

Nanotechnology (NANO)

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Nanotechnology Minor Faculty Coordinators and Curriculum Committee

- Gregory Salamo, Distinguished Professor, Physics
- Min Zou, Associate Professor, Mechanical Engineering
- Jin-Woo Kim, Professor, Biological and Agricultural Engineering
- David Zaharoff, Assistant Professor, Biomedical Engineering
- Donald Keith Roper, Associate Professor, Chemical Engineering
- Gregory J. Thoma, Professor, Chemical Engineering
- Jingyi Chen, Assistant Professor, Chemistry and Biochemistry
- Fisher Yu, Assistant Professor, Electrical Engineering
- Steve Tung, Associate Professor, Mechanical Engineering
- Po-Hao Adam Huang, Associate Professor, Mechanical Engineering

The Nanotechnology minor is an interdisciplinary program that provides students with foundational knowledge and skills related to the emerging field of nanotechnology, including hands-on experience in several major areas of nanotechnology, such as synthesis of nanomaterials, nanoscale imaging, nanostructure assembly and manipulation, device and system integration, and performance evaluation. The Nanotechnology minor draws faculty expertise and coursework from the College of Engineering and the J. William Fulbright College of Arts and Sciences and utilizes state-of-the-art equipment and facilities at the Institute for Nanoscience and Engineering. The Nanotechnology minor is intended to prepare participating students for a career in which nanotechnology is playing an increasingly important role, and increase students' research competitiveness for graduate studies. The Nanotechnology minor is designed to be accessible to students majoring in engineering, physics, or chemistry and biochemistry. It is open to all students who have the necessary prerequisites to enroll in the courses that constitute the minor.

Requirements for the Nanotechnology Minor

Students wishing to participate in the Nanotechnology minor must declare participation formally. The students are required to meet with the faculty coordinator of an individual department who will help the student to develop a list of courses suitable for the minor and a schedule for taking those courses. Examples of model programs for each participating department are given below.

Students need to take a total of 15 credit hours, which includes 6 credit hours of required courses and 9 credit hours of elective courses and must earn a grade of "C" or better for all courses used to fulfill the requirements of the Nanotechnology minor.

Required Courses (6 hours)

Nanotechnology Laboratory	3
BENG 4753L Nanotechnology Laboratory or BENG 4753H Honors Nanotechnology Laboratory	
BMEG 4103L Nanotechnology Laboratory or BMEG 4103H Honors Nanotechnology Laboratory	
CHEM 4153L Nanotechnology Laboratory or CHEM 4153H Honors Nanotechnology Laboratory	
MEEG 4323L Nanotechnology Laboratory or MEEG 4323H Honors Nanotechnology Laboratory	
PHYS 4793L Nanotechnology Laboratory or PHYS 4793H Honors Nanotechnology Laboratory	

Nanotechnology Research (Independent Study or Honors Thesis in nanotechnology) 3

Students can choose from the following courses:

BENG 450V Special Problems	
BENG 451VH Honors Thesis	
BMEG 450VH Honors Thesis	
BMEG 460VH Honors Individual Study	
CHEG 488V Special Problems	
CHEM 400V Chemistry Research	
ELEG 488V Special Problems	
ELEG 488VH Honors Special Problems	
MEEG 492V Individual Study in Mechanical Engineering	
MEEG 4903H Honors Mechanical Engineering Research	
PHYS 498V Senior Thesis	
PHYS 306V Projects	
PHYS 399VH Honors	

Elective Courses

A minimum of 9 hours of elective courses selected from the following: 9

BENG 3113 Measurement and Control for Biological Systems or BENG 3113H Honors Measurement and Control for Biological Systems	
BENG 3733 Transport Phenomena in Biological Systems	
BENG 4743 Food and Bio-Product Systems Engineering	
BENG 4123 Biosensors & Bioinstrumentation	
BENG 4743 Food and Bio-Product Systems Engineering	
BMEG 3634 Biomaterials	
BMEG 3824 Biomolecular Engineering	
BMEG 4243 Advanced Biomaterials and Biocompatibility	
CHEG 3713 Chemical Engineering Materials Technology	
CHEM 4123 Advanced Inorganic Chemistry I	
CHEM 4213 Instrumental Analysis	
CHEM 4283 Energy Conversion and Storage	
ELEG 4253 Nanotechnology in Engineering & Medicine	
ELEG 4203 Semiconductor Devices	
ELEG 4303 Introduction to Nanomaterials and Devices	
ELEG 4213 MEMS and Microsensors	
MEEG 491V Special Topics in Mechanical Engineering	
MEEG 4313 Introduction to Tribology	
MEEG 4303 Materials Laboratory	
PHYS 3213 Electronics in Experimental Physics	

PHYS 4073 Introduction to Quantum Mechanics

PHYS 4213 Physics of Devices

PHYS 4713 Solid State Physics

PHYS 4773 Introduction to Optical Properties of Materials

or from other appropriate courses not on this list if approved first by the Nanotechnology Minor Curriculum Committee and by the course instructor.

Below are model programs for students from different participating departments. Students also have the flexibility to design their own programs according to the stated requirements above.

Model program for a student majoring in Biological Engineering

Required Courses (6 hours) 6

BENG 4753L Nanotechnology Laboratory
or BENG 475H Honors Nanotechnology Laboratory

BENG 450V Special Problems
or BENG 451V Honors Thesis

Elective Courses (9 hours) 9

BENG 3113 Measurement and Control for Biological Systems
or BENG 3113H Honors Measurement and Control for Biological Systems

BENG 4743 Food and Bio-Product Systems Engineering
BENG 4123 Biosensors & Bioinstrumentation

Model program for a student majoring in Biomedical Engineering

Required Courses (6 hours) 6

BMEG 4103L Nanotechnology Laboratory
or BMEG 4103H Honors Nanotechnology Laboratory

BMEG 450VH Honors Thesis
or BMEG 460VH Honors Individual Study

Elective Courses (9 hours) 9

BMEG 3634 Biomaterials
BMEG 3824 Biomolecular Engineering
BMEG 4243 Advanced Biomaterials and Biocompatibility

Model program for a student majoring in Chemical Engineering

Required Courses (6 hours) 6

PHYS 4793L Nanotechnology Laboratory
or PHYS 4793H Honors Nanotechnology Laboratory

CHEG 488V Special Problems

Elective Courses (9 hours) 9

CHEG 3713 Chemical Engineering Materials Technology
CHEG 5023 Nano Bio Photonics (will be co-listed 4000-level course in the future)
CHEG 4043 Colloids and Surfaces

Model program for a student majoring in Chemistry

Required Courses (6 hours) 6

CHEM 4153L Nanotechnology Laboratory

or CHEM 415H Honors Nanotechnology Laboratory

CHEM 400V Chemistry Research

Elective Courses (9 hours) 9

CHEM 4123 Advanced Inorganic Chemistry I

CHEM 4213 Instrumental Analysis

CHEM 4283 Energy Conversion and Storage

Model program for a student majoring in Electrical Engineering

Required Courses (6 hours) 6

PHYS 4793L Nanotechnology Laboratory

ELEG 488V Special Problems

or ELEG 488VH Honors Special Problems

Elective Courses (9 hours) 9

ELEG 4253 Nanotechnology in Engineering & Medicine

ELEG 4203 Semiconductor Devices

ELEG 4303 Introduction to Nanomaterials and Devices

Model program for a student majoring in Mechanical Engineering

Required Courses 6

MEEG 4323L Nanotechnology Laboratory

or MEEG 4323H Honors Nanotechnology Laboratory

MEEG 492V Individual Study in Mechanical Engineering

or MEEG 4923H Honors Mechanical Engineering Research

Elective Courses 9

MEEG 491V Special Topics in Mechanical Engineering

MEEG 4313 Introduction to Tribology

Model program for a student majoring in Physics

Required Courses (6 hours) 6

PHYS 4793L Nanotechnology Laboratory

or PHYS 4793H Honors Nanotechnology Laboratory

PHYS 498V Senior Thesis

or PHYS 399V Honors

Elective Courses (9 hours) 9

PHYS 4073 Introduction to Quantum Mechanics

PHYS 4713 Solid State Physics

PHYS 4773 Introduction to Optical Properties of Materials