



Nanoscience and Engineering Certificate

www.PhysicsAndAstronomy.Pitt.edu

Revised: 01/2021

Overview

Advances in nanoscience and nanotechnology (the ability to predict, create, and design with nanoscale materials and systems) are expected to reveal new physical phenomena and to enable the creation of highly desirable products and devices, in addition to revolutionary changes in industrial practice. Strength in nanoscience and nanotechnology has been identified as central to the nation's future competitiveness and prosperity and strategic plans have been developed to accelerate nanoscience research and development, encourage knowledge transfer to spur economic growth, and expand educational programs and workforce training – all in a socially and environmentally responsible and sustainable manner.

This certificate program requires 15 credits, described as follows. Satisfactory completion of the certificate satisfies the Dietrich School of Arts and Sciences requirement of a related area.

Required courses

ENGR 0240 Nanotechnology and Nanoengineering
CHEM 1630 Foundations of Nanoscience **or**
PHYS 1375 Foundations of Nanoscience
CHEM 1730 Directed Research in Nanoscience **or**
Nanotechnology **or**
ENGR 1730 Directed Research in Nanoscience **or**
Nanotechnology **or**
PHYS 1903 Directed Research in Nanoscience **or**
Nanotechnology

Elective courses

Select two courses from the following list

CHEM 1410 Physical Chemistry 1 **or**
CHEM 1420 Physical Chemistry 2 **or**
CHEM 1480 Intermediate Physical Chemistry
CHEM 1450 Molecular Modeling and Graphics

CHEM 1600 Synthesis and Characterization of Polymers
CHEM 1620 Atoms, Molecules, and Materials
ECE 0257 Analysis & Design of Electronic Circuits
ECE 1247 Semiconductor Device Theory
ECE 2295 Nanosensors
ENGR 0241 Fabrication and Design in Nanotechnology
IE 1012/ **or** IE 2012 Manufacture of Structural Nanomaterials
MEMS 1057 Micro/NanoManufacturing
MEMS 1447 Nanocharacterization
MEMS 1469 Materials Science of Nanostructures
MEMS 1477 Thin Film Processes and Characterization
MEMS 1478 Nanoparticles: Science and Technology
MEMS 1480 Introduction to Microelectromechanical Systems
PHYS 0520 Modern Physics Measurements
PHYS 1361 Wave Motion and Optics
PHYS 1370 Quantum Mechanics 1 **or**
PHYS 1371 Quantum Mechanics 2
PHYS 1374 Introduction to Solid State Physics

Non-Dietrich School course credit

Students may apply up to 18 credits of non-Dietrich School coursework to their undergraduate degrees.

Credit overlap

No more than six credits of coursework may overlap between the requirements for this certificate and a major in Physics and Astronomy or in Chemistry.

Grade Requirements

A minimum GPA of 2.0 is required in each course that counts toward the certificate.

Satisfactory/No Credit Option

No course that counts toward this certificate may be taken on the S/NC basis.

For more information

Contact the departmental advisor for the Physics and Astronomy major, Russell Clark (RUC2@Pitt.edu).