PHYSICS MAJOR

Physics is the most fundamental science. It is the foundation for our understanding of the world around us, spanning the ultimate depths within subatomic nuclei to distances beyond the known universe. Physics provides a basis for other sciences, including chemistry, biology, astronomy, and geology. Physics discoveries, which led to technologies ranging from energy sources to quantum information and nano-communication devices to state of the art medical diagnostics, have revolutionized our world, and will continue to do so. The physics curriculum at Tulane provides strong analytical skills and problem-solving abilities for careers ranging from academic research, to industrial development, to large government exploration, to project management, to the financial sector, to creative writing. The curriculum is unusually flexible and has successfully led to degrees with double, and even triple majors in diverse fields. The physics program also promotes and rewards creativity, stimulates intellectual development, and engages our students in life-long learning.

Mission Statement for Physics

The mission of the Physics program is to provide outstanding opportunities for learning and research in physics and teaching of the highest quality and impact, addressing needs and challenges of the 21st century. The program is designed to assist our students in developing deep understanding via powerful problem-solving skills, preparing them for a very broad range of opportunities.

Program Objectives for Physics

The Physics program aims to educate students to become professionals with in-depth knowledge and skills in science and mathematics to understand physical systems; to research, design and solve problems in physics and related disciplines; and to provide the foundation for graduate study and lifelong learning. Our objective is to prepare graduates to be able to successfully pursue:

- Advanced studies leading to research and/or professional careers in physical science;
- Careers in related technical and professional fields in industry or government.

Program Outcomes for Physics

Graduates of the Physics program at Tulane University will attain:

- an ability to apply knowledge of physics, mathematics, other sciences, and engineering;
- an ability to design and conduct experiments, as well as to analyze and interpret data;
- an ability to function on multi-disciplinary teams;
- an ability to identify, formulate, and solve problems;
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively;
- a recognition of the need for, and an ability to engage in life-long learning;
- a knowledge of contemporary issues;
- an ability to apply advanced mathematics through multivariate calculus, differential equations, and/or numerical techniques;
- a knowledge of contemporary analytical and experimental techniques;
- a competence in the use of computational tools and in the use of a high-level programming language;
- a depth of knowledge in calculus-based physics at an advanced level.

Our physics curriculum places emphasis on:

- physics
- mathematics
- computer science and engineering
- problem solving
- computational skills
- science and scientific principles
- research
- communications
- multi-disciplinary teamwork
- continuous learning
- leadership

- ethics
- preparation for advanced degrees in a broad variety of fields

The basic physics requirements are flexible and accommodate degrees with majors in multiple and diverse fields. Students planning to continue on to graduate school should take more than the minimum courses required.

Website

https://sse.tulane.edu/pep/academics/undergraduate/physics (https://sse.tulane.edu/pep/academics/undergraduate/physics/)

Requirements

General Course Requirements for Physics

The intention of Tulane's physics major program is to encourage students to continue on to graduate education in Physics and related disciplines or to pursue cross-disciplinary preparation in physics for medical or other professional schools. Dual majors are encouraged, however students may not major in both Physics and Engineering Physics due to the substantial overlap. Students pursuing a career in physics are advised to follow the "Pre-Graduate Training" sequence. The minimum GPA for degree certification, counting all courses pertaining to Physics, Mathematics, and approved Science and Engineering electives, is 2.50.

The basic requirements for a Physics Major are as follows:

Course ID	Title	Credits
Select at least four courses of mathematics [1]		**13**
Required Physics Courses		**18**
PHYS 1310	General Physics I	4
PHYS 1320	General Physics II	4
PHYS 2350	Modern Physics I	3
PHYS 2360	Modern Physics II	3
PHYS 3530	Advanced Laboratory	3
PHYS 3800	Physics Colloquium	1
Four Physics Electives		**12**
Select two of the following:		6
PHYS 3010	Theoretical Physics	3
PHYS 3630	Electromagnetic Theory	3
PHYS 3650	Optics	3
PHYS 3740	Classical Mechanics	3
PHYS 4230	Thermal Physics	3
PHYS 4470	Intro Quantum Mechanics	3
Select two additional 3-credit PHYS courses at the 2000 level or higher		6
Additional Electives		**15**
Select five 3-credit elective courses in Mathematics, Physics, Chemistry, Computer Science, or Engineering. The courses must be at the 2000 level or higher, with exceptions noted in the footnote. One of these five electives must be a computational course. [2]		15

1 At least two courses at the 2000-level or above.

2 The five elective courses must be at or above the 2000 level, with the exception of CHEM 1070+1075, CHEM 1080+1085, CMPS 1500, and CMPS 1600. Students should always confirm with the Major Advisor that all their electives are acceptable.

Notes:

- Students are encouraged to consider a bachelor of science in physics as preparation for graduate study in disciplinary and interdisciplinary sciences (physics, astrophysics, biophysics, chemistry, neuroscience, materials science, geophysics, meteorology, oceanography, and applied physics), for professional study in medicine, patent law, business, or engineering, and for careers in environmental science, in mathematical or computer modeling, in science writing, or in science and public policy.
- Within the requirements above, programs can be tailored to suit the needs of students who elect these career options. In addition, the department offers a 4+1 program that allows students to obtain a Master's Degree in five years, by enabling them to take graduate level courses as an undergraduate. Tulane University is a member of the Oak Ridge Associated Universities (ORAU) consortium.
- Research opportunities are often available for undergraduate Physics majors in conjunction with faculty, on a case by case basis.

- Students are responsible for fulfilling all TIDES, cultural knowledge, foreign language, writing, service learning, and other requirements, required by Tulane and the School of Science and Engineering.

Sample Schedule of Classes for Physics

(This is only a suggested schedule and students should not feel compelled in any way to model their course of studies on this example. Many other options and alternatives are possible, especially when including a double major. Chemistry, for example, is not a requirement for the B.S. in Physics. The illustration of certain courses in certain semesters below does not guarantee they will be offered in the suggested semester. Many physics courses at the 3000-level and above are given only once every two years. Students should keep abreast of actual course offerings as they are published by the Registrar.)

Year 1		
Fall		**Credit Hours**
PHYS 1310	General Physics I	4
MATH 1210	Calculus I	4
ENGL 1010	Writing	4
CHEM 1070 & CHEM 1075	General Chemistry I and General Chemistry Lab I	4
TIDES Course		
	Credit Hours	**16**
Spring		
PHYS 1320	General Physics II	4
CHEM 1080 & CHEM 1085	General Chemistry II and General Chemistry Lab II	4
MATH 1220	Calculus II	4
Foreign Language or Elective		
	Credit Hours	**12**
Year 2		
Fall		
PHYS 2350	Modern Physics I	3
MATH 2210	Calculus III	4
Cultural Knowledge Elective		
Foreign Language or Elective(s)		
Public Service Course [1]		
	Credit Hours	**7**
Spring		
PHYS 2360	Modern Physics II	3
PHYS 3170	Computnl Physics & Engr	3
PHYS 4230	Thermal Physics	3
MATH 2240	Intro To Applied Math	4
Cultural Knowledge Elective		
Elective(s)		
	Credit Hours	**13**
Year 3		
Fall		
PHYS 3010	Theoretical Physics	3
PHYS 3630	Electromagnetic Theory	3
PHYS 3700	Electronic Properties of Materials	3
PHYS 3800	Physics Colloquium	1
Cultural Knowledge Elective		
Elective		
	Credit Hours	**10**

Spring		
PHYS 3530	Advanced Laboratory	3
PHYS 3600	Nanoscience & Technology	3
PHYS 3650	Optics	3
Cultural Knowledge Elective		
	Credit Hours	**9**
Year 4		
Fall		
PHYS 3150	Intro To Neutron Science	3
Elective(s)		
	Credit Hours	**3**
Spring		
PHYS 4470	Intro Quantum Mechanics	3
Elective(s)		
	Credit Hours	**3**
	Total Credit Hours	**73**

[1] e.g., Introduction to Physics Pedagogy

Pre-Graduate Training in Physics

The student who intends to continue graduate work in physics should complete at least 32 credits in physics including:

Course ID	Title	Credits
PHYS 1310	General Physics I	4
PHYS 1320	General Physics II	4
PHYS 2350	Modern Physics I	3
PHYS 2360	Modern Physics II	3
PHYS 3630	Electromagnetic Theory	3
PHYS 3650	Optics	3
PHYS 3740	Classical Mechanics	3
PHYS 4230	Thermal Physics	3
PHYS 4470	Intro Quantum Mechanics	3

Students are encouraged to undertake a research project and write a senior honors thesis under the supervision of a physics faculty member.

Recommended mathematics courses include:

Course ID	Title	Credits
MATH 3050	Real Analysis I	3
MATH 3090	Linear Algebra	4
MATH 4060	Real Analysis II	3
MATH 4210	Differential Geometry	3
MATH 4300	Complex Analysis	3
Courses in Scientific Computing [1]		

[1] e.g., PHYS 3170 Computnl Physics & Engr (3 c.h.) or MATH 3310 Scientific Computing I (3 c.h.) are also recommended.