

BME 5580 Microfluidics and BioMEMS

Spring 2014

Prerequisite:

EGN 3353C “Fluid Mechanics” or consent of the instructor

Textbook:

Recommended textbooks:

M. Madou, “Fundamentals of Microfabrication: The Science of Miniaturization”, 2nd Edition, CRC Press, ISBN: 0849308267

Albert Folch, “Introduction to BioMEMS”, 1st Edition, CRC Press, ISBN: 9781439818398

Nam-Trung Nguyen and Steve Wereley, “Fundamentals and Applications of Microfluidics”, 2nd Edition, Artech House, ISBN: 1580539726

Class notes and handouts will be provided.

Class Schedule and Grading Policy:

Course meeting times: MWF 6 (12:50 – 1:40 pm)

Classroom: MAE-A 327

Grading: 30% on the during-term exam #1, 30% on the during-term exam #2, 40% on the term paper. There is no final exam. Bonus points will be assigned to one optional lab.

Credits: 3

Instructor:

Z. Hugh Fan, Professor, Department of Mechanical and Aerospace Engineering, J. Crayton Pruitt Family Department of Biomedical Engineering, and Department of Chemistry

Office: LAR 223, Tel: 352-846-3021, Email: hfan@ufl.edu

Web: <http://plaza.ufl.edu/hfan/>, ID and password will be provided in the class.

Office hours: F7 (1:55 – 2:45 pm)

Course Objectives:

The objective of this course is to introduce the concept of miniaturization, the materials and methods for microfabrication, the principles of microfluidics, and a variety of biological applications of microfluidic and biomedical MEMS devices.

Lecture Topics to be Covered and Tentative Schedule:

1. Miniaturization (5 h)
2. Microfabrication (7 h)
3. Microfluidics (15 h)
 - a. Pumping (5 h)
 - b. Valving and mixing (2 h)
 - c. Integration (5 h)
 - d. Simulation (3 h)
4. Applications (12 h)
 - a. Detection (2 h)

- b. DNA & protein analysis (2 h)
- c. Cellular studies (2 h)
- d. Medical diagnostics (2 h)
- e. Drug discovery (2 h)
- f. Commercial examples (2 h)

Late/Makeup policy:

No late assignments will be accepted. Makeup exams are not normally allowed.

Class Rules:

Cell phones/beepers should be off while in class. Late arrivals should be minimized; if you are late, be considerate when you get into the classroom

Academic Honesty:

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action.

This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.

Accommodations for Disabilities:

Students with disabilities who are requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodations.

Other Student Resources:

University Counseling Center - (352) 392-1575 - <http://www.counsel.ufl.edu/default.asp>

Mental Health Services - (352) 392-1171 - <http://www.health.ufl.edu/shcc/smhs.htm>

Alachua County Crisis Center - (352) 264-6789