

## **Ve/Vm 506: Selected Topics in Nanotechnology**

Summer 2018

Instructor: Morteza Eslamian

Classroom: TBA

Lecture times: TBA

Office hours: TBA

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### **1. Course Description :**

Selected topics in nanotechnology is an introductory course designed for graduate students with interest in research areas related to nanotechnology or for those students who wish to gain knowledge and insight about the field. By its nature, nanotechnology is an interdisciplinary field, building on latest progress especially in Physics, Chemistry, Materials Science, Biology, and Engineering. The ability of cross-disciplinary communication is absolutely crucial to achieve progress in the field. Nanotechnology represents one of the fastest growing fields in Science and Technology. Applications of nanotechnology range widely from advanced electronics to energy storage and conversion to biomedical devices.

There are no formal course pre-requisites for this course. The physical behavior at the nanometer scale is governed by laws of quantum mechanics, however, in this course the focus is on the applications rather than the governing equations.

The course starts off with a general introduction to nanotechnology, its history, trend, research directions and so on. Principles of Electron Microscopy as the main characterization tool in nano-features will be covered. Various fabrication methods of nanoparticles, thin films, bulk nano-structured materials and nano-features, nanotubes and patterns as well advanced properties of nanomaterials will be discussed. Other issues such as environmental concerns, some engineering applications of nanotechnology such as nanofluids, thin film solar cells, fuel cells, and nanoelectronics will be also covered.

### **2. Evaluation:**

Quizzes (about 8)	50%
Final Exam:	50%

### **3. Textbook:**

No particular book or textbook will be used. Students are required to take lecture notes. Presentation slides will be available to the students. Students should read online sources and papers to gain better understanding of the course materials.

#### 4. Lectures:

##### Tentative schedule

Week	Topic
1	Introduction to nanotechnology
2	Synthesis methods of nanoparticles (liquid phase)
3	Synthesis methods of nanoparticles (gas phase)
4	Synthesis methods of thin films (physical methods)
5	Synthesis methods of thin films (chemical methods)
6	Synthesis of nanotubes and nanowires
7	Nanolithography and self-assembly
8	Synthesis and properties of bulk nanomaterials
9	Electron and probe microscopy
10	Nanofluids- Thin film solar cells
11	Fuel cells-Nanoelectronics
12	Other applications-Nano risks
13	Final Exam August, 2017

#### 5. Academic Integrity

No laptop or any other electronic device is allowed in the class.

Common sense and all articles of the JI Honor code are applicable. Please see:

<http://web.eecs.umich.edu/~sugih/courses/eecs487/common/notes/JI-HonorCode.pdf>