Nanoscale Physics

The Wiess School of Natural Sciences

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Degrees Offered: MS

Rice University introduced a professional master's degree in Nanoscale Physics in fall 2002. This program combines a strong component in quantum theory, which governs the behavior of systems at the nanoscale, with the study of practical nano- and mesoscale devices. The program provides the student with the knowledge required to successfully navigate the emerging field of nanotechnology. New courses cover cutting-edge areas such as quantum behavior of nanostructures, quantum nanotechnology, nanoscale imaging, and the fabrication of nanostructures. In addition, a year-long course in methods of experimental physics ensures that students obtain the advanced practical skills valuable to industry.

The Nanoscale Physics degree is one of three tracks in the new Professional Master's Program at Rice housed in the Wiess School of Natural Sciences. These master's degrees are designed for students seeking to gain further scientific core expertise coupled with enhanced management and communication skills. These degrees instill a level of scholastic proficiency that exeeds that of the bachelor's level and creates the cross-functional aptitudes needed in modern industry. This will allow students to move more easily into management careers in consulting or research and development, design, and marketing of new science-based products.

Degree Requirements for the MS in Nanoscale Physics

In addition to the core science courses, students are required to complete a three- to six-month internship and take a set of cohort courses focusing on business and communication. At the conclusion of the internship, students must present a summary of the internship project in both oral and written form as part of the Professional Master's Seminar.

Part-time students who already work in their area of study may fulfill the internship requirement by working on an approved project with their current employer. Certain course requirements may be waived based upon prior graduate coursework or industrial experience. For general university requirements for graduate study, see pages 62–63, and see also Professional Degrees, page 58.

Admission

Admission to graduate study in nanoscale physics is open to qualified students holding a bachelor's degree in physics, electrical engineering, or a related field that includes intermediate level work in mathematics, electrodynamics, and quantum physics. Department faculty evaluate the previous academic record and credentials of each applicant individually.

Science core courses:

PHYS 533 *Nanostructures and Nanotechnology I* (F)

PHYS 539 *Characterization and Fabrication at the Nanoscale* (F)

PHYS 537 *Methods of Experimental Physics I* (F)

PHYS 534 *Nanostructures and Nanotechnology II* (S)

PHYS 538 *Methods of Experimental Physics II* (S)

PHYS 416 *Computational Physics* (S)

Cohort courses:

MGMT 750 *Management in Science and Engineering* (F)

NSCI 501 *Professional Master's Seminar* (F, S) [required for two semesters]

NSCI 511 *Science Policy and Ethics* (S)

INTERNSHIP

An internship under the guidance of a host company, government agency, or national laboratory. A summary of the internship project is required in both oral and written form as part of the Professional Master's Seminar.

ELECTIVE COURSES

Note: Each of these electives is not offered every year, and some courses may have prerequisites or require instructor permission.

Students will choose four elective courses, two of which must be science or engineering 500 level or above. Recommended courses include, but are not limited to, the following:

CAAM 378 *Introduction to Operations Research* (F)

CHEM 533 *Nanostructure and Nanotechnology*

CHEM 547 *Supramolecular Chemistry* (F)

CHEM 630 *Molecular Spectroscopy and Group Theory* (F)

ELEC 561 *Topics in Semiconductor Manufacturing* (S)

ELEC 562 *Submicrometer and Nanometer Device Technology* (S)

ELEC 568 *Laser Spectroscopy* (F)

ELEC 603 *Nano-Optics and Nanophotonics* (F)

ELEC 645 *Thin Films* (F)

ELEC 685 *Fundamentals of Medical Imaging* (F)

ENGI 303 *Engineering Economics and Management* (S)

MGMT 617 *Managerial Decision Making* (S)

MGMT 636 *Systems Analysis and Database Design*

MGMT 661 *International Business Law* (F)

MGMT 674 *Production and Operations Management* (F)

MGMT 676 *Project Management/ Project Finance* (S)

MGMT 721 *General Business Law* (S)

MGMT 751 *New Venture Creation in Science and Engineering* (S)

PHYS 569 *Ultrafast Optical Phenomena* (S)