Lectures: A combination of lectures and online lab activities are scheduled every week. The lecture topics outline shown at the end of this document is tentative, but it will closely follow the actual schedule on Angel.

Instructor: Terry Kuzma, txk@psu.edu

Office hours: Tuesday morning 10:00-11:00 AM US East Coast time via txk107@psu.edu. E-mail to txk107@psu.edu will also be checked every business day and responses will be made within 24 hours.

Textbook:
Nanostructures & Nanomaterials; Synthesis, Properties & Applications.
by Guozhong Cao [ISBN 1-86094-480-9]

Semiconductor Manufacturing Technology

Course Objectives:
This course is an overview of the broad spectrum of processing approaches involved in “top down”, “bottom up”, and hybrid nanofabrication. The majority of the course details a step-by-step description of the equipment, facilities processes and process flow used in today’s device and structure fabrication. Students learn to appreciate processing and manufacturing concerns including safety, process control, contamination, yield, and processing interaction. The students design process flows for micro- and nano-scale systems. Students learn the similarities and differences in “top down” and “bottom up” equipment and process flows by undertaking hands-on processing. This hands-on overview exposure covers basic nanofabrication processes including deposition, etching, and pattern transfer.
Examinations:

There will be six exams during the semester. All exams will be on-line exams. The time allocation is listed on each file. These exams are scheduled for weekends to give you maximum flexibility.

The exam schedule will be listed on Angel, but in general and exams will be once every two weeks.

Homework

There will be four homework assignments. These assignments will be problem sets and will be due as noted in the syllabus below. Homework is answered in a time limited quiz format. You will be given the homework questions days before the homework quiz is due. Homework handed in up to 12 hours late will receive 30% off, homework handed in up to 24 hours late will receive 50% off. No homework will be accepted after 24 hours. You are responsible for checking to make sure that you have correctly submitted your homework on time. You will receive your grade and any comments back electronically.

Lab activities

There will be approximately six lab based exercises. These assignments will consist of watching or performing tasks and then evaluating the results. The lab activity results will be handed in electronically via the homework drop boxes on Angel. Lab activity reports handed in up to 12 hours late will receive 30% off, Lab activity reports handed in up to 24 hours late will receive 50% off. No lab activity reports will be accepted after 24 hours. You are responsible for checking to make sure that you have correctly submitted your assignments on time. You will receive your grade and any comments back electronically.

Grading:

The standard grading system will be used to assign final letter grades in the course

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<tr>
<th>Grade</th>
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<tr>
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Grading Rubric

Grades will come from three areas, tests, lab material, and homework. Currently tests are approximately 555 points, labs account for 330 points, and homework is worth 125 points. Of course these values could change, but this breakdown should be close.

Academic Honesty:

Students are encouraged to work together on homework assignments; however, original solutions are required. If cheating or copying is suspected, all students involved will receive a zero for that assignment. **Cheating or plagiarism** on any graded activity (homework or exam) will be penalized with a minimum of a zero points for the assignment, and up to a **failing grade** in the class. Any academic integrity violation report will be placed in the offender’s permanent files. If you are not familiar with what constitutes an academic integrity violation, read Penn State’s policies on the web site [http://www.engr.psu.edu/CurrentStudents/acadinteg.asp](http://www.engr.psu.edu/CurrentStudents/acadinteg.asp).

Topics Covered:

- Self-assembly
- Anisotropic and isotropic etching
- Wet and dry etching
- Physical deposition
- Chemical deposition
- Oxidation and dielectric Materials
- Lithography introduction
- Liftoff process