</b>  PH 324 is required for the emphasis. A different upper level physics elective is required for the core requirements.
<b>Total Major Credits=66</b>			
<b>Additional Elective Credits Required for Graduation=14</b>			
This major is available on the following tracks:			
Fall-Winter---- YES	Winter-Spring/Spring-Fall----	Freshman Sophomore YES/Junior Senior NO	

<b>Graduation Plan</b>				
<b>BS in Physics - Medical Physics Emphasis (770-166)</b>				
<b>Semester 1</b> <i>Take these courses:</i> PH 150          1 PH 121          3 FDSCI 101       2 FDMAT 112      4 FDREL 121 or 122 2 Elective Credit 3 <hr style="width: 100%;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215      4 PH 123          3 CHEM 105       4 FDENG 101      3 FDREL 121 or 122 2 <hr style="width: 100%;"/> 16	<b>Semester 3</b> <i>Take these courses:</i> MATH 316      4 PH 220          3 PH 250          1 FDAMF 101      3 FDREL 200       2 FDMAT 108T    1-3 <hr style="width: 100%;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 291          2 PH 279          3 BIO 230*        4 FDSCI Issues    2 FDREL Scripture 2 FDENG 201      3 <hr style="width: 100%;"/> 16	<b>Semester 5</b> <i>Take these courses:</i> PH 333          4 PH 328          2 PH 332          4 PH 324**        3 FDREL Scripture 2 <hr style="width: 100%;"/> 15
<b>Semester 6</b> <i>Take these courses:</i> PH 385          2 PH 336          2 PH 314          3 FDSCI Issues    3 FDCA/FDWLD    2-3 Elective Credit 3 <hr style="width: 100%;"/> 15	<b>Off-Track</b> ***Choose 1: PH 398R or      1 PH 405 fall semester 1 <hr style="width: 100%;"/> 1	<b>Semester 7</b> <i>Take these courses:</i> ***PH 406      1 PH 433          3 PH 412          3 FDREL Elective 2 FDCA/FDWLD    2-3 Elective Credit 3 <hr style="width: 100%;"/> 14	<b>Semester 8</b> <i>Take these courses:</i> PH 473          3 PH 488          1 PH Elective     3 FDCNC 350      2 FDREL Elective 2 Elective Credit 4 <hr style="width: 100%;"/> 15	<b>Program Notes</b> *Bio 240 is offered on a rotating schedule, so take care to fit it in early. **PH 324 is a Fall only class in the even years.

# Physics

Brigham Young University-Idaho 2013-2014

<b>BS in Physics</b>			
<b>Pre-Medical Emphasis (770-167)</b>			
Take required Foundations courses			
Major Requirements			
<i>No Grade Less Than C- in Major Courses</i>			
<b>Core Courses</b> <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: 50px; margin-left: 0;"/> 14  <i>Take these courses:</i> MATH 316      4 PH 250        1 PH 279        3 PH 291        2 PH 314        3 <hr style="width: 50px; 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: 50px; margin-left: 0;"/> 14	<i>Take these courses:</i> PH 412        3 PH 433        3 PH 473        3 <hr style="width: 50px; margin-left: 0;"/> 9  <i>Take 1 course:</i> PH 323        3 PH 324        3 PH 374        3 PH 375        3 <hr style="width: 50px; margin-left: 0;"/> 3  <b>Internship/Research Courses</b> <i>Take 1 course:</i> PH 398R      1-3 PH 406        1 <hr style="width: 50px; margin-left: 0;"/> 1  <i>Take this course:</i> PH 488        1 <hr style="width: 50px; 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: 50px; margin-left: 0;"/> 12	<i>Program Notes:</i>
<b>Total Major Credits=67</b>			
<b>Additional Elective Credits Required for Graduation=13</b>			
This major is available on the following tracks:			
Fall-Winter---- YES                      Winter-Spring/Spring-Fall----                      Freshman Sophomore YES/Junior Senior NO			

<b>Graduation Plan</b>				
<b>BS in Physics - Pre-Medical Emphasis (770-167)</b>				
<b>Semester 1</b> <i>Take these courses:</i> PH 150        1 PH 121        3 FDSCI 101    2 FDMAT 112   4 FDREL 121 or 122 2 Elective Credit   3 <hr style="width: 50px; margin-left: 0;"/> 15	<b>Semester 2</b> <i>Take these courses:</i> MATH 215      4 PH 123        3 CHEM 105      4 FDENG 101     3 FDREL 121 or 122 2 <hr style="width: 50px; margin-left: 0;"/> 16	<b>Semester 3</b> <i>Take these courses:</i> MATH 316      4 PH 220        3 PH 250        1 FDAMF 101     3 FDREL 200     2 FDMAT 108T   1 <hr style="width: 50px; margin-left: 0;"/> 14	<b>Semester 4</b> <i>Take these courses:</i> PH 291        2 PH 279        3 CHEM 106      4 FDSCI Issues   2 FDREL Scripture 2 FDENG 201     3 <hr style="width: 50px; margin-left: 0;"/> 16	<b>Semester 5</b> <i>Take these courses:</i> PH 333        4 PH 328        2 PH 332        4 Elective Credit   3 FDREL Scripture 2 <hr style="width: 50px; margin-left: 0;"/> 15
<b>Semester 6</b> <i>Take these courses:</i> PH 385        2 PH 336        2 PH 314        3 PH Elective    3 FDCA/FDWLD   2-3 FDSCI Issues   3 <hr style="width: 50px; margin-left: 0;"/> 15	<b>Off-Track</b> ***Choose 1: PH 398R or      1 PH 405 fall semester   1	<b>Semester 7</b> <i>Take these courses:</i> ***PH 406      1 PH 433        3 PH 412        3 BIO 180        4 FDCA/FDWLD   2-3 FDREL Elective   2 <hr style="width: 50px; margin-left: 0;"/> 15	<b>Semester 8</b> <i>Take these courses:</i> PH 473        3 PH 488        1 FDCNC 350     2 FDREL Elective 2 Elective Credit   4 Elective Credit   3 <hr style="width: 50px; margin-left: 0;"/> 15	<b>Program Notes</b>



# Physics

Brigham Young University-Idaho 2013-2014

## Physics Concentration (D 129)

### Concentration Requirements

*No Double Counting of Concentration Courses*

*Take these 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
IDS 398R	1-3
IDS 499	<u>2</u>
	35

*Program Notes:*

**Total Concentration Credits=35**

This concentration is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

## Minor in Physics (104)

### Minor Requirements

*No Double Counting of Minor Courses*

*Take these courses:*

MATH 215	4
PH 121	3
PH 123	3
PH 150	1
PH 220	3
PH 250	1
PH 279	3
PH 311	3
PH 314	<u>3</u>
	24

*Program Notes:*

**Total Minor Credits=24**

This minor is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

### Minor in Physics Education (178)

#### Minor Requirements

*No Double Counting of Minor Courses*

*Take these 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
	<hr/>
	20

*Program Notes:*

**Total Minor Credits=20**

This minor is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

### Minor in Physical Science Education (182)

#### Minor Requirements

*No Double Counting of Minor Courses*

*Take these courses:*

CHEM 105	4
CHEM 106	4
PH 105	4
PH 106	4
	<hr/>
	16

*Take 1 course:*

CHEM 150	5
CHEM 220	5
CHEM 351	4
	<hr/>
	4

*Program Notes:*

**Total Minor Credits=20**

This minor is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

# Physics

Brigham Young University–Idaho 2013-2014

## Physics Pre-approved Clusters

Technical Physics	6400	Physics Exposure	6401
<i>Take 12 Credits:</i>		<i>Take 14 credits:</i>	
PH 121 Principles of Physics 1	3	PH 105 Introductory Applied Physics I	4
PH 123 Principles of Physics 2	3	PH 106 Introductory Applied Physics II	4
PH 150 Beginning Physics Lab	1	PH 311 Physics by Inquiry I	3
PH 220 Principles of Physics 3	3	PH 314 History/Philosophy of Science	3
PH 250 Intermediate Physics Laboratory for Physics and Physical Science	1	<b>Total Credits</b>	<b>14</b>
PH 279 Modern Physics	3		
PH 311 Physics by Inquiry 1	3		
PH 314 History/Philosophy of Science	3		
<b>Total Credits</b>	<b>12</b>		

## Physical Science Pre-approved Clusters

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 (Chem 150 and Chem 153 cannot be taken with Chem 351 and/or Chem 352)	0-10
<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)

Principles of classical and modern physics as they relate to current concepts of the physical environment. This course includes a lab component.  
(Fall, Winter - even years)

#### PH 105 Introductory Applied Physics 1

(4:3:4)

Prerequisites: FDMAT 110 and Math 111 or Math 109 or FDMAT 112  
An introductory general physics course, including a lab component.  
(Fall, Winter, Spring)

#### PH 106 Introductory Applied Physics 2

(4:3:4)

Prerequisites: PH 105  
Second course in an introductory physics sequence. This course includes a lab component.  
(Fall, Winter, Spring)

#### PH 117 Descriptive Acoustics

(3:2:2)

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.  
(Spring)

#### PH 121 Principles of Physics 1

(3:2:3)

Concurrent Course: Concurrent enrollment in or completion of 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 2

(3:2:3)

Prerequisites: PH 121  
Concurrent Course: Concurrent enrollment in or completion of Math 113 or Math 215  
This course is the second semester of the Principles of Physics sequence. The course 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)

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. Includes an integrated laboratory experience.  
(Fall, Spring)

#### PH 150 Beginning Physics Lab

(1:0:3)

Concurrent Course: Concurrent enrollment in or completion of 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 3

(3:2:3)

Prerequisites: PH 121  
Concurrent Course: Concurrent enrollment in or completion of Math 113 or Math 215  
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.  
(Fall, Winter, Spring)

# Physics

## Brigham Young University-Idaho 2013-2014

<b>PH 223 Engineering Physics</b> (4:3:2) Prerequisites: ME 204, ME 210, 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)	<b>PH 328 Introduction to Physics Research</b> (2:2:0) Prerequisites: PH 220, FDENG 201, Math 314 or Math 316 This course acquaints students with possible career tracks in physics. 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. Introduces students to the research process in physics, by beginning the senior thesis or internship process. (Fall)
<b>PH 250 Intermediate Physics Lab</b> (1:0:3) Prerequisites: PH 150 Concurrent Course: PH 150, Concurrent enrollment in or completion of PH 220 Intermediate Physics Laboratory for Physics and Physical Science Teaching Majors. Experimental investigations into electricity and magnetism. (Fall, Winter, Spring)	<b>PH 332 Classical Mechanics</b> (4:4:0) Prerequisites: PH 220, Math 316 or Math 371 This is a junior level course applying Newton's Laws of Motion in a wide variety of applications. (Fall)
<b>PH 277 Contemporary Issues in Astronomy</b> (2:2:0) Prerequisites: PH 127 This 2 credit course explores areas of current research in astronomy. Many of these issues have technological, social, and political implications. It builds on the principles of astronomy learned previously in Ph 127. A working knowledge of college algebra is assumed. (Fall)	<b>PH 333 Electricity and Magnetism</b> (4:4:0) Prerequisites: PH 220, Math 316 or Math 371 This is a junior level course which covers electromagnetic theory. (Fall)
<b>PH 279 Modern Physics</b> (3:2:3) Prerequisites: PH 123 Concurrent Course: Concurrent enrollment in or completion of PH 150 and PH 220 Fourth of the principles of Physics sequence. Introductory course dealing with the fundamental topics of modern physics, including special relativity, elementary quantum mechanics, nuclear physics, and some particle physics. (Winter, Spring)	<b>PH 336 Advanced Physics Lab</b> (2:0:6) Prerequisites: PH 250; PH 332 This course introduces students to the basics of computer interfacing. It is designed to teach students the limitations and advantages of using computers to collect and analyze experimental data. It will also teach the basic electronics and programming needed to interface an experiment to a computer. (Winter)
<b>PH 291 Wave Physics</b> (2:2:0) Concurrent Course: Concurrent enrollment in or completion of PH 279, Concurrent enrollment in or completion Math 316 or Math 371 Physics course that reviews mathematical methods in the context of wave phenomena. Prepares students for the mathematical rigors of upper division physics. (Winter, Spring)	<b>PH 374 Astrophysics</b> (3:3:0) Prerequisites: PH 279; PH 332 A junior level mathematically based course designed to introduce students to the field of astrophysics. (Winter, even years)
<b>PH 311 Physics by Inquiry 1</b> (3:2:3) Course requirement: Junior level or permission of the instructor 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. (Fall)	<b>PH 375 Principles of Optics</b> (3:3:0) Prerequisites: PH 291, PH 333, 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. The course may also cover other topics such as Fourier optics and lasers. (Winter, odd years)
<b>PH 314 History and Philosophy of Science</b> (3:3:0) Prerequisites: Completion of two FDSCI Issues courses 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)	<b>PH 385 Numerical Modeling in Physics</b> (2:1:3) Prerequisites: PH 279 A lab course that applies numerical modeling and methods to a variety of modern topics in physics. MATLAB is used in this course. (Winter)
<b>PH 323 Solid State Physics</b> (3:3:0) Prerequisites: MATH 316; 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)	<b>PH 398R Physics Internship</b> (1:3:0:0) Repeatable Course: may earn maximum of 3 credits A professional internship providing the student with job experience in a physics-related field. (Spring)
<b>PH 324 Nuclear and Particle Physics</b> (3:3:0) Prerequisites: PH 279 This is a junior level survey course which introduces the physics of atomic nuclei and elementary particles. (Fall, even years)	<b>PH 403 Methods of Physics Teaching</b> (2:2:0) Prerequisites: PH 279; PH 314 Methods and philosophy of teaching physics principles in a high school setting. (Fall)
	<b>PH 406 Physics Senior Research</b> (1:1:0) Course requirement: Instructor Authorization 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.

## Physics

Brigham Young University-Idaho 2013-2014

(Fall)

### **PH 411 Physics by Inquiry 2 (3:2:3)**

Prerequisites: 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.

Opportunity may exist to practice appropriate questioning skills.

(Fall)

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

Prerequisites: PH 332

This is a second level course covering classical thermodynamics and statistical mechanics. This class builds upon and expands some of the material that was covered in PH 123.

(Fall)

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

Prerequisites: PH 279, 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)**

Prerequisites: 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)**

Course requirement: Instructor Authorization

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)