Physics, MS, PhD

Specialization(s): Upper Atmospheric Physics (MS)
Department: Physics Department
College: College of Science

Overview

About This Degree

Physics degrees are among the oldest degrees offered by the university. Through the years, the Physics Department has remained dedicated to instructing its students and providing them with ample opportunities for research in several branches of physics.

The students and faculty of the department are frequently recognized by the university, the state of Utah, and the nation with prestigious awards; physics students at USU have been named National Science Foundation Graduate Fellows, Goldwater Scholars, and Rhodes Scholars, and students frequently win awards at research conferences.

Physics classes are small, providing students with faculty attention where research is encouraged, mentored, and facilitated. Students can choose from several areas of study, which are: complexity; fields, astrophysics, and spacetime theory; plasma physics; space science; and surface physics.

Career Options

Graduates in physics can pursue various career paths, including:

- Teaching
- Research in academia or in industrial and national laboratories
- Analysts in financial firms or high-technology consulting companies
- Laboratory and engineering assistants
- Technicians in hospitals
- Software designers
- Computer chip manufacturing
- Aircraft and automobile industries

What it takes

Admissions Requirements

The program prefers students with undergraduate degrees in science or mathematics, and it is best if they have completed undergraduate coursework in physics.

Application Requirements:

- Complete the online application
- Pay the $55 application fee
- Score at or above the 40th percentile on the GRE, MAT, or GMAT
- Have a 3.0 or higher GPA on your last 60 semester or 90 quarter credits
- Provide transcripts of all college/university credits
- Provide three contacts for letters of recommendation
- Send a letter of interest to the Physics Department. This letter should include: who you are, where you live, which degree you are pursuing, what areas of physics you are interested in, when you wish to start.

International students have additional admissions requirements.

Admissions Deadlines

Applications are accepted on a rolling basis. To guarantee full consideration, however, students should have their applications in by the following deadlines:

- Fall semester – January 15
- Spring semester – June 1

Master's Degree Plan Options

Students can receive the MS by pursuing one of three options:

- In the **Plan A** option, students complete graduate-level coursework and must write a thesis.
- The **Plan B** option requires the production of a paper or creative work of art and is expected to reflect equivalent scholarship standards as a thesis.
- A third option, **Plan C**, does not involve a thesis or a defense meeting and is comprised of coursework only.

Students pursuing the **upper atmospheric physics** specialization must participate in the following option:

- In the **Plan A** option, students complete graduate-level coursework and must write a thesis.

Financial Assistance

A limited number of scholarships are available through the Physics Department. These change from year to year depending on available funding, so contact the department to see what is currently available.

The College of Science offers the Willard L. Eccles Foundation Science Fellowship. It is an award of $22,000 per year for three years. The graduate programs committee nominates two to three candidates, and one candidate is chosen from the college each year. Selection criteria include: GPA, GRE score, letters of recommendation, and evidence of strong academic and research potential in the discipline.

The USU Diversity Fellowship in Science and Engineering is an award of $22,000 per year for two years plus $500 for travel/equipment. This fellowship is jointly administered by the School of Graduate Studies, the College of Engineering, and the College of Science. Biology candidates are nominated by the graduate programs committee. The award includes an annual stipend, full tuition remission, and a travel/equipment grant. Criteria include: academic research potential, GPA, GRE score, and letters of recommendation.

All PhD students are supported at a minimum with tuition awards, subsidized health insurance, and a monthly stipend for work performed as teaching assistants in instructional activities or research assistants in research groups.

A variety of additional funding opportunities are available, including fellowships, scholarships, assistantships, tuition awards, and travel support. Additionally, students may be eligible for subsidized health insurance through qualifying assistantships.

Program Requirements

Click here to see course requirements for the **Master of Science**.

Click here to see course requirements for the **Doctor of Philosophy**.

PhD Qualifying Exams:

PhD students are required to take a candidacy exam in order to prove their ability to participate in the world of physics research. It normally take place during the fifth semester. The exam process requires the student to study the research literature on a particular physics topic and then educate the physics faculty about that topic in a 45-minute oral presentation followed by a 30-minute oral examination period that is attended by the Physics Department faculty and the outside member of the student's supervisory committee.

Contact

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Get Involved

Professional Organizations, Honor Societies, and Clubs

Society of Physics Students: SPS is a professional association explicitly designed for students. Membership, through collegiate chapters, is open to anyone interested in physics.

Sigma Pi Sigma: This exists to honor outstanding scholarship in physics, to encourage interest in physics among students at all levels, to promote an attitude of service in its members, and to provide a fellowship of persons who have excelled in physics.

Society of Physics Students: This society was formed in 1968 with the union of Sigma Pi Sigma and the American Institute of Physics Student Sections. Today Sigma Pi Sigma is housed within the SPS.

Labs, Centers, Research

Atmospheric LIDAR Observatory: The observatory is outfitted with a high-energy green laser. The observatory consists of four 1.5m mirrors, steerable to 45 degrees from zenith, for monitoring.

Bear Lake Observatory: Located about one hour northeast of Logan, the Bear Lake Observatory measures the effects of lower atmospheric energy and momentum inputs (i.e. tides, gravity, planetary waves) into the upper atmosphere and investigates subauroral phenomena during enhanced magnetic activity.

Center for Active Sensing and Imaging: CASI uses radar-like, laser-based LIDAR technology to measure distances instead of radio waves for a variety of industrial applications, including sitting wind farms, controlling emissions, and rapid replacement of bridges, runways, and other infrastructure.

Center for Atmospheric and Space Sciences: CASS is recognized nationally and internationally as a progressive research center with advanced space and upper atmospheric research programs. CASS scientists are tackling the adverse consequences of space weather. Undergraduate and graduate students are involved in numerous research projects in CASS that provide opportunities to program computers, analyze data, and build instrumentation.

Center for Surface Analysis and Applications: This center houses four research laboratories and a Nanoscale Device Lab with a scanning electron microscope.

Energy Laboratory: This lab seeks to develop solutions to America's most intractable energy problems through scientific and technological innovation. It provides a cohesive framework permitting faculty, students, and partnering institutions to focus on contemporary energy-related research issues.

Space Dynamics Laboratory: SDL is known for sending 500+ successful experiments into space and brings in $54 million per year in revenue, the majority coming from grants, contracts, and appropriations. SDL’s expertise in the development of sensors and calibration, small satellites and real-time intelligence has made it an internationally known organization in the space arena.

Space Weather Center: SWC is developing innovative applications for mitigating space weather in technical systems. The ionosphere is a key region that affects communication and navigation systems of the space environments that are affected by space weather. The USTAR initiative is developing products to reduce adverse effects of the ionosphere on these types of systems.

Tokamak Plasma Confinement Laboratory: USU Physics has an experimental Tokamak Plasma Confinement

Laboratory on the Innovation Campus in Logan where research is conducted on nuclear fusion.

Utah State University Observatory: The USUO was constructed in 2009, during the International Year of Astronomy. Outfitted with a 20-inch Corrected Dall-Kirkham telescope from Planewave, the observatory is a multi-purpose facility.