MASC 350L

Nanostructured Materials: Design, Synthesis, and Processing

Instructor: Prof. Andrea Armani, Dept. of Chemical Engineering and Materials Science, MCB 495, (213) 740-4428, armani@usc.edu; email is preferred and response time is usually within 5 hours during normal working hours.

Class Hours: Tuesday/Thursday 8:00-9:20am

Office Hours: immediately before/after every class for 30 minutes

Textbook/Reference material:

There is no specific textbook. Reference materials, such as review articles, will be posted on Blackboard. Lecture notes will also be posted.

Course Vision:

This course is designed to discuss Nanotechnology from the bottom up and top down. In that sense, we will first discuss the building blocks of nanotechnology, or structures like nanocrystals, polymers and nanowires/tubes, and their fundamental properties (optical, electrical, mechanical, etc). From there, we will use these individual structures to build more complex devices using methods ranging from self-assembly to lithography, and different applications.

Course Objective:

The objective of this course is to expose students to modern engineering tools and challenges and teach them how to approach and solve problems which have immediate relevance. A secondary objective is to teach students how to express research results in a scientific manner.

Grading:

Homework (2)	5%
Labs (5)	35%
Midterm (1)	25%
Final (1)	35%

Expectations/Information for Assignments, Exams and Papers:

Homework assignments:

There will be two problems sets/homeworks. They are due at the beginning of class. Late homeworks are not accepted. The answers to the homeworks will be reviewed in class.

In addition, students are expected to complete reading assignments. Reading assignments will be posted on Blackboard.

Labs:

There are five labs, which are divided into two categories: 1) synthesis of nanomaterials and 2) applications nanomaterials. The lab manual and the template for the lab report are posted on Blackboard. It is expected that you will have read the lab manual and completed the assigned pre-lab reading before coming to lab. Although you are working with a partner, every student should submit their own lab report.

If a lab report is plagiarized, the student will receive 0pts for the lab report. There is a ppt presentation detailing what is considered plagiarism on Blackboard. If you have any questions, please ask.

Lab reports are due at 8am on Thursday. No late lab reports are accepted.

Exams:

There is 1 midterm and 1 final exam.

The midterm and final exam will consist of 5-10 problems, structured to allow the entire exam to be completed in a single class period. The final exam will cover material from the entire semester. A sheet of crucial equations and mathematical formulas will be attached to the exams. Nothing except a pencil or pen is allowed (no calculators, class notes, slides, papers, problem sets or solutions). The midterm and final from a previous year's class are assigned as homework. However, it is important to remember that the course content does vary slightly every semester (as new discoveries are made).

Detailed Course Outline:

Posted on Blackboard

Statement on Academic Conduct and Support Systems

Academic Conduct:
Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, "Behavior Violating University Standards" https://policy.usc.edu/scampus-part-b/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Support Systems:
Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.
https://engemannshc.usc.edu/counseling/

National Suicide Prevention Lifeline - 1-800-273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. http://www.suicidepreventionlifeline.org

Relationship & Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. https://engemannshc.usc.edu/rsvp/

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: http://sarc.usc.edu/

Office of Equity and Diversity (OED)/Title IX compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class.
https://equity.usc.edu/

Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. https://studentaffairs.usc.edu/bias-assessment-response-support/

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations.
http://dsp.usc.edu

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. https://studentaffairs.usc.edu/ssa/

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students.
https://diversity.usc.edu/

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, http://emergency.usc.edu

USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime.
Provides overall safety to USC community. http://dps.usc.edu

MASC 350L (Spring 2019)

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Detailed Course Outline: (tentative)

Lect #	Topic (Tentative)	Items Due	Lab Schedule
1	intro/lab reports		
2	physics		
3	Au/Ag nanoparticles		Lab 1 (W/Th)
4	Au/Ag nanoparticles		Lab 1 (W/Th)
5	Quantum Dots		
6	Quantum Dots	Lab 1	
7	Nanowires		Lab 2 (W/Th)
8	nanowires		Lab 2 (W/Th)
9	ZnO		
10	CNT	Lab 2	
11	2D materials		Lab 3 (W/Th)
12	Polymer intro/diblock co-polymers		Lab 3 (W/Th)
13	Diblock co-polymers/composites		
14	Smart materials	Lab 3	
15	Fabrication		
16	Fabrication		
17	homework	HW1	
	midterm	Midterm	
	Spring break		
	Spring break		
18	Midterm Solutions/Microfluidics		
19	biology/surface chemistry		
20	Sensors		Lab 4 (W/Th) pt2
21	Sensors		Lab 4 (W/Th) pt2
22	Therapeutics		
23	Therapeutics	Lab 4	
24	Multi-functional Imaging		Lab 5 (W/Th)
25	Multi-functional Imaging		Lab 5 (W/Th)
26	Energy		
27	Energy	Lab 5	
28	HW2	HW2	
	Course Evals		