



## CENTER FOR CAREER & PROFESSIONAL DEVELOPMENT

# Major Possibilities: Physics

### Quick Facts

- Physics is sometimes referred to as the "liberal arts" degree of technology because physics majors can go on to careers in computer science, engineering, research and development, chemistry, mathematics, and biology.
- Internships (including research experiences) help shape professional identities, develop 21<sup>st</sup> century career-readiness skills, and make meaning of the academic experience.
- The starting salaries of engineers are among the highest of all college graduates, according to the Bureau of Labor Statistics.
- The National Aeronautics and Space Administration (NASA) and the US Department of Defense have traditionally been two of the largest employers of physicists and astronomers in the federal government.

### Physics Major Synopsis

Physics is the study of the fundamental principles and laws that govern the physical universe. The Physics Department offers majors and minors for the Bachelor of Science and the Bachelor of Arts degrees; the requirements are identical except that the BS requires one additional physics course plus the remaining BS core courses. Students wishing to study Engineering are also supported by the department through the interdisciplinary Applied Physics major, in which they complete introductory courses at Southwestern and then transfer to another university to earn the engineering degree. Physics majors take courses on the earth and the universe, along with other courses in musical acoustics, modern physics, electromagnetism, mechanics, and quantum physics.

### Sample Occupational Areas

#### PHYSICISTS

Physicists explore and identify basic principles and laws governing the motion, energy, structure, and interactions of matter. Most physicists work in research and development. Some do basic research to increase scientific knowledge. Others conduct applied research to build upon the discoveries made through basic research and work to develop new devices, products, and processes. Much physics research is done in small or medium-sized laboratories. However, experiments in plasma, nuclear, and high-energy physics, as well as in some other areas of physics, require extremely large, expensive equipment, such as particle accelerators. Physicists in these subfields often work in large teams. Physicists generally specialize in one of many subfields: elementary particle physics, nuclear physics, atomic and molecular physics, condensed matter physics (solid-state physics), optics, acoustics, space physics, plasma physics, or the physics of fluids. A Ph.D. is required for a career as a physicist.

#### ENGINEERS

Engineers apply the principles of science and mathematics to develop solutions to technical problems. Their work is the link between scientific discoveries and the commercial applications that meet societal and consumer needs. In addition to design and development, many engineers work in testing, production, or maintenance. There are 17 engineering specialties covered in the Federal Government's Standard Occupational Classification (SOC) system. A few of them are aerospace engineers, agricultural engineers, biomedical engineers, chemical engineers, civil engineers, computer hardware engineers, electrical engineers, electronics engineers (except computer), and environmental engineers. Many of these occupations require a Master's degree.

#### COMPUTER SCIENTISTS

Computer scientists work as theorists, researchers, or inventors. Their jobs are distinguished by the higher level of theoretical expertise and innovation they apply to complex problems and the creation or application of new technology. Computer software engineers apply the principles of computer science and mathematical analysis to the design, development, testing, and evaluation of the software and systems that make computers work. There are two types of computer software engineers. Computer applications software engineers analyze users' needs and design, construct, and maintain general computer applications software or specialized utility programs.

Computer systems software engineers coordinate the construction, maintenance, and expansion of an organization's computer systems. A bachelor's degree is usually sufficient, though a master's degree may be preferred for more complex work.

## Sample Job Titles

Animal Breeder	Hydrologist	Military Officer	Researcher/Developer
Astronomer	Lab Technician	Missions Analyst	Satellite Data Analyst
Computer Scientist	Law Enforcement Officer	Nutritionist	Seismologist
Consultant	Lawyer	Physical Therapist	Teacher
Contract Administrator	Manufacturing Specialist	Physicist	Technical Support
Engineer	Media Specialist	Power Plant Manager	Representative
Geologist	Medical Illustrator	Product Designer	
Grant Writer	Meteorologist	Quality Engineer	

## Sample Internship Employers of SU Students

Abbey Lane INC.	Nanohmics Inc.
Abbott Laboratories	NASA
Brookfield Zoo	REU with NSF
CDS International	Rice Quantum Institute
Center for Science in the Public Interest	<i>Science News</i>
Civil and Environmental Consultants, Inc.	SLAC National Accelerator Lab
DuPont	TxDOT
FTWoods Construction	UNT IBMAL Lab
Harvard-Smithsonian Observatory	UT Austin Training Reactor Facility
Institut für Theoretische Physik	Walt Disney World
JJ Pickle Nuclear Engineering Teaching Lab	Waste Connections
Mitchell Elementary School	Zachary Engineering

## Sample Full-Time Employers of SU Grads

Air Pollution Scientist (Nordon Corp.)	Pilot (US Marines)
Biomedical Flight Controller (Wyle Laboratories)	Principal Quality Engineer (Global Foundries)
Controls Engineer Intern (SLAC National Accelerator Laboratory)	Process Engineer (Hawker Beechcraft Corporation)
Electronic Engineer (National Bureau of Standards)	Proposals Specialist (Invensys Operations Management)
Engineer (Boeing, Steger & Bissell)	Researcher (National Instruments, NM State University)
Geophysicist (Exxon)	Software Engineer (Northrop Grumman)
Grant Writer (Cinco Solar)	Student Research Fellow (NIST Boulder)
Integrated Combat Engineer (Johns Hopkins University)	Submarine Officer Nuclear Propulsion (US Navy)
Lab Technician (Boral, Texas Research Institute)	Teacher (Desoto Private School)
Manufacturing Specialist (Wolfram Manufacturing)	Technical Aide (3M)
Mechanical Engineer (3M)	Technology Support Specialist (Southwestern University ITS)

## Professional Associations

American Association for the Advancement of Science  
American Society for Biochemistry and Molecular Biology  
American Association of Physics Teachers  
American Institute of Physics  
American Physical Society  
Institute for Mathematics and its Applications  
Institute of Physics  
International Association of Mathematical Physics  
International Union of Pure and Applied Physics  
National Science Teachers Association