PHYSICS

Faculty

Finch, Leon Evan, Associate Professor
Broadbridge, Christine, Professor
Casetti, Dana, Assistant Professor
Enjalran, Matthew, Professor
Horch, Elliott, Professor
Schwendemann, Todd, Associate Professor
Wu, Binlin, Assistant Professor and Graduate Coordinator
Applied Physics, M.S.
Physics Nanotechnology, Graduate Certificate
PHYSICS NANOTECHNOLOGY, GRADUATE CERTIFICATE

The program course outline and graduation requirements for this catalog year are listed below. The department website provides an overview of the program, including admission requirements, faculty biographies, learning outcomes, and careers: https://www.southernct.edu/academics/physics/programs

Program Sequence

As sequencing changes, it is highly recommended that students meet with their program advisor to finalize a list of requirements for graduation.

Required Courses
PHY 519 – Nanotech I-Fundamentals of Nanoscience – 3 credits
PHY 521 – Nanotech II-Characterization of Nanomaterials – 3 credits
PHY 523 – Nanotech IV-Nanosystems Laboratory – 3 credits
One prerequisite course * - 3 credits

*Advanced undergraduate or graduate courses in biology, chemistry, engineering, materials science, physics, and others will be considered to meet the three credit prerequisite requirement.

This program is not eligible for financial aid (Title IV and/or State funds).
APPLIED PHYSICS, M.S.

The program course outline and graduation requirements for this catalog year are listed below. The department website provides an overview of the program, including admission requirements, faculty biographies, learning outcomes, and careers: https://www.southernct.edu/academics/physics/programs

Program Sequence - 36 Credits

As sequencing changes, it is highly recommended that students meet with their program advisor to finalize a list of requirements for graduation.

B or better average required

Core Courses
PHY 507 – Applied Physics graduate Seminar – 3 credits
PHY 512 – Methods of Theoretical Physics I – 3 credits
CHE 520 – Advanced Physical chemistry I – 3 credits
CSC 541 – Digital Image Processing – 3 credits
MBA 500 – Management Process – 3 credits
MBA 505 – Marketing Management – 3 credits

Choose One Track

Materials Science/Nano Track
PHY 519 – Nanotech I: Fundamentals of Nanoscience – 3 credits
PHY 521 – Nanotech II: Characterization of Nanomaterials – 3 credits

Optics/Optical Instrumentation Track
PHY 530 – Optics and Detector Physics – 3 credits
PHY 531 – Interferometric Methods in Imaging and Precision Measurement – 3 credits

Elective Courses (Choose two)
PHY 513 – Methods of Theoretical Physics II – credits
PHY 522 – Nanoscale Fabrication and Synthesis – 3 credits
CSC 551 – Pattern Recognition – 3 credits
CSC 561 – Scientific Visualization – 3 credits
CHE 532 – Advanced Inorganic Chemistry
MBA 507 – Legal Issues in Business & Management
MBA 510 – Project Management – 3 credits
MBA 512 – Strategic Factors in Marketing – 3 credits
MBA 515 – International Entrepreneurship – 3 credits
MBA 537 – Product Management – 3 credits
MBA 538 – Marketing Analysis and Measurement – 3 credits
MBA 548 – Business Process Excellence – 3 credits

Capstone (Select Thesis or Special Project)
Master's Thesis
PHY 590 - Thesis Research I  
PHY 591 - Thesis Research II

Special Project
PHY 580 - Special Project (3 or 6 credits).  
May in some cases be completed with a host company where the student will complete the work and be overseen by an on-campus adviser.
COURSES

**PHY 507 - Applied Physics Graduate Seminar**
An overview of current topics in Applied Physics Research. An introduction of scientific writing, speaking and professional topics. 
Prerequisite(s): graduate status in Applied Physics or departmental permission. 
Last Offered: Fall 2021
3 credits

**PHY 512 - Methods of Theoretical Physics**
The development of the laws of physics in mathematical form. The application of these laws to physical problems and a discussion of the mathematical methods employed. 
Prerequisite(s): two semesters of college calculus and eighteen credits of undergraduate physics or departmental permission.  
Last Offered: Spring 2021
3 credits

**PHY 519 - Fundamentals of Nanoscience**
Provides a highly interdisciplinary introduction to the science of nanoscale materials (nanoscience). Topics will include historical background, characterization techniques, physics and chemistry of nanoscience materials, fabrication techniques, nanoscale applications and ethical/societal considerations. 
Prerequisite(s): PHY 309 and CHE 121 or equivalents. 
Last Offered: Fall 2020
3 credits

**PHY 521 - Characterization of Nanomaterials**
Introduces the state-of-the-art techniques commonly used in the characterization of nanomaterials. Two important aspects of characterization, imaging and chemical analysis, are included. Emphasizes force, transmission and scanning electron microscopy. 
Prerequisite(s): PHY 519 or departmental permission. 
Last Offered: Fall 2021
3 credits

**PHY 523 - Nanosystems Laboratory**
The capstone experience for the Graduate Certificate in Nanotechnology. Students chose an appropriate topic in nanotechnology in consultation with the instructor, perform a literature search, design the experiments and perform the data collection and analyses, write up the project following the style of a professional journal article, and present their results to their peers and instructor in the format of a formal scientific presentation. 
Prerequisite(s): one upper-division or graduate level course (of at least 3 credits) in an appropriate scientific area. 
Last Offered: Spring 2021
3 credits

**PHY 530 - Optics and Optical Detectors**
Provides the student with a basic understanding of the scientific principles associated with optics and optical image formation, as well as image capture, processing and analysis. An end-to-end treatment of the imaging system is employed to illustrate the inter-relationships of the concepts introduced. The student will become familiar with systems analyses of simple imaging systems and image analysis methods. 
Prerequisite(s): PHY 309 or equivalent. 
Last Offered: Fall 2021
3 credits
PHY 531 - Interferometric Methods in Imaging and Precision Measurement
The interference of light is discussed in detail. Applications to high-resolution imaging and precision measurement are covered, including techniques such as electronic speckle pattern interferometry, long baseline optical interferometry and related techniques. The student will become familiar with the basic performance metrics and main types of interferometers in use today. Prerequisite(s): PHY 530. Last Offered: Spring 2022 3 credits

PHY 580 - Special Project
The student will conduct a research project in physics either on campus or in the context of an internship with a local company. The special project may either be a technological special project or an entrepreneurial special project. There will be a product as defined in the School of Graduate Studies guidelines for special projects at the conclusion of the course. Prerequisite(s): departmental permission. Last Offered: Spring 2021 3 or 6 credits

PHY 590 - Thesis Research I
The student will develop a thesis proposal according to accepted style guidelines, including a current literature review of the thesis topic and a description of the project design, and begin the research. Prerequisite(s): departmental permission. Last Offered: Fall 2020 3 credits

PHY 591 - Thesis Research II
Thesis investigation conducted under the supervision of an approved adviser. Completion of the written thesis and oral defense of the research work in the thesis. Prerequisite(s): departmental permission. Last Offered: Spring 2021 3 credits

PHY 600 - Independent Study and Research
Prerequisite: departmental permission. Prerequisite(s): departmental permission. Last Offered: Spring 2021 3 credits