

- Required course for the Nanotechnology Minor
- Cross-listed as MEEG 4323L, BENG 4753L, BMEG 4103L, CHEM 4153L, PHYS 4793L
- Corresponding Honors Courses: MEEG 4323M, BENG 4753M, BMEG 4103M, CHEM 4153M, PHYS 4793M

#### Course Objective:

The objective of the course is to develop students' hands-on skills in several major areas of nanotechnology through a variety of laboratory experiments. Emphases are placed on nanoscale imaging, synthesis of nanomaterials, nanostructure assembly and manipulation, device and system integration, and performance evaluation. The overall theme of the lab course is the integration of size-dependent properties and surface and interface effects at the nanoscale into devices and systems.

#### Course Outline:

- Introduction / Safety
- Imaging at the nanoscale
- Synthesis and characterization of colloidal Au nanoparticles
- Self-assembly of bio/abio hybrid nanostructures via controlled interfacing
- Experiencing scaling effects via nano composite MEMS devices
- Fabrication and testing of a single-walled CNT based field effect transistor Fabrication
- Fabrication of surfaces with extreme wettability
- Thermoplasmonic characteristics of self-assembled colloidal nanocomposites

#### Prerequisites:

MATH 2564, PHYS 2074, CHEM 1103 or CHEM 1113

#### Co-requisites:

Drill component, junior standing and instructor consent

#### Co-taught by seven faculty from the Nano Institute.

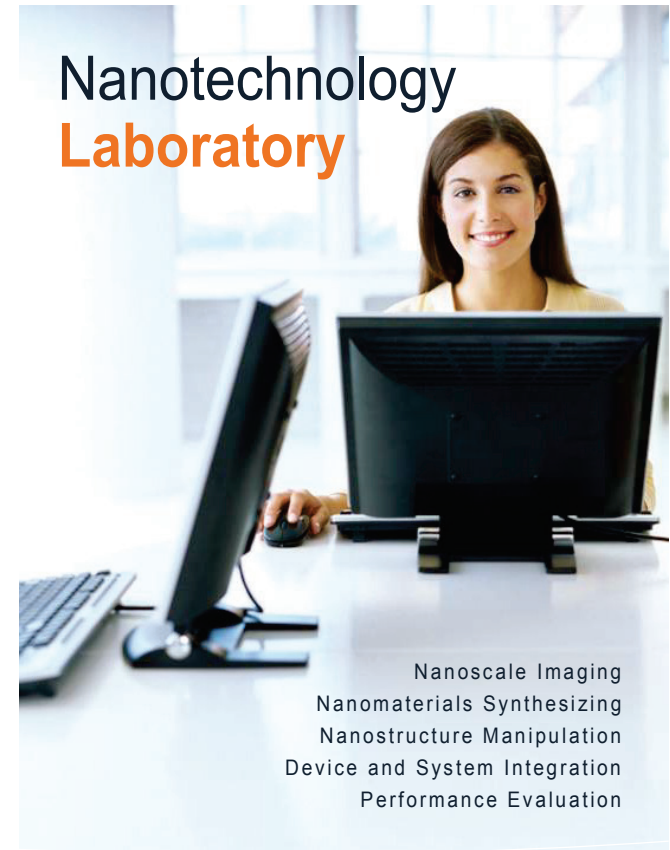
#### For more information, please contact:

- Dr. Gregory Salamo, Physics
- Dr. Jingyi Chen, Chemistry
- Dr. Jin-Woo Kim, Bioengineering
- Dr. Adam Huang, Mechanical Engineering
- Dr. Steve Tung, Mechanical Engineering
- Dr. Min Zou, Mechanical Engineering
- Dr. Keith Roper / Greg Thoma, Chemical Engineering

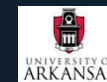
#### To enroll, please contact:

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# Nanotechnology Laboratory



Nanoscale Imaging  
 Nanomaterials Synthesizing  
 Nanostructure Manipulation  
 Device and System Integration  
 Performance Evaluation



Institute for Nanoscience  
& Engineering

Nano 104  
 University of Arkansas  
 731 W. Dickson St.  
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# Nanotechnology Minor

A NEW INTERDISCIPLINARY UNDERGRADUATE MINOR STARTING FALL 2013.

Administrated by the Provost's Office.

Participating Departments:

MEEG, BENG, BMEG, CHEG, ELEG,

Chemistry, Physics

Nanotechnology is a rapidly developing interdisciplinary field that holds great promise for new applications in a wide range of industries that have large societal impact, including consumer goods, electronics, computers, energy, biotechnology, and medicine. It is projected that 2 million workers are needed in nanotechnology-based businesses by 2020 in the United States alone. This field is expected to continue to grow and increasingly in need of trained scientists and engineers.

## Prepare Yourself for the Nanotechnology Revolution

### MINOR REQUIREMENT (15 HOURS WITH GRADES 'C' OR BETTER)

#### Required courses (6 hours)

- Nanotechnology Laboratory (3 hours)
- Nanotechnology Research (3 hours)

#### Elective courses (9 hours)

- Select 3 from the List of Electives

#### Nanotechnology Laboratory

Cross-listed as the following courses:

- MEEG 4323L, BENG 4753L, BMEG 4103L, CHEM 4153L, PHYS 4793L
- MEEG 4323M, BENG 4753M, BMEG 4103M, CHEM 4153M, PHYS 4793M.

#### Nanotechnology Research

(Independent Study or Honors Thesis in Nanotechnology)

Students can choose one from the following list to fulfill this requirement:

- 1) BENG 450V Special Problems
- 2) BENG 451VH Honors Thesis
- 3) BMEG 450VH Honors Thesis
- 4) BMEG 460V Individual Study

#### Nanotechnology Research (Continued)

- 5) CHEM 400V Chemistry Research
- 6) CHEM 498V Senior Thesis
- 7) CHEG 488V Special Problems – Nanotechnology Research
- 8) ELEG 488V Special Problems
- 9) ELEG 488VH Honors Special Problems
- 10) MEEG 492V Individual Studies
- 11) MEEG 4903H Honors Mechanical Engineering Research
- 12) PHYS 498V Senior Thesis
- 13) PHYS 306V Projects
- 14) PHYS 399VH Honors Physics Research

#### List of Electives (Select 3 courses from the list)

- (1) BENG 3733 Transport Phenomena in Biological Systems
- (2) BENG 4743 Food and Bio-product Systems Engineering
- (3) BENG 3113 Measurement and Control for Biological Systems
- (4) BENG 4123 Biosensors & Bioinstrumentation
- (5) BMEG 3634 Biomaterials
- (6) BMEG 3824 Biomolecular Engineering
- (7) BMEG 4243 Advanced Biomaterials and Biocompatibility
- (8) CHEG 3713 Chemical Engineering Materials Technology
- (9) CHEG 5023 Nano Bio Photonics
- (10) CHEG 4043 Colloids and Surfaces
- (11) CHEM 4123 Advanced Inorganic Chemistry
- (12) CHEM 4213 Instrumental Analysis
- (13) CHEM 4283 Energy Conversion and Storage
- (14) ELEG 4253 Nanotechnology
- (15) ELEG 4203 Semiconductor Devices
- (16) ELEG 4303 Introduction to Nanomaterials and Devices
- (17) ELEG 4213 MEMS and Microsensors
- (18) MEEG 491V Introduction to Micro and Nanosystems
- (19) MEEG 4313 Introduction to Tribology
- (20) MEEG 491V Intermediate Materials
- (21) MEEG 4303 Materials Laboratory
- (22) PHYS 3213 Electronics in Experimental Physics
- (23) PHYS 3614 Modern Physics
- (24) PHYS 4073 Introduction to Quantum Mechanics
- (25) PHYS 4213 Physics of Devices
- (26) PHYS 4713 Solid State Physics
- (27) PHYS 4774 Introduction to Optical Properties of Materials



Questions? Please Contact:

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