

Nanotechnology (NANO)

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Nanotechnology Minor Faculty Coordinators and Curriculum Committee

- Gregory Salamo, Distinguished Professor, Physics
- Min Zou, Professor, Mechanical Engineering
- Jin-Woo Kim, Professor, Biological and Agricultural Engineering
- Raj Rao, Professor, Biological and Agricultural Engineering
- Karthik Nayani, Assistant Professor, Chemical Engineering
- Jingyi Chen, Professor, Chemistry and Biochemistry
- Fisher Yu, Professor, Electrical Engineering
- Steve Tung, Professor, Mechanical Engineering
- Po-Hao Adam Huang, Associate Professor, Mechanical Engineering
- Keisha Bishop Walters, Department Head and Professor, Chemical 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 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 Research Courses

Nanotechnology Research (Independent Study or Honors Thesis in nanotechnology) 6

Students can choose from the following courses:

BENG 4500V Special Problems

BENG 451HV Honors Thesis

BMEG 450HV Honors Thesis
BMEG 4600V Individual Study
or BMEG 4601HV Honors Individual Study

CHEG 4880V Special Problems

CHEM 4000V Chemistry Research
or CHEM 4001HV Honors Chemistry Research

ELEG 4880V Special Problems

MEEG 490H3 Honors Mechanical Engineering Research

MEEG 4920V Individual Study in Mechanical Engineering
or MEEG 4921HV Honors Individual Study in Mechanical Engineering

PHYS 3060V Projects

PHYS 399HV Honors

PHYS 4980V Senior Thesis

Elective Courses

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

BENG 31103 Measurement and Control for Biological Systems
or BENG 3111HV Honors Measurement and Control for Biological Systems

BENG 37303 Transport Phenomena in Biological Systems

BENG 47403 Food and Bio-Product Systems Engineering

BENG 41203 Biosensors & Bioinstrumentation

BENG 47403 Food and Bio-Product Systems Engineering

BMEG 36304 Biomaterials

BMEG 38204 Biomolecular Engineering

BMEG 42403 Advanced Biomaterials and Biocompatibility

CHEG 37103 Chemical Engineering Materials Technology

CHEG 50403 Colloid and Interface Science

CHEM 41203 Advanced Inorganic Chemistry I

CHEM 42203 Instrumental Analysis

CHEM 42803 Energy Conversion and Storage

CHEM 54403 Physical Chemistry of Materials

ELEG 42003 Semiconductor Devices

ELEG 43003 Introduction to Nanomaterials and Devices

MEEG 43003 Materials Laboratory

MEEG 43103 Introduction to Tribology

MEEG 52603 Introduction to Micro Electro Mechanical Systems

MEEG 53403 Computational Material Science

PHYS 32103 Electronics in Experimental Physics

PHYS 36103 Modern Physics

PHYS 40703 Introduction to Quantum Mechanics

PHYS 42103 Physics of Devices

PHYS 47103 Solid State Physics

PHYS 47703 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.

Total Hours

15

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)

BENG 4500V	Special Problems	1-4
BENG 451HV	Honors Thesis	1-6

Elective Courses (9 hours) 9

BENG 31103	Measurement and Control for Biological Systems or BENG 311HV Honors Measurement and Control for Biological Systems	
BENG 47403	Food and Bio-Product Systems Engineering	
BENG 41203	Biosensors & Bioinstrumentation	

Total Hours 15

Model program for a student majoring in Biomedical Engineering

Required Courses (6 hours)

BMEG 450HV	Honors Thesis	1-4
BMEG 4600V	Individual Study or BMEG 460HV Honors Individual Study	1-3

Elective Courses (9 hours) 9

BMEG 36304	Biomaterials	
BMEG 38204	Biomolecular Engineering	
BMEG 42403	Advanced Biomaterials and Biocompatibility	

Total Hours 15

Model program for a student majoring in Chemical Engineering

Required Courses (6 hours)

CHEG 4880V	Special Problems	6
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Elective Courses (9 hours) 9

CHEG 37103	Chemical Engineering Materials Technology	
CHEG 50403	Colloid and Interface Science	
CHEM 42203	Instrumental Analysis	

Total Hours 15

Model program for a student majoring in Chemistry

Required Courses (6 hours) 6

CHEM 4000V	Chemistry Research or CHEM 40 Honors Chemistry Research	
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Elective Courses (9 hours) 9

CHEM 41203	Advanced Inorganic Chemistry I	
CHEM 42203	Instrumental Analysis	
CHEM 42803	Energy Conversion and Storage	

Total Hours 15

Model program for a student majoring in Electrical Engineering

Required Courses (6 hours) 6

ELEG 4880V	Special Problems	
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Elective Courses (9 hours) 9

PHYS 42103	Physics of Devices	
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ELEG 42003 Semiconductor Devices

ELEG 43003 Introduction to Nanomaterials and Devices

Total Hours 15

Model program for a student majoring in Mechanical Engineering

Required Courses

MEEG 4920V	Individual Study in Mechanical Engineering or MEEG 492H Honors Individual Study in Mechanical Engineering	3
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MEEG 490H3 Honors Mechanical Engineering Research 3

Elective Courses 9

MEEG 43003	Materials Laboratory	
MEEG 43103	Introduction to Tribology	
MEEG 52603	Introduction to Micro Electro Mechanical Systems	

Total Hours 15

Model program for a student majoring in Physics

Required Courses (6 hours)

PHYS 3060V Projects 1-3

PHYS 4980V Senior Thesis 1-6
or PHYS 399HV Honors

Elective Courses (9 hours) 9

PHYS 40703	Introduction to Quantum Mechanics	
PHYS 47103	Solid State Physics	
PHYS 47703	Introduction to Optical Properties of Materials	

Total Hours 15