Microflows and Nanoflows

First term 1398-99 (Fall 2019)

Code: 24-14-4-703-01   **Credit: 3**

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Assessments: Projects (50%)
Final exam (50%)

References:
- Microflows and Nanoflows, Fundamentals and Simulation (Chih-Ming Ho)
- Fundamentals of Microfabrication and Nanotechnology (Mark J. Madou)
- Microsystem Design (Stephen D. Senturia)
- Microfluidic Technologies for Miniaturized Analysis Systems (Steffen Hasdt)
- Introduction to Microsystem Design (Werner Karl Schomburg)

Weeks	Subjects
1st	Pre-assessment Describe the main objectives
2nd	Introduction to microfluidics, applications and market
3rd – 6th	Micro fabrication process for microfluidic • Materials • Cleaning, oxidation and doping • Evaporation, sputtering, and chemical vapor deposition • Photolithography • Wet etching • Dry etching • Wafer Bonding • CNC machining, injection molding and rapid hot embossing
7th	Basic concepts of microflows and nanoflows
8th	Governing equations and slip models
9th – 10th	Shear-driven flows
11th – 12th	Pressure-driven flows
13th	Surface tension-driven flows
14th – 15th	Applications • Micropumps • Microvalves • Flow Sensors
16th	Project presentations