The Department of Physics, Applied Physics, and Astronomy prepares students to contribute to new concepts and technologies through innovative teaching methods that combine student-faculty interactions, computer-based education, and “hands-on” experience in modern laboratories.

DEGREES OFFERED

- Applied Physics  B.S.
- Astronomy  M.S.
- Multidisciplinary Science  M.S., Ph.D.
- Physics  B.S., M.S., Ph.D.

MAJOR RESEARCH AREAS

In all areas of research, problems are addressed using computational techniques. One-third of our faculty members conduct computationally driven research programs.

- Astronomy and Astrophysics
  - Astrobiology, chemistry of interstellar dust, galactic structure and evolution, magnetohydrodynamics, dark matter
- Energy Research
  - Energy harvesting, conversion and transfer, solid-state lighting, complex systems and networks.
- Nanoscience and Nanomaterials
  - Nanophotonics, nanostructures, nano-bio interfaces.
- Particle Physics
  - Direct detection of dark matter, lattice field theory, neutrinoless double beta decay.
- Optical Physics
  - Plasmonic structures, terahertz spectroscopy.
- Condensed Matter Physics
  - Complex systems, molecular electronics, quantum molecular dynamics, semiconductor materials and devices, thin film morphologies and transport.

AFFILIATED RESEARCH CENTERS

These centers provide students access to state-of-the-art facilities, including supercomputers, a class 100 microfabrication clean room, thin film deposition laboratories, and scanning probe microscopy laboratories.

- Center for Biotechnology and Interdisciplinary Studies
- Center for Integrated Electronics
- Center for Computational Innovations
- New York Interconnect Focus Center
- NSF Smart Lighting Engineering Research Center
Physics, Applied Physics, and Astronomy

PROFESSOR
Shirley Ann Jackson
NAE, President

György Korniss
Complex systems; social dynamics; transport, flow, and cascading failures in complex networks; population dynamics and ecological invasion.

Shawn-Yu Lin
Photonic crystals, plasmonics, nano and silicon photonics, solid-state lighting, solar energy applications.

Toh-Ming Lu
R.P. Baker Distinguished Professor of Physics
Materials physics, thin film morphology and texture, nanostructures for energy and electronics applications.

Vincent Meunier
Department Head, Gail and Jeffrey L. Kodosky '70 Constellation Professor of Physics, Information Technology, and Entrepreneurship
Theory, modeling, and computer simulation in condensed matter physics, including nanoscience; with emphasis on electronic materials, spectroscopy, and nano-bio interfaces.

Heidi Jo Newberg
Structure and dark matter distribution of the Milky Way galaxy, using MilkyWay@home, SDSS, and LAMOST.

Peter Persans
Department Associate Head
Optical and structural properties of amorphous, nanocrystalline, and quantum dot semiconductor materials.

Wayne Roberge
Astrobiology, multifluid magnetohydrodynamics, interstellar shock waves; physics of dusty plasmas.

John Schroeder
Glass and nanoparticle physics; cataract studies in human lenses.

Michael Shur
Patricia W. and C. Sheldon Roberts ’48 Professor of Solid State Electronics
THz electronics, physics of semiconductor materials and devices, color rendition; deep ultraviolet light emitting diodes.

Paul Stoler
Properties of hadrons; neutrino physics

Humberto Terrones
Rayleigh Endowed Chair in Theoretical Condensed Matter Physics
Physics and physical chemistry of nanostructures, in particular, 2-D materials.

Gwo-Ching Wang
Travelstead Institute Chair
Growth mechanism of oblique angle deposited nanostructures and films for energy applications.

Morris Washington
Associate Director, Center for Integrated Electronics; Professor of Practice, Physics
Photonic and electronic devices.

Christian Wetzel
Associate Dean for Research and Graduate Programs
Wide band gap semiconductor materials and devices for energy efficiency by means of epitaxy and optical spectroscopy.

Douglas Whittet
Director, New York Center for Astrobiology
Composition and evolution of interstellar matter; organic inventories of protoplanetary disks; infrared astronomy; astrobiology.

Shengbai Zhang
Gail and Jeffrey L. Kodosky ’70 Senior Constellation Professor of Physics, Information Technology, and Entrepreneurship
First-principles theory of structures, dynamics, defect properties of condensed matter, layered structures, and topological insulators.

ASSOCIATE PROFESSOR
Jöel Giedt
Lattice field theory beyond the standard model; phenomenology of warped string compactifications.

Kim Michelle Lewis
Experimental investigations of electron transport in molecules, biomaterials, and nanostructures.

Ingrid Wilke
Ultrafast and THz spectroscopy, sources and detectors of THz radiation.

Masashi Yamaguchi
Structural and electronic dynamics in condensed matter; nonlinear THz and picosecond acoustic spectroscopy of nanomaterials.

ASSISTANT PROFESSOR
Esther Wertz
Light-matter interactions of single molecules with plasmonic nanostructures, super-resolution microscopy.

Ethan Brown
Dark matter direct detection (XENON), neutrinoless double beta decay (nEXO), experimental particle physics.