EEPMP 504 **: Introduction to Microelectromechanical Engineering (MEMS)**

Summer Quarter 2017

Department of Electrical Engineering, University of Washington

Course Description: Research and development of MEMS (Micro Electro Mechanical Systems) builds on the dramatic advances in silicon processing infrastructure to create micron-scale machines. Unlike conventional integrated circuits, MEMS devices can have many functions, including sensing, communication, and actuation. Just like microelectronics, MEMS technology has started to permeate our everyday lives. This class is an introduction to this exciting field. The class includes a one-day cleanroom session and a group research project. There will also be homeworks and a midterm exam.

The course will cover a wide range of topics including,

- Micromachining techniques
    - Patterning, etching, deposition
- Microfabrication processes
    - Process flows, MUMPS, SCREAM, CMOS, foundries
- Devices and structures
    - Cavities, cantilevers, beams, membranes, pores, hinges, flexures
- Transducers (sensors and actuators)
    - Electrostatic, thermal, piezoresistive, piezoelectric, magnetic
- Case histories and example systems
    - Pressure sensors, accelerometers, micromirror arrays, inkjet printheads, low-voltage field emitters, scanning probe tips

Prerequisites: Graduate standing or permission by instructor. This class covers a broad set of topics in multiple engineering disciplines but does not have specific course requirements.

Class Information:

Instructor:	Tai-Chang Chen
Webpage:	Canvas
Lectures:	Tuesdays 6:00-9:50pm **at EEB 045**
Recommended Texts and/or References:	The text book is Chang Liu, Foundations of MEMS (2nd edition). Other useful books are Marc Madou, Fundamentals of Microfabrication: The Science of Miniaturization; Stephen D. Senturia, Microsystem Design, and Gregory T.A. Kovacs, Micromachined Transducers Sourcebook
Course Grading:	4 homeworks (40%), 1 midterm exam (in class, open book) (25%), 1 project (35%).

Homeworks:	There will be bi-weekly homework assignments. Late homework loses 10 percentage points per day. No late homework will be accepted after solution has been posted.
Exam:	There will be one in-class midterms. No make-up exam will be given. The exams are open books and notes.
Project:	The class project is a small-scale research project that investigates aspects in MEMS design, modeling, simulation, fabrication, or testing. A project team consists of 2 to 4 students. A short proposal is due in week 3. The proposal will be used to check the approach and feasibility of the project. A final write-up (short conference paper style) is due on August 14th.

Academic Integrity

If you cheat, you cheat yourself of the opportunity to learn the material, and you cheat your classmates — all of your classmates — out of grades they have earned. If you let someone else copy your work, you are allowing them to devalue your grade and that of your fellow students. Cheating is a bad way to embark on a career in engineering. Cheaters make bad engineers, and you should be a good one. You can help by not tolerating cheating by your fellow students. The TAs and I will monitor for cheating and I will resolve all cheating cases in accordance with College of Engineering and University policy. Please help avoid this by avoiding even the appearance of possible cheating. Cheating can result in failure of the course and/or eventual expulsion from the University.