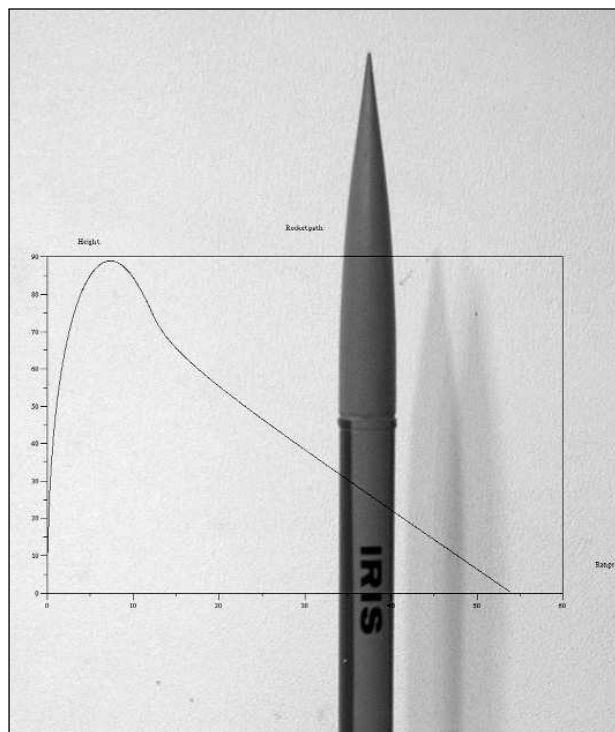


Department of  
**Physics**

**Stephen Turcotte, Department Chair**

Rodney Bain, Richard Hatt, Evan Hansen, Stephen McNeil, Kevin Kelley, Todd Lines, Ryan Nielson, David Oliphant, Brian Pyper, Brian Tonks, Stephen Turcotte  
Melanie Nelson, Secretary (208) 496-1913  
<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 and

engineering. A physics background can lead to a successful career in business and economics, patent law, and medicine.

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. In addition, the laboratory courses give students valuable skills and knowledge in experimental physics, extensive experience in modeling and simulations, and computer control of devices and data acquisition.

In addition to the knowledge that students gain in the physics program at BYU-Idaho, students develop a comprehensive set of valuable skills that can be applied to many 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.

**General Education Courses**

To fill the General Education Physical Science requirements, students may take Fundamental of Physics (Ph 101), Physical Science (PhS 100), Physical Science for Teachers (PhS110), Descriptive Astronomy (Ph 127) or Descriptive Acoustics of Music and Speech (Ph 117). These courses include lab sessions each week. These courses require minimal preparation in mathematics. CHECK WITH YOUR ADVISOR TO ENSURE THAT YOU ARE ENROLLED IN THE CORRECT COURSE.

**Technical/ Industrial Science Majors**

These majors take Introductory Applied Physics (Ph 105 and 106) and their associated labs. These courses require extensive use of Algebra and Trigonometry. CHECK WITH YOUR ADVISOR TO ENSURE THAT YOU ARE ENROLLED IN THE CORRECT COURSE.

**Life Science/ Pre-Medicine, Architecture Majors**

These majors take a two-semester General Physics course (Ph 115, 116) which includes a lab component. CHECK WITH YOUR ADVISOR TO ENSURE THAT YOU ARE ENROLLED IN THE CORRECT COURSE.

**Physics/ Chemistry/ Engineering/ Mathematics/ Computer Science Majors**

These majors take one to four calculus based Principles of Physics courses (Ph 121, 123, 220, 309), and two one-semester labs (Ph 150 & Ph 250). CHECK WITH YOUR ADVISOR TO ENSURE THAT YOU ARE ENROLLED IN THE CORRECT COURSE.





104			
<b>Minor in Physics</b>			
<b>Minor Requirements</b>			
<i>No Grade Less Than C- in Minor Courses</i>			
<i>Take these courses:</i>	<i>Take either Option A or Option B:</i>		<i>Program Notes:</i>
PH 311            3 PH 314            3 6	<b>Option A:</b> <i>(If Math 112 is already taken, you may choose either option)</i>	<b>Option B:</b> <i>(If Math 110 is taken as GE, without taking Math 112, you must select this option)</i>	
	<i>Take these courses:</i>	<i>Take these courses:</i>	
	MATH 215        4 PH 121            3 PH 123            3 PH 150            1 PH 220            3 PH 250            1 PH 309            3 18	MATH 111        2 PH 115            4 PH 116            4 PH 117            3 PH 117L          1 PH 127            3 PH 127L          1 18	
<b>Total Minor Credits=24</b>			
<i>This minor is available on the following tracks:</i>			
Fall-Winter---- YES	Winter-Summer---- YES	Summer-Fall---- YES	

178			
<b>Minor in Physics Education</b>			
<b>Minor Requirements</b>			
<i>No Grade Less Than C- in Minor Courses</i>			
<i>Take these courses:</i>	<i>Take either Option A or Option B:</i>		<i>Program Notes:</i>
PH 311            3 PH 314            3 6	<b>Option A:</b> <i>Take these courses:</i> <i>(If Math 113 is taken, you may choose either option)</i>	<b>Option B:</b> <i>Take these courses:</i> <i>(If you take Math 119 you must select this option)</i>	
<i>Take 1 course:</i> <i>(If Math 112 is chosen as GE Math Requirement, choose Math 113)</i>	PH 121            3 PH 123            3 PH 150            1 PH 220            3 PH 250            1 PH 309            3 14	PH 115            4 PH 116            4 PH 411            2 10	<i>AND Take these courses:</i> PH 117            3 PH 117L          1 4 <b>OR:</b> <i>Take these courses:</i> PH 127            3 PH 127L          1 4
MATH 113        3 MATH 119        4 3			
<b>Total Minor Credits=23</b>			
<i>This minor is available on the following tracks:</i>			
Fall-Winter---- YES	Winter-Summer---- YES	Summer-Fall---- YES	

182				
<b>Minor in Physical Science Education</b>				
<b>Minor Requirements</b>				
<i>No Grade Less Than C- in Minor Courses</i>				
<i>Take these courses:</i>	<i>Take 1 course:</i>	<i>Choose either Option A or B:</i>		<i>Program Notes:</i>
CHEM 105        4 CHEM 106        4 PH 311            3 11	CHEM 150        5 CHEM 220        4 CHEM 351        4 4	<b>Option A:</b> <i>Take these courses:</i>	<b>Option B:</b> <i>Take these courses:</i>	
		PH 105            3 PH 105L          1 PH 106            3 PH 106L          1 8	PH 115            4 PH 116            4 8	
<b>Total Minor Credits=23</b>				
<i>This minor is available on the following tracks:</i>				
Fall-Winter---- YES	Winter-Summer---- YES	Summer-Fall---- YES		

**Course Descriptions****Credits\*****PH 101 Fundamentals of Physics****(3:3:0)**

Fulfills GE Physical Science requirement.

Principles of classical and modern physics as they relate to current concepts of the physical environment.  
(Fall, Winter, Summer)

**PH 101L Fundamentals of Physics Lab****(1:0:3)**

Fulfills GE Physical Science requirement.

Prerequisite: Concurrent Registration: PH 101,  
Competency with High School Algebra is assumed

This laboratory is designed to provide students with experience in making and analyzing measurements of the physical environment at a fundamental level. Must be taken concurrently with Fundamentals of Physics PH 101.  
(Fall, Winter, Summer)

**PH 105 Introductory Applied Physics I****(3:3:0)**

Fulfills GE Physical Science requirement.

Prerequisite: Math 108 or Math 110 and Math 111 or strong trigonometry skills.

This course is the first semester of the algebra and trigonometry-based Applied Physics sequence.

While this course satisfies the physics requirement for most medical schools it does not specifically address preparation for the MCAT exams.

(Fall, Winter, Summer)

**PH 105L Applied Physics Lab I****(1:0:3)**

Fulfills GE Physical Science requirement.

A three-hour per week physics lab course.

Must be taken concurrently with PH 105.

GE course introduces students to the basic principles and laws that govern motion and waves. It is designed to help students learn to think analytically in terms of these laws and principles. Teaches good problem solving skills and prepares for other courses in a pre-professional discipline.

(Fall, Winter, Summer)

**PH 106 Introductory Applied Physics II****(3:3:0)**

Fulfills GE Physical Science requirement.

Prerequisite: Physics 105

This course is the second semester of algebra and trigonometry based Applied Physics Sequence. Concurrent registration of PH 106L is strongly recommended.

(Fall, Winter, Summer)

**PH 106L Applied Physics Lab II****(1:0:3)**

Fulfills GE Physical Science requirement.

Prerequisite: Concurrent registration in PH 106.

A three-hour per week physics lab course to accompany Ph 106.

Must be taken concurrently with PH 106.

(Fall, Winter, Summer)

**PH 115 Pre-Medical Professional Physics I****(4:3:4)**

Fulfills GE Physical Science requirement.

Prerequisite: Math 110 and Math 111 or High School Trig

Math Level: Extensive use of college algebra, trigonometry.

A general course particularly designed for pre-medical students, but also appropriate for architecture, biology and GE students. It is designed to address the concepts and topics needed to prepare student for the MCAT and entrance into professional schools.

The style of MCAT physics questions is addressed directly.

(Fall, Winter, Summer)

**PH 116 Pre-Medical Professional Physics II****(4:3:4)**

Fulfills GE Physical Science requirement.

Prerequisite: PH 115 or equivalent experience and permission of the instructor.

Second course in sequence of general physics particularly designed for pre-medical students, but also appropriate for architecture, biology and GE students. It is designed to address the concepts and topics needed to prepare students for the MCAT and entrance into professional schools. The style of MCAT physics questions is addressed directly.

(Fall, Winter, Summer)

**PH 117 Descriptive Acoustics of Music and Speech****(3:3:0)**

Fulfills GE Physical Science requirement.

Introductory acoustics course surveying the physical principles underlying the production and perception of sound, music and speech. Must be taken concurrently with Ph 117L

(Fall, Winter)

**PH 117L Acoustics Lab****(1:0:3)**

Fulfills GE Physical Science requirement.

This lab addresses basic measurements, vibrations, wave properties, perception and measurement, and room properties.

Emphasis is placed on the experience, reasoning, and observations that support understanding in the course.

(Fall, Winter)

**PH 121 Principles of Physics I****(3:5:0)**

Fulfills GE Physical Science requirement.

Prerequisite: Concurrent Registration or completion of Math 112.

Math Level: Extensive use of College Algebra, Trigonometry, and Elementary Calculus.

Classical Mechanics with emphasis on combining intuition and past experience with mathematics to understand the fundamental laws of nature.

(Fall, Winter, Summer)

**PH 123 Principles of Physics II****(3:5:0)**

Prerequisite: PH 121 or ME 204

Concurrent Registration 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, engineering, chemistry and mathematics. The course covers topics in waves, thermodynamics, and optics. These areas of study are important in a wide variety of engineering and scientific disciplines. For example, an understanding of wave properties is essential in various electrical engineering 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, Summer)

**PH 127 Descriptive Astronomy****(3:3:0)**

Fulfills GE Physical Science requirement.

Prerequisite: Math level: High School Algebra. Must be taken concurrently with PH 127L

Astronomy is the study of the heavens and the Earth as a planet.

Astronomy introduces students to the wonders of the heavens.

Students learn the vocabulary and concepts of modern astronomy, understand its fundamental observations and theories, and appreciate how scientists discover this information. Occasional use is made of the planetarium and observatory.

(Fall, Winter, Summer)

**PH 127L Astronomy Lab****(1:0:3)**

Fulfills GE Physical Science requirement.

Prerequisite: Math level: Extensive use of High School Algebra. Must be taken concurrently with PH 127.

This laboratory is designed to give the student experience in observing and analyzing basic astronomical phenomena.

(Fall, Winter, Summer)

<p><b>PH 150 Beginning Physics Lab</b> (1:0:3) Fulfills GE Physical Science requirement. Prerequisite: Completion of or concurrent enrollment in Physics 121. This General Education 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 also teaches students how to analyze data and numerically model common physics problems. (Fall, Winter, Summer)</p>	<p><b>PH 332 Classical Mechanics</b> (3:3:0) Prerequisite: Completion of or concurrent registration in Math 316 or 371 This is a junior level course applying Newton's laws of motion in a wide variety of applications. (Fall)</p>
<p><b>PH 220 Principles of Physics III</b> (3:5:0) Prerequisite: Physics 121 or ME 204 (Dynamics) Concurrent Registration or completion of Math 113 or Math 215. Math Level: Extensive use of College Algebra, Trigonometry, and single and multi-variable Calculus. 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, Summer)</p>	<p><b>PH 333 Electricity and Magnetism I</b> (3:3:0) Prerequisite: Physics 220 Math 316 or Math 371 This is a junior level course which covers electromagnetic theory. (Fall)</p>
<p><b>PH 250 Intermediate Physics Laboratory for Physics and Physical Science</b> (1:0:3) Prerequisite: Math 112, Physics 150. Concurrent Registration or completion of Physics 220. Math Level: Extensive use of college algebra, trigonometry, and elementary calculus. Intermediate Physics Laboratory for Physics and Physical Science Teaching Majors. Experimental investigations into electricity and magnetism and optics. (Fall, Winter, Summer)</p>	<p><b>PH 336 Advanced Physics Lab</b> (2:1:5) Prerequisite: Physics 250 Completion of or current enrollment in 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 programing needed to interface an experiment to a computer. (Winter)</p>
<p><b>PH 309 Modern Physics</b> (3:5:0) Prerequisite: Math 113 or Math 215 Physics 121, 123 Concurrent Registration:(or completion of) PH 220 Math Level: Extensive use of college algebra, trigonometry, and elementary calculus. 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. (Fall, Winter)</p>	<p><b>PH 372 Thermal and Statistical Physics</b> (3:3:0) Prerequisite: Physics 220 Math 316 or 371 This is a junior level course covering classical thermodynamics and statistical mechanics. (Winter)</p>
<p><b>PH 311 Physics By Inquiry I</b> (3:2:3) Prerequisite: Junior level standing or permission of the instructor. This hands-on course covers selected topics in physics with emphasis on depth of-understanding and developing skills essential to the scientific process. The 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 373 Electricity and Magnetism II</b> (3:3:0) Prerequisite: Physics 333 Math 316 or Math 371 This is a junior level course which covers the second half of electromagnetic theory. (Winter)</p>
<p><b>PH 314 History/Philosophy of Science</b> (3:3:0) Fulfills GE Letters requirement. Prerequisite: Completion of Physical Science GE class and its associated lab. Math Level: Some use of high school algebra I 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 398R Physics Internship</b> (2:0:0) Prerequisite: Junior Standing and Instructor Permission A professional internship providing the student with job experience in a physics-related field. (Fall, Winter, Summer)</p>
	<p><b>PH 403 Methods of Physics Teaching</b> (2:2:0) Prerequisite: PH 309 and PH 314 Methods and philosophy of teaching physics principles in a high school setting. (Fall)</p>
	<p><b>PH 405 Numerical Modeling in Physics</b> (2:1:3) Prerequisite: PH 220, PH 309, PH 336 A lab course that applies numerical modeling and methods to a variety of modern topics in physics. (Fall)</p>
	<p><b>PH 411 Physics By Inquiry II</b> (2:1:3) 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. Opportunity may exist to practice appropriate questioning skills. (Fall)</p>

- PH 433 Quantum Mechanics** (3:3:0)  
 Prerequisite: Physics 309  
 Math 316 or 371  
 This is a senior level course which covers an introduction to the theory of quantum mechanics.  
 (Fall)
- PH 473 Atomic and Solid State Physics** (3:3:0)  
 Prerequisite: Physics 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 I** (3:3:0)  
 Prerequisite: Ph 333, 433  
 This is a research based capstone course.  
 (Winter)
- PH.S 100 Physical Science** (3:3:0)  
 Fulfills GE Physical Science requirement.  
 Prerequisite: Concurrent registration with PH.S 100L  
 This course is designed to be a survey class covering all of physical science. Physical science includes various subjects in the disciplines of physics, chemistry, astronomy, meteorology, and geology. The course is designed for students majoring in non-scientific disciplines as part of their General Education curriculum. The course will give students a background in science that will help them better appreciate and understand the technological advances that are transforming society.  
 (Fall, Winter, Summer)
- PH.S 100L Physical Science Laboratory** (1:0:3)  
 Fulfills GE Physical Science requirement.  
 Prerequisite: Concurrent registration with PH.S 100.  
 This course consists of a series of twenty-six laboratory assignments. The assignments are drawn from a variety of topics related to physical science. Students will have an opportunity to gain "hands-on" experience applying some of the concepts learned in Ph.S 100. For example, students will make measurements of objects in motion and describe the motion in terms of displacement, velocity, and acceleration. Students will investigate electrical circuits and learn about the terminology used to describe the flow of electricity. In one of the experiments, students will determine the speed of sound and learn about properties of waves including resonance and harmonics. In all of the assignments, students will learn about the process of collecting, analyzing, and presenting data. Microsoft Excel will be used throughout the course for the purposes of data analysis and presentation. Many of the skills developed in this course will be applicable to a variety of careers unrelated to science.  
 (Fall, Winter, Summer)
- PH.S 110 Physical Science for Teachers** (4:3:3)  
 Fulfills GE Physical Science requirement.  
 Prerequisite: For Elementary Education Majors, moderate use of high school algebra.  
 For Elementary Education majors only. This is an introductory course and lab dealing with the basic principles and concepts of physical science. The main objectives are to gain an appreciation of the fundamental principles of physical science and show how these principles influence our everyday life. Students will also be able to demonstrate hands-on applications appropriate for elementary school (K-8). Course includes a three-hour lab per week.  
 (Fall, Winter, Summer)