EE612 – Science and Practice of Nanotechnology

University of Southern California
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Office: PHE 624

Tuesdays and Thursdays 12:30 - 1:50PM
Office Hours: Thursday 9-11AM
Course Website: http://blackboard.usc.edu

This is a seminar class focusing on reviewing current literature in the rapidly expanding and progressing field of nanoscience and nanotechnology. The course is intended for senior graduate students who are focusing mainly on research. As such, there will be no problem sets or exams given in this course.

Teaching Philosophy: During the course of your undergraduate and early graduate studies, you probably solved over 6,000 well defined problems. In most of these problems, you were given three variables to be plugged into the appropriate equation from that chapter. This is the so called *plug-and-chug* approach. Sadly, you will never need these skills. No one will ever walk into your office with a problem the even remotely resembles this. Developing the ability to formulate your own problem, propose a solution, and communicate that idea effectively to others is far more valuable. People will come into your office with poorly defined problems (e.g., why is the 14nm fab line not working?), and until that problem is well formulated, you won't have a chance in solving it.

Goals: The aim of this class is twofold: 1.) Survey recent advances in the broadly defined, rapidly expanding field of nanoscience and nanotechnology. 2.) Teach you to formulate a problem, propose a solution, and communicate that idea effectively to others.

Course Structure: There will be no problem sets or exams given in this course. Homeworks will primarily consist of preparing short presentations to be given in class. During the first part of this course, these presentations will entail giving a review of a paper from literature. Midterm and final projects will consist of preparing a research proposal, one that is related to your current research topic and one that is unrelated. Participation will be a crucial element to this class and does not simply mean attendance. In addition to forming and answering questions in class, there will be in-class assignments to help students engage the material more actively.

Grading: Students' final grades will be calculated from a weighted average as follows:

In-class Presentations	40%
Midterm project (presentation)	25%
Final Project (presentation)	25%
In-class assignments	10%

Course Outline: Depending on how quickly lecture material is covered, the following is a tentative list of topics to be covered in the class.

1.) Carbon Nanotubes
2.) Graphene
3.) Transition Metal Dichalcogenides
4.) Plasmonic Nanostructures
5.) Photocatalysis
6.) Superlattices and Quantum Wells
7.) Nanowires
8.) Superconducting Nanostructures
9.) Photonic Crystals