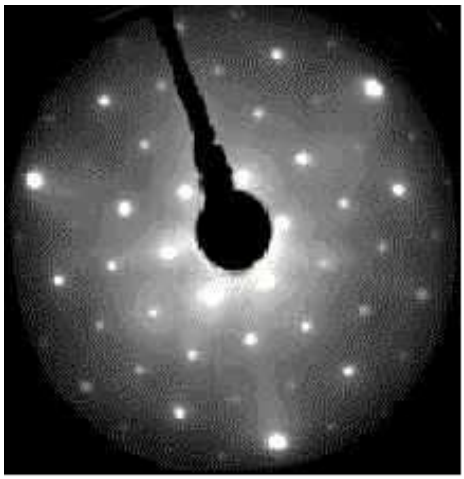
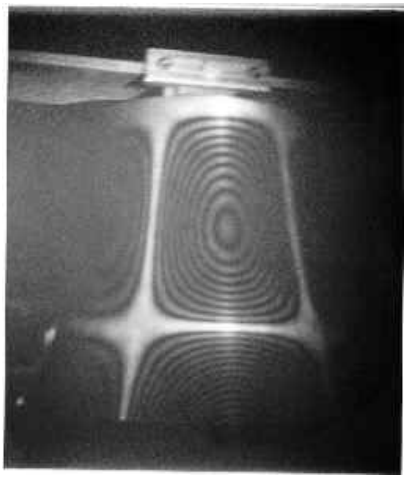
STETSON
UNIVERSITY

PHYSICS DEPARTMENT

The Physics Major's Handbook

Physics - Pre-Engineering - Pre-Health





The Physics Major's Handbook

Physics

Physics ~ Pre-Engineering ~Dual-Degree Program

Physics ~ Pre-Medicine and Health Professions Program

Contents:

What Is Physics?

Physics is the science devoted to the investigation of the fundamental principles that govern the behavior of the physical universe. Physicists seek to understand phenomena that range from the infinitesimal, like how two 'up' quarks and one 'down' quark are held together to form a proton, to the grand, like how the Big Bang lead to the distribution of galaxies observed in the universe today. Given the wonderful diversity in the phenomena displayed in the universe one would think there must be a bewildering number of fundamental principles that are required to explain it all. The power and the beauty of physics is that it takes only a few.

The study of physics is challenging, but it is also richly rewarding. Students are challenged by the need to train their minds to look at the world in a different way, and to become masters at applying logic and advanced mathematics to problems. They are rewarded with the thrill of accomplishment in understanding the theories of great scientists like Newton, Maxwell, and Einstein, and with the satisfaction of being able to explain phenomena they have always been curious about such as the beauty of a double rainbow and the steady beat of a pendulum clock.

Students earning an undergraduate degree in physics are well prepared to immediately start careers using their scientific and technical skills for employers in research and development, manufacturing, and teaching. A physics degree is also an excellent liberal arts degree for students who enjoy science but are interested in a career in a non-scientific area like business, finance, and government because of its heavy emphasis on critical analysis and problem solving; additionally, there

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is a high demand in those fields for people who understand science. Finally, students interested in pursuing graduate level studies find themselves well prepared for a variety of graduate programs including physics, engineering, and medical schools, as well as many closely related or interdisciplinary fields.

Physics at Stetson

Located in the two north corridors of Sage Hall, the Physics Department has state-of-the-art laboratory equipment and our faculty are dedicated to undergraduate education in physics.

Our facilities feature teaching laboratories with computers at every lab station and the latest equipment. The labs are supported by an endowed fund which allows substantial purchases and updates to be made to the equipment on an annual basis. The department also houses research laboratories in which cutting edge research is being done by our faculty. Students are invited and encouraged to participate in this research. Such opportunities are rare for undergraduates and are frequently not available at larger institutions. Finally, the department has a fully equipped machine shop with a full-time machinist. This allows the faculty to modify existing equipment or create unique, custom-made equipment as needed for the labs.

The Physics Department has five Ph.D. physicists on the faculty. Our faculty value teaching undergraduate students and have chosen to teach at Stetson so that they may do so. The faculty maintain open office hours and can be found in the building throughout the day. They encourage students to drop by anytime they are not in class to discuss physics, their coursework, their career goals, or any other concerns they may have.

Our faculty are:

GEORGE GLANDER, PH.D.
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Surface Science - Low Energy Electron Diffraction (LEED)
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THOMAS A. LICK, PH.D.
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The Physics Department is a very supportive department. Class sizes are kept small. This allows students and faculty to get to know each other, and it allows faculty to tailor their teaching to meet the specific needs of the students enrolled in a course. The department provides free tutoring to all students enrolled in the introductory level courses, and of course, all students are encouraged to meet with their professor if they need extra assistance. Tutoring is held in a computer lab, and students may drop by to use the computers as well. The department also has a reading room. Students are encouraged to work their homework problems together, and this room is a gathering place for all students in the natural sciences. Finally, the department is able to provide offices to all its upper-class majors. All of this, we think, makes Stetson a good place for learning and doing physics.

The Physics Department has integrated student research into the curriculum. All physics majors are required to do a comprehensive laboratory project for their senior project. They design a project, carry it out, and then present their results to their fellow majors and the faculty. Recent student research projects range from examining the vastness of the universe to the minuteness of atoms as viewed through our scanning tunneling microscope; they range from the physics of musical instruments and baseball bats to the surface structure of silicon crystals used in computers. While students are encouraged to pursue topics of their individual interests, they are also invited to work on the professional projects of the faculty as well. Should a student desire to participate in research beyond the senior research project, many options are open. More information about all the research opportunities available in the Physics Department can be found on pages 9-11.

The physics majors at Stetson are a friendly group. Homework is done cooperatively, not competitively. The department has active chapters of the Society of Physics Students (SPS) and the physics honor society, Sigma Pi Sigma. These organizations sponsor field trips (such as to watch a space shuttle lift-off, and to the Center for Research and Education in Optics and Lasers, CREOL, at the University of Central Florida), visiting guests (the SPS sponsored a reception after the lecture presented by Lawrence Krauss, Ph.D., best selling author of The Physics of Star Trek), pizza lunches, an annual T-shirt contest, and even an occasional movie night, bowling expedition, or pancake breakfast at a local state park. Information on all activities sponsored by the students and the department are posted around the building as well as on our web site.

Roughly 20% of the Physics Department's recent graduates went right to work after graduating. They are employed as scientists, teachers, and in business. The other 80% have gone to graduate school, just over half of those in physics or a related scientific field, just over a quarter in engineering, and most of the remaining in business. Our graduates have gone on to graduate study at a wide variety of prestigious schools, including Yale, Dartmouth, Cornell, and Stanford University. When they have completed whatever level of schooling they choose to pursue, our graduates find themselves employed at companies such as Honeywell, Martin Marietta, AT&T, Northrop Grumman, and Oak Ridge National Laboratory, or joining the faculty at institutions such as University of North Carolina at Chapel Hill, West Point, and Stanford Medical School. Some have formed their own businesses, ranging from medical practices to a nuclear power consulting firm. The department strives to keep in touch with all our graduates, and we publish an annual newsletter, CROSS SECTION, where alumni can publish their own news about their careers, lives, or family. Finally, we feature our alumni on our web site with a "Featured Alum" program. Each year this page spotlights the achievements of one of our alumni, and it includes an open letter from them to our majors. We encourage you to log on to our web site and meet our current featured alum.

Degree Requirements For Bachelor of Science in Physics

Required Physics and Math Courses: (See pages 13-22 for typical sequencing.)

PHYS-141	University Physics I	1 unit
PHYS-142	University Physics II	1 unit
MATH-141	Calculus I	1 unit
	(Students who are not prepared to take MATH-141 will be allowed to substitute MATH-130 / Math-131 Calculus with Review parts 1 and 2 for MATH-141.)	
MATH-142	Calculus II	1 unit
MATH-243	Calculus III	1 unit
PHYS-243	Modern Physics	1 unit
PHYS-304	Mathematical Methods	1 unit
PHYS-312	Laboratory Techniques	1 unit
PHYS-322	Mechanics I	1 unit
PHYS-332	Electricity & Magnetism	1 unit
PHYS-343	Quantum Mechanics I	1 unit
PHYS-380	Physics Colloquium	non-credit
	One physics course with lab numbered 250 or higher	1 unit
	PHYS-252 Optics	
	PHYS-256 Electronics	
	PHYS-412 Advanced Lab Techniques	
PHYS-497	Senior Project Proposal	non-credit
PHYS-498	Senior Project	1 unit
PHYS-499	Senior Seminar	1 unit

Elective Physics Courses:

Additional elective credits in physics are generally recommended.
(See pages 6-8 for suggestions for selecting electives.)

Using Physics and Math Courses to Satisfy General Education Requirements:

- MATH-141Q (or MATH-131Q) will satisfy the Quantitative Reasoning requirement in the Foundations section of the General Education requirements.
- PHYS-141P will satisfy the Physical and Natural World option in the Knowledge section of the General Education requirements.

Careers and Selection of Electives

Physics majors are only required to take one elective course in the Physics Department; it must have a course number of 250 or higher and it must have a laboratory. It is generally recommended that physics majors fill out their schedules with as many physics courses as they can so that they develop as solid and broad a foundation in their understanding of physics as possible. Physics electives should be selected to compliment a student's career goals. Below are suggestions for courses that would be appropriate for students interested in pursuing different career paths.

Graduate Studies in Physics:

It is important that students who are planning to continue the study of physics in graduate school take as many physics electives as possible. The courses listed below are roughly equal in importance. The three advanced theory courses, PHYS-422, PHYS-432 and PHYS-443, bolster the student's preparation for the courses taken during the first year of graduate school. Students interested in pursuing a track in theoretical physics in graduate school should also consider MATH-361 Numerical Analysis and MATH-411 Complex Analysis.

Intermediate Courses:

PHYS-252	Optics
PHYS-256	Electronics
PHYS-362	Thermophysics
MATH-211	Linear Algebra

Advanced Courses:

PHYS-422	Mechanics II
PHYS-432	Electromagnetic Theory
PHYS-443	Quantum Mechanics II

Technical Employment Immediately Following Graduation:

Students who are planning to start careers using their scientific and technical skills for employers immediately upon completing a B.S. in physics can often find jobs in research and development, quality control, and manufacturing. Students interested in this career path should try to take the four electives listed below. Additional electives, particularly in computer science, would be a good idea.

PHYS-252	Optics
PHYS-256	Electronics
PHYS-362	Thermophysics
CSCI-141	Introduction to Computer Science I

Non-Technical Employment Immediately Following Graduation:

Students who want to major in physics because they enjoy science, but who are interested in a career in a non-scientific area like business, finance, and government, find that physics is an excellent liberal arts degree because of its heavy emphasis on critical analysis and problem solving; additionally, there is a high demand in those fields for people who understand science. Students interested in this career path should seriously consider taking PHYS-362 Thermophysics as an elective because it introduces the concepts that are critical to understanding energy conservation and fuel efficiency. The student's electives should mostly be chosen from outside the Physics Depart-

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ment, selecting courses that will build communication skills, or building an understanding of public policy issues, business or finance. Completing a minor in one of the Humanities, one of the Social Sciences, Business, or Finance would significantly strengthen the student's resume.

Teaching High School Physics:

High school physics teachers are always in demand in Florida's school districts as well as across the country. For teaching in Florida, most students interested in teaching physics complete the standard physics major, and then apply for a Temporary Teaching Certificate when they graduate, and immediately begin applying for teaching positions. The Temporary Teaching Certificate is good for three years, during which time you work on completing the courses (usually three courses) required for the regular Professional Certificate. Recent alumni who are now teaching have said that the classes needed for full certification are readily available and not difficult to pass. Other states will have similar requirements. Students should contact the Education Department to find out what the current requirements are.

Students interested in teaching high school physics should try to take the three electives listed below. Additional courses are generally a good idea, but they may be selected according to interest.

PHYS-252	Optics
PHYS-256	Electronics
PHYS-362	Thermophysics

Electrical Engineering:

Students interested in pre-engineering or a dual-degree program in engineering should see the descriptions of those programs on page 12. Students who are interested in graduate study in electrical engineering after completing a B.S. in physics at Stetson should try to take the electives listed below. Additional courses are generally a good idea, but they may be selected according to interest.

PHYS-256	Electronics
PHYS-362	Thermophysics
PHYS-432	Electromagnetic Theory
MATH-211	Linear Algebra

Civil, Mechanical, or Aeronautical Engineering:

Students interested in pre-engineering or a dual-degree program in engineering should see the descriptions of those programs on page 12. Students who are interested in graduate study in civil, mechanical, or aeronautical engineering after completing a B.S. in physics at Stetson should try to take the electives listed below. Additional courses are generally a good idea, but they may be selected according to interest.

PHYS-362	Thermophysics
PHYS-422	Mechanics II
MATH-211	Linear Algebra

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Medical School or Other Health Profession Schools:

Students interested in pursuing a career in medicine or other health professions will need to work with advisors in both the Physics Department and the Pre-Medicine and Health Professions Program to lay out a sequence of courses that best suits the student's needs. In addition to the courses required by the physics program, the student will probably need to take the following biology and chemistry courses:

BIOL-141, -142	Introduction to Biology I & II
CHEM-141, -142	General Chemistry I & II
CHEM-201, -301	Organic Chemistry I & II
CHEM-204	Biochemistry

One possible sequence for the courses is shown on pages 21-22. These additional courses will not leave much room for extra physics courses. If the student does have time for extra electives in physics, some good choices might be:

PHYS-252	Optics
PHYS-256	Electronics
PHYS-412	Advanced Laboratory Techniques

Other Career Paths:

There are many other career paths that a physics major can be well prepared to pursue. Students considering other career paths should talk extensively with their advisors so that their course selections can be tailored to best fit their needs. Students interested in entering the work force immediately after completing their B.S. degree may make themselves more marketable by supplementing their physics major with a minor in a complimentary field.

Research Opportunities

The Physics Department believes that developing finely tuned laboratory skills is a critical component of every physicist's training. The department is committed to offering courses that teach basic and advanced laboratory techniques and to offering opportunities for students to work on independent research projects. Students may apply for a Stetson Undergraduate Research Experience (SURE) grant that pays a stipend for students to do research during the summer. There are also several federally funded programs that students can apply for that pay a stipend and travel expenses for them to do summer research internships at a variety of universities and national laboratories around the country. The capstone of the physics major is a comprehensive laboratory project. Every physics major is required to do a senior research project, and if a student wishes to expand this project additional work can be done as an independent study.

The SURE Grant Program:

Stetson offers grants to students through a program called the Stetson Undergraduate Research Experience (SURE) program. Each spring, students are invited to submit applications in which they describe their projects. The applications are reviewed by a interdisciplinary faculty committee and awards are granted on a competitive basis. The awards provide a stipend for working on the project at Stetson for the summer. The work that is supported by a SURE grant may not by itself be used for a student's senior project, but additional work may be done on the same project during the fall semester for the senior project. Complete information on the SURE Grant Program can be found at the SURE web site: http://www.stetson.edu/sure.

Physics majors who have been awarded SURE grants in recent years include:

- SARAH CAUDILL*: Evaluating How Elastically Scattered Electrons Affect the Holographic Analysis of Kikuchi Electron Patterns* (Sarah declined the SURE award to go to an internship at the Laser Interferometer Gravity-wave Observatory/LIGO, California Institute of Technology, which she then used as her senior research project.)
- JON GOSNELL: *Using Magnetic Force Microscopy to Analyze the Magnetic Structure of Fe/GaAs Thin Films.*
- R. ADAM PRIDEMORE: *The Construction of a Laser Doppler Velocimeter for the Purpose of Examining the Onset of Turbulence In Fluids*
- TODD DUBOSQ: *Analyzing Vibrating Objects Using T.V. Holograph*
- HOPE WYMER: *Using Fast Fourier Transforms in the Analysis of Electron Diffraction Data*
- EDWYNN WALLACE: *Holographic Analysis of Kikuchi Electron Patterns for the Si (111)-(root7xroot7)-R19.1°-Al Surface Structure* (Ed declined the SURE award to go to an internship at Auburn University, and instead he did this project for his senior research.)
- JAMES STOCK: *Computational Processing of Kikuchi Electron Diffraction Data*
- AMANDA YORK: *Development of a TV Holography System for Modal Analysis of Musical Instruments*
- RYAN MUNDEN: *Auger Electron Spectroscopy*

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Summer Internships:

The federal government has several programs that provide funding for summer research internships at a variety of universities and national laboratories around the country. The internships usually pay a modest stipend and provide housing, and often pay travel expenses as well. The Physics Department posts the announcements for these in the upstairs hallway and maintains a web page with links to pages for the different programs. Most applications are due early in the spring semester.

This is an excellent opportunity for students. These programs show students what doing research is like in graduate schools and professional laboratories, they are an excellent item to list on a resume or on applications for graduate schools, and the work done on the internship can sometimes be used for the student's senior research project.

Our students have been very successful at being accepted into these programs. Recent participants include:

- BRIAN BELL: Physics Department, University of Nebraska - Summer, 2008
- CHRISTIAN PECORA: Physics Department, University of Central Florida - Summer, 2008
- TIMOTHY HOLIFIELD: Physics Department, Drexel University - Summer, 2008
- MICHELLE ADAN: Los Alamos National Laboratories - Summer, 2007
- TIMOTHY HOLIFIELD: Florida International University in Miami - Summer, 2007
- CHARLES RARESHIDE: Iowa State University - Summer, 2007
- BRANDON MARSELL: High Altitude Observatory - Summer, 2006
- SARAH CAUDILL: Laser Interferometer Gravity-wave Observatory/LIGO, California Institute of Technology - Summer, 2005
- DANIEL CARLSON: Woods Hole Oceanographic Institution - Summer, 2004
- RENEE DICKINSON: Clemson University - Summer, 2004
- DANIEL CARLSON: Harbor Branch Oceanographic Institute - Summer, 2003
- DANIEL CARLSON: University of Florida - Summer, 2002
- DANIEL CARLSON: Florida International University - Summer, 2001
- ASHLEY COWART: University of Central Florida School of Optics/CREOL - Summer, 2001
- RYAN MUNDEN: Oak Ridge National Laboratory - Summer, 2001
- RYAN MUNDEN: Materials Science Division, Argonne National Laboratory - Summer, 2000
- JAMES STOCK: Physics Department, University of Florida - Summer 2000
- APRIL TESKE: Living State Physics Department, Vanderbilt University - Summer 2000
- EDWYNN WALLACE: Department of Physics, Auburn University - Summer, 2000

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Senior Research:

The senior research project is an experiment that the student designs and performs, usually in close collaboration with a faculty mentor. The student is guided through the steps of choosing and then planning a project in Senior Project Proposal (PHYS-497) and conducting the research in Senior Project (PHYS-498). The results of the project are then presented in Senior Seminar (PHYS-499). The research is usually done during the fall semester of the student's senior year, but faculty are sometimes available to supervise a project during the summer. Students who do a summer research internship at another university or a national laboratory can often substitute that work for their senior project.

The department maintains a wide selection of equipment that students may use for their projects; a partial listing of this equipment includes:

- atomic force microscope (AFM)
- scanning tunneling microscope (STM)
- radio telescope
- 12" Meade telescope with solar filters
- 8" Celestron telescope
- TV holography
- ultra high vacuum electron diffraction
- vibrating sample magnetometer
- table-top x-ray crystalography unit
- Stirling engine
- gamma ray spectrometer
- Franck-Hertz apparatus
- e/m apparatus
- Planck's Constant apparatus
- Mickelson interferometer
- microwave interferometer
- electron diffraction apparatus
- prism spectrometers
- Ruchardt's apparatus for measurement of gamma
- velocity of light apparatus
- viscosity measurement apparatus
- bench top high vacuum apparatus with mass spectrometer
- big G torsion balance
- adiabatic gas law apparatus
- large laboratory electromagnet
- optical lab tables

Additionally, the faculty of the department are active researchers and frequently invite students to work with them in research grade laboratories devoted to the study of magnetic films, electron diffraction, and vibrational holography.

The resources available within the Physics Department are enhanced by a machine shop and full-time machinist who is skilled at making components for modifying existing equipment or making new instruments.

SPECIAL PROGRAMS

Pre-Engineering and the Dual-Degree Program

All accredited engineering schools require their first- and second-year students to take a relatively standardized set of mathematics and physics courses that are commonly referred to as pre-engineering courses. Students who perform well in these courses are accepted into the engineering program of their choice, and they complete the specialized courses associated with that program during their third and fourth years. Stetson does not offer an engineering degree, but we do offer the standard pre-engineering courses, and students interested in engineering have the three options listed below available to them. Students who choose to attend Stetson while preparing for a career in engineering benefit from the fostering atmosphere of small class sizes and close interaction with faculty, in addition to developing the communications and critical thinking skills that are the hallmarks of a liberal arts education.

OPTION ONE: Students choosing this option complete their first two years at Stetson and then transfer to an engineering school, where they complete their undergraduate work and earn a bachelor of science in engineering. While at Stetson, the students take essentially the same pre-engineering courses that their counterparts at the engineering school take, laying a solid foundation in mathematics and physics, plus the general education courses that are required by the engineering school. Students pursuing this option should obtain catalogs from the engineering schools they are interested in transferring to, and should consult with their advisor so that they can tailor their course selections to match the requirements of the engineering schools.

OPTION TWO (The Dual-Degree Program): Students choosing this option earn bachelor of science degrees from both Stetson and an engineering school. Students spend three years at Stetson completing the requirements for a physics major, and then transfer to an accredited engineering school where they are usually able to complete the engineering degree in two years. Upon receiving the engineering degree, they are awarded the B.S. degree from Stetson. Students are free to complete the dual-degree program at any accredited engineering school. The typical sequence of classes taken by a student pursuing a dual-degree is shown on pages 19-20.

OPTION THREE: Many of our pre-engineering students like what they find at Stetson so much that they choose to complete their Bachelor of Science degree in physics at Stetson, and then they pursue specialized training in engineering at the graduate level. Students choosing this option are able to take many more electives in physics and develop a much deeper understanding of the science that underlies the field of engineering they are interested in. They also benefit from having their written and oral communications skills more finely honed. These prove to be an excellent foundation for graduate studies in engineering, and students are able to make the transition with little or no difficulty.

The Pre-Medicine and Health Professions Program

Physics is one of many possible majors that may be chosen by a student interested in a career in medicine, dentistry, veterinary medicine, and allied health fields. Professional schools in these areas require students to complete a core set of science courses that generally includes Introduction to Biology I & II, General Chemistry I & II, Organic Chemistry I & II, and Biochemistry (plus several physics and mathematics courses that all physics majors take). Since all of these additional courses include a laboratory, careful planning is required to schedule them in a sequence with a manageable work load. One possible sequence for the courses is shown on pages 21-22. Students should consult advisors in both the Physics Department and in the Pre-Medicine and Heath Professions Program prior to registering each semester. More information on the Pre-Medicine and Health Professions Program can be found at its web site, http://www.stetson.edu/artsci/prehealth/index.php.

Typical Sequence Of Classes for Students Taking PHYS-141 and MATH-141 Fall Term of Freshman Year

The sequence of classes listed below roughly outlines the physics and mathematics classes that a physics major can expect to take if he or she starts taking physics courses as a freshman and who has a solid enough foundation in mathematics to be taking the regular Calculus I course (MATH-141 Calculus I with Analytic Geometry) in the fall semester. Students who are not fully prepared for MATH-141 should see the sequence for courses shown on beginning on page 16.

The selection of courses offered each semester is determined both by student interest and availability of faculty to teach them. Courses that are shown in bold font are generally offered every year, and those shown in italics are generally offered in alternate years.

Fall of Freshman Year:

PHYS-141P University Physics I	1 unit
MATH-141Q Calculus I w/ Analytic Geometry	1 unit
Freshman Seminar or ENGL-101	1 unit
General Education Course	1 unit

Spring of Freshman Year:

PHYS-142 University Physics II	1 unit
MATH-142 Calculus II w/ Analytic Geometry	1 unit
Freshman Seminar or ENGL-101	1 unit
General Education Course	1 unit

Fall of Sophomore Year:

PHYS-243 Modern Physics	1 unit
PHYS-380 Physics Colloquium	non-credit
MATH-243 Calculus III	1 unit
General Education Course	1 unit
General Education Course	1 unit

Spring of Sophomore Year:

PHYS-304 Mathematical Methods	1 unit
PHYS-312 Laboratory Techniques	1 unit
PHYS-322 Mechanics I	1 unit
PHYS-380 Physics Colloquium	non-credit
General Education Course	1 unit

Fall of Junior Year:

PHYS-332 Electricity & Magnetism	1 unit
PHYS-343 Quantum Mechanics I	1 unit
PHYS-380 Physics Colloquium	non-credit
Physics Elective:	
PHYS-252 Optics or *PHYS-256 Electronics*	1 unit
General Education Course	1 unit

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Spring of Junior Year:

PHYS-497 Senior Project Proposal	non-credit
PHYS-380 Physics Colloquium	non-credit
Elective course	1 unit
Elective course	1 unit
Elective course	1 unit
Elective course	1 unit

The elective courses may include the following physics courses or other courses:

PHYS-362 Thermophysics or *PHYS-412 Advanced Lab*
PHYS-422 Mechanics II, *PHYS-432 Electromagnetic Theory*,
or *PHYS-443 Quantum Mechanics II*

Fall of Senior Year:

PHYS-498 Senior Project	1 unit
PHYS-380 Physics Colloquium	non-credit
Physics Elective:	
PHYS-252 Optics or *PHYS-256 Electronics*	1 unit
Other Elective Course	1 unit
Other Elective Course	1 unit

Spring of Senior Year:

PHYS-499 Senior Seminar	1 unit
PHYS-380 Physics Colloquium	non-credit
Elective course	1 unit
Elective course	1 unit
Elective course	1 unit

The elective courses may include the following physics courses or other courses:

PHYS-362 Thermophysics or *PHYS-412 Advanced Lab*
PHYS-422 Mechanics II, *PHYS-432 Electromagnetic Theory*,
or *PHYS-443 Quantum Mechanics II*

Typical Sequence Of Classes for Students Taking PHYS-141 and MATH-131 Fall Term of Freshman Year

The sequence of classes listed below roughly outlines the physics and mathematics classes that a physics major can expect to take if he or she starts taking physics courses as a freshman and who **does not** have a solid enough foundation in mathematics to be taking the regular Calculus I course (MATH-141 Calculus I with Analytic Geometry) in the fall semester. Students in this group will need to take MATH-131 Calculus I with Review Part 1 in the fall and MATH-132 Calculus I with Review Part 2 in the spring. If possible, MATH-142 Calculus II should be taken in the summer after the freshman year* so that the student may take the normal sequence of courses for the sophomore year and beyond (see pages 12-13 for that normal sequence).

**Note: It is preferable to take Calculus II at Stetson, but it can also be take at a state or community college.*

The selection of courses offered each semester is determined both by student interest and availability of faculty to teach them. Courses that are shown in bold font are generally offered every year, and those shown in italics are generally offered in alternate years.

Fall of Freshman Year:

PHYS-141P University Physics I	1 unit
MATH-130 Calculus I w/ Review Part 1	1 unit
Freshman Seminar or ENGL-101	1 unit
General Education Course	1 unit

Spring of Freshman Year:

PHYS-142 University Physics II	1 unit
MATH-131 Calculus I w/ Review Part 2	1 unit
Freshman Seminar or ENGL-101	1 unit
General Education Course	1 unit

Summer before Sophomore Year:

The following course is strongly recommended for the summer.

MATH-142 Calculus II w/ Analytic Geometry	1 unit

If MATH-142 is taken in the summer then switch to the sequence shown for sophomore year and beyond on pages 17-18.

If MATH-142 is not taken during the summer, proceed with the following sequence:

Fall of Sophomore Year:

PHYS-380 Physics Colloquium	non-credit
MATH-142 Calculus II w/ Analytic Geometry	1 unit
Physics Elective:	
PHYS-252 Optics or *PHYS-256 Electronics*	1 unit
General Education Course	1 unit
General Education Course	1 unit

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Spring of Sophomore Year:

PHYS-312 Laboratory Techniques	1 unit
PHYS-380 Physics Colloquium	non-credit
General Education Course	1 unit
Elective course	1 unit
Elective course	1 unit

Fall of Junior Year:

PHYS-243 Modern Physics	1 unit
PHYS-380 Physics Colloquium	non-credit
MATH-243 Calculus III	1 unit
Physics Elective:	
PHYS-252 Optics or *PHYS-256 Electronics*	1 unit
General Education Course	1 unit

Spring of Junior Year:

PHYS-304 Mathematical Methods	1 unit
PHYS-322 Mechanics I	1 unit
PHYS-497 Senior Project Proposal	non-credit
PHYS-380 Physics Colloquium	non-credit
Elective course	1 unit
Elective course	1 unit

The elective courses may include the following physics courses or other courses:

PHYS-362 Thermophysics or *PHYS-412 Advanced Lab*
PHYS-422 Mechanics II, *PHYS-432 Electromagnetic Theory*,
or *PHYS-443 Quantum Mechanics II*

Fall of Senior Year:

PHYS-332 Electricity & Magnetism	1 unit
PHYS-343 Quantum Mechanics I	1 unit
PHYS-498 Senior Project	1 unit
PHYS-380 Physics Colloquium	non-credit
Elective course	1 unit

The elective course may include the following physics courses or another course:

PHYS-252 Optics or *PHYS-256 Electronics*

Spring of Senior Year:

PHYS-499 Senior Seminar	1 unit
PHYS-380 Physics Colloquium	non-credit
Elective course	1 unit
Elective course	1 unit
Elective course	1 unit

The elective courses may include the following physics courses or other courses:

PHYS-362 Thermophysics or *PHYS-412 Advanced Lab*
PHYS-422 Mechanics II, *PHYS-432 Electromagnetic Theory*,
or *PHYS-443 Quantum Mechanics II*

Typical Sequence Of Classes for Students Taking PHYS-141 Fall Term of Sophomore Year

The sequence of classes listed below roughly outlines the physics classes that a physics major can expect to take if he or she takes PHYS-141 during the fall semester of sophomore year.

The selection of courses offered each semester is determined both by student interest and availability of faculty to teach them. Courses that are shown in bold font are generally offered every year, and those shown in italics are generally offered in alternate years.

Fall of Sophomore Year:	
PHYS-141P University Physics I	1 unit
MATH-141Q Calculus I w/ Analytic Geometry	1 unit
General Education or Elective Course	1 unit
General Education or Elective Course	1 unit
Spring of Sophomore Year:	
PHYS-142 University Physics II	1 unit
MATH-142 Calculus II w/ Analytic Geometry	1 unit
General Education or Elective Course	1 unit
General Education or Elective Course	1 unit
Fall of Junior Year:	
PHYS-243 Modern Physics	1 unit
PHYS-380 Physics Colloquium	non-credit
MATH-243 Calculus III	1 unit
Physics Elective:	
PHYS-252 Optics or *PHYS-256 Electronics*	1 unit
General Education or Elective Course	1 unit
Spring of Junior Year:	
PHYS-304 Mathematical Methods	1 unit
PHYS-312 Laboratory Techniques	1 unit
PHYS-322 Mechanics I	1 unit
PHYS-497 Senior Project Proposal	non-credit
PHYS-380 Physics Colloquium	non-credit
General Education or Elective Course	1 unit
Fall of Senior Year:	
PHYS-332 Electricity & Magnetism	1 unit
PHYS-343 Quantum Mechanics I	1 unit
PHYS-498 Senior Project	1 unit
PHYS-380 Physics Colloquium	non-credit
Physics Elective:	
PHYS-252 Optics or *PHYS-256 Electronics*	1 unit
Elective course	1 unit

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Spring of Senior Year:

PHYS-499 Senior Seminar	1 unit
PHYS-380 Physics Colloquium	non-credit
Elective course	1 unit
Elective course	1 unit
Elective course	1 unit

The elective courses may include the following physics courses or other courses:

PHYS-362 Thermophysics or *PHYS-412 Advanced Lab*
PHYS-422 Mechanics II, *PHYS-432 Electromagnetic Theory*,
or *PHYS-443 Quantum Mechanics II*

Typical Sequence Of Classes for Students Pursuing Dual-degrees: Physics & Engineering

The Dual-degree Program allows students to earn bachelor of science degrees from both Stetson and an engineering school. In this program, students spend three years at Stetson completing the requirements for a physics major, and then transfer to an accredited engineering school where they are usually able to complete the engineering degree in two years. Upon receiving the engineering degree, they are awarded the B.S. degree from Stetson. Students are free to complete the dual-degree program at any accredited engineering school. Stetson has formal arrangements with the University of Florida – Gainesville and the University of Miami, wherein students are guaranteed acceptance into their programs provided they maintain a satisfactory grade point average while at Stetson.

Completing the requirements for the physics major (including the general education requirements) in three years takes careful planning, so if you are considering the dual-degree option, notify your advisor immediately. Students should consult catalogs from the engineering schools they are interested in to ensure that the courses selected to fulfill the general education requirements for the Stetson degree also fulfill the general education requirements for the engineering degree.

The sequence of classes listed below roughly outlines the physics classes that a physics major pursuing a dual-degree should take. Courses that are shown in bold font are generally offered every year, and those shown in italics are generally offered in alternate years. *See page 20 for comments on what additional courses engineering schools may require.*

Fall of Freshman Year:

PHYS-141P University Physics I	1 unit
MATH-141Q Calculus I w/ Analytic Geometry	1 unit
Freshman Seminar or ENGL-101	1 unit
General Education Course	1 unit

Spring of Freshman Year:

PHYS-142 University Physics II	1 unit
MATH-142 Calculus II w/ Analytic Geometry	1 unit
Freshman Seminar or ENGL-101	1 unit
General Education Course	1 unit

Fall of Sophomore Year:

PHYS-243 Modern Physics	1 unit
PHYS-380 Physics Colloquium	non-credit
MATH-243 Calculus III	1 unit
General Education Course or Physics Elective: *PHYS-252 Optics* or *PHYS-256 Electronics*	1 unit
General Education Course	1 unit

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Spring of Sophomore Year:

PHYS-304 Mathematical Methods	1 unit
PHYS-312 Laboratory Techniques	1 unit
PHYS-322 Mechanics I	1 unit
PHYS-497 Senior Project Proposal	non-credit
PHYS-380 Physics Colloquium	non-credit
General Education Course	1 unit

Fall of Junior Year:

PHYS-332 Electricity & Magnetism	1 unit
PHYS-343 Quantum Mechanics I	1 unit
PHYS-498 Senior Project	1 unit
PHYS-380 Physics Colloquium	non-credit
Physics Elective:	
PHYS-252 Optics or *PHYS-256 Electronics*	1 unit
General Education Course	1 unit

Spring of Junior Year:

PHYS-499 Senior Seminar	1 unit
PHYS-380 Physics Colloquium	non-credit
Elective course	1 unit
Elective course	1 unit
Elective course	1 unit

The elective courses may include the following physics courses or other courses:

PHYS-362 Thermophysics or *PHYS-412 Advanced Lab*
PHYS-422 Mechanics II, *PHYS-432 Electromagnetic Theory*,
or *PHYS-443 Quantum Mechanics II*

Some engineering programs require the following courses. Consult the catalogs for the engineering schools you are interested in to see what they require.

CY101 General Chemistry I
CY102 General Chemistry II
MS316 Differential Equations
Many but not all schools will allow PHYS-304 in place of this course.
BY101 General Biology I (Not a common requirement.)

Typical Sequence Of Classes for Physics Majors In The Pre-Medicine and Health Professions Program

The sequence of classes listed below roughly outlines the physics, mathematics, chemistry and biology classes that a physics major participating in the Pre-Medicine/Health Professions Program can expect to take.

Fall of Freshman Year:

PHYS-141P University Physics I	1 unit
MATH-141Q Calculus I w/ Analytic Geometry	1 unit
BIOL-141 Introductory Biology I	1 unit
Freshman Seminar or ENGL-101	1 unit

Spring of Freshman Year:

PHYS-142 University Physics II	1 unit
MATH-142 Calculus II w/ Analytic Geometry	1 unit
BIOL-142 Introductory Biology II	1 unit
Freshman Seminar or ENGL-101	1 unit

Fall of Sophomore Year:

PHYS-243 Modern Physics	1 unit
PHYS-380 Physics Colloquium	non-credit
MATH-243 Calculus III	1 unit
CHEM-141 General Chemistry I	1 unit
General Education Course	1 unit

Spring of Sophomore Year:

PHYS-304 Mathematical Methods	1 unit
PHYS-312 Laboratory Techniques	1 unit
PHYS-322 Mechanics I	1 unit
PHYS-380 Physics Colloquium	non-credit
CHEM-142 General Chemistry II	1 unit

Fall of Junior Year:

PHYS-332 Electricity & Magnetism	1 unit
PHYS-343 Quantum Mechanics I	1 unit
PHYS-380 Physics Colloquium	non-credit
CHEM-201 Organic Chemistry I	1 unit
General Education Course or Physics Elective:	1 unit

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PHYS-252 Optics or *PHYS-256 Electronics*

Spring of Junior Year:

PHYS-497 Senior Project Proposal	non-credit
PHYS-380 Physics Colloquium	non-credit
CHEM-301 Organic Chemistry II	1 unit
General Education Course	1 unit
General Education Course or Elective course	1 unit
General Education Course or Elective course	1 unit

The elective courses may include the following physics courses or other courses:

PHYS-362 Thermophysics or *PHYS-412 Advanced Lab*
PHYS-422 Mechanics II, *PHYS-432 Electromagnetic Theory*,
or *PHYS-443 Quantum Mechanics II*

Fall of Senior Year:

PHYS-498 Senior Project	1 unit
PHYS-380 Physics Colloquium	non-credit
CHEM-204 Biochemistry I	1 unit
General Education Course or Physics Elective: *PHYS-252 Optics* or *PHYS-256 Electronics*	1 unit
General Education Course or Elective course	1 unit

Spring of Senior Year:

PHYS-499 Senior Seminar	1 unit
PHYS-380 Physics Colloquium	non-credit
General Education Course or Elective course	1 unit
General Education Course or Elective course	1 unit
Elective course	1 unit

The elective courses may include the following physics courses or other courses:

PHYS-362 Thermophysics or *PHYS-412 Advanced Lab*
PHYS-422 Mechanics II, *PHYS-432 Electromagnetic Theory*,
or *PHYS-443 Quantum Mechanics II*

Notes...

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