Syllabus

PHYS, ECE, BENG-5710: Advanced Microfabrication

Instructor: T.-C. Shen (tc.shen@usu.edu)

Class website: www.usu.edu/nanolab/5710

Class meets: Individually arranged

Purpose
The goal of this course is to train students with advanced knowledge and experience to perform microfabrication as part of their research projects across campus. Microfabrication is ubiquitous at the forefront of research today, from materials science to molecular biology, to reveal basic physical, chemical and biological principles and to engineer novel devices including reconfigurable antennas, nanoelectronics/photonics, biological and chemical sensors, and energy conversion, just to name a few. Many students on campus have the need to create such structures for their research and future careers but cannot find proper training. Since the science and technology involved in microfabrication is so vast, the pre-requisite PHYS/ECE/BENG 5700 can only provide an overview of this important subject.

Activities
Students in this course will have an opportunity to focus and excel on processes tailored for their own research needs under the supervision of the instructor. To ensure the feasibility of each project using the tools at Nanoscale Device Laboratory (NDL), each student or a group of students will submit a project proposal with their advisor’s consent to the instructor before registration. The proposal can be a part of undergraduate research, senior project, thesis, or dissertation. Student projects may be revised after discussion with the instructor to ensure their success at NDL. For students who are interested in the technology of microfabrication but have no current research projects, the instructor will provide feasible projects. For students who are interested in instrumentation, there will be opportunities to design and build instruments to expand the capability of NDL. This hands-on experience will be invaluable for their future careers in the fields of science and technology. Specialized materials not supplied by NDL should be provided by the students or their advisors. Students will be trained and qualified by the instructor to use the tools at NDL to carry out their projects. The instructor will have weekly meetings with students in each project to monitor their progress. The course requests a $100 lab fee for consumables and repairs.

Learning objectives and grading scheme
At the end of the course, students should be able to conduct some of the basic tasks including photomask design, wafer cleaning, photo/e-beam lithography, chemical and reactive ion etching, metal and dielectric deposition. Specific goals of each project will be set at the beginning of the semester. Student grade will be evaluated by targets completeness (80%) and a final project report (20%)

USU policies
We follow strictly USU policies towards (1) academic freedom and professional responsibilities, (2) academic integrity, (3) grievance process, (4) plagiarism, (5) sexual harassment, (6) disabilities, and (7) withdraw and incomplete.

Please go to http://www.usu.edu/provost/faculty-life/syllabus.cfm for details.