# Nanoscale Science and Engineering (NSE)

## Courses

### NSE C201 Introduction to Nano-Science and Engineering 3 Units

Terms offered: Spring 2015, Spring 2013, Spring 2012
A three-module introduction to the fundamental topics of Nano-Science and Engineering (NSE) theory and research within chemistry, physics, biology, and engineering. This course includes quantum and solid-state physics; chemical synthesis, growth fabrication, and characterization techniques; structures and properties of semiconductors, polymer, and biomedical materials on nanoscales; and devices based on nanostructures. Students must take this course to satisfy the NSE Designated Emphasis core requirement.
Introduction to Nano-Science and Engineering: Read More [+]
**Rules & Requirements**

**Prerequisites:** Major in physical science such as chemistry, physics, etc., or engineering; consent of advisor or instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Nanoscale Science and Engineering/Graduate

**Grading:** Letter grade.

**Instructors:** Gronsky, S.W. Lee, Wu

**Also listed as:** BIO ENG C280/MAT SCI C261/PHYSICS C201

Introduction to Nano-Science and Engineering: Read Less [-]

### NSE C203 Nanoscale Fabrication 4 Units

Terms offered: Spring 2016, Spring 2015, Spring 2013
This course discusses various top-down and bottom-up approaches to synthesizing and processing nanostructured materials. The topics include fundamentals of self assembly, nano-imprint lithography, electron beam lithography, nanowire and nanotube synthesis, quantum dot synthesis (strain patterned and colloidal), postsynthesis modification (oxidation, doping, diffusion, surface interactions, and etching techniques). In addition, techniques to bridging length scales such as heterogeneous integration will be discussed. We will discuss new electronic, optical, thermal, mechanical, and chemical properties brought forth by the very small sizes.
Nanoscale Fabrication: Read More [+]
**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week

**Additional Details**

**Subject/Course Level:** Nanoscale Science and Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Chang-Hasnain

**Also listed as:** EL ENG C235

Nanoscale Fabrication: Read Less [-]

### NSE C237 Computational Nano-mechanics 3 Units

Terms offered: Spring 2018, Spring 2017, Fall 2014, Spring 2013
Basic mathematics foundations, physical models, computational formulations and algorithms that are used in nanoscale simulations and modelings. They include (1) cohesive finite element methods and discontinuous Galerkin methods; (2) meshfree methods, partition of unity methods, and the eXtended finite element methods (X-FEM); (3) quasicontinuum method; (4) molecular dynamics; (5) multiscale simulations; (6) Boltzmann method.
Computational Nano-mechanics: Read More [+]
**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of laboratory per week

**Additional Details**

**Subject/Course Level:** Nanoscale Science and Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Li

**Also listed as:** CIV ENG C237

Computational Nano-mechanics: Read Less [-]

## NSE C242 Computational Nanoscience 3 Units

Terms offered: Spring 2009, Spring 2008, Spring 2006
A multidisciplinary overview of computational nanoscience for both theorists and experimentalists. This course teaches the main ideas behind different simulation methods; how to decompose a problem into "simulatable" constituents; how to simulate the same thing two different ways; knowing what you are doing and why thinking is still important; the importance of talking to experimentalists; what to do with your data and how to judge its validity; why multiscale modeling is both important and nonsense.
Computational Nanoscience: Read More [+]
**Rules & Requirements**

**Prerequisites:** Graduate standing or consent of instructor

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week

**Additional Details**

**Subject/Course Level:** Nanoscale Science and Engineering/Graduate

**Grading:** Letter grade.

**Also listed as:** PHYSICS C203

Computational Nanoscience: Read Less [-]

## NSE 290 Special Topics in Nanoscale Science and Engineering 3 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015
Lectures and appropriate assignments on fundamental or applied topics of current interest in nanoscale science and engineering.
Special Topics in Nanoscale Science and Engineering: Read More [+]
**Rules & Requirements**

**Prerequisites:** Graduate standing or consent of instructor

**Credit Restrictions:** Subject to home department limitations.

**Repeat rules:** Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

**Additional Details**

**Subject/Course Level:** Nanoscale Science and Engineering/Graduate

**Grading:** Letter grade.

Special Topics in Nanoscale Science and Engineering: Read Less [-]

## NSE 298 Group Studies, Seminars, or Group Research 1 Unit

Terms offered: Spring 2018, Fall 2017, Spring 2017
Advanced studies in various subjects through special seminars on topics to be selected each year. Informal group studies of special problems, group participation in comprehensive design problems, or group research on complete problems for analysis and experimentation.
Group Studies, Seminars, or Group Research: Read More [+]
**Rules & Requirements**

**Prerequisites:** Required for participants in Designated Emphasis

**Repeat rules:** Course may be repeated for credit.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1 hour of seminar per week

**Additional Details**

**Subject/Course Level:** Nanoscale Science and Engineering/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

Group Studies, Seminars, or Group Research: Read Less [-]