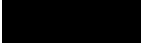


NE 343 Microfabrication and thin-film technology
ECE 433 Fabrication technology for micro & nano devices
ECE 730 Advanced technology for semiconductor processing
 University of Waterloo
 Nanotechnology Engineering Program
 Spring 2023

Lectures/Tutorials: see below

Subject	Catalog#	Units	Title																				
NE	343	0.5	Microfabrication & Thin-film																				
	Class	Comp	Sec	Camp	Loc	Assoc.	Class	Rel 1	Rel 2	Enrl	Cap	Enrl	Tot	Wait	Cap	Wait	Tot	Time	Days/Date	Bldg	Room	Instructor	
	3039	LEC	001	UW	U		1	101		100		0		0		0							Cui,Bo
	<i>Held With: ECE 433 LEC 001</i>																						
	<i>Held With: ECE 730 LEC 001</i>																						
	3040	TUT	101	UW	U		1			100		0		0		0							Cui,Bo
	<i>Held With: ECE 433 TUT 101</i>																						

Instructor: **Dr. Bo Cui**
 Office: 
 Office hours: will discuss during class
 Email: bcui@uwaterloo.ca
 Phone: 519-577-3680 (cell phone)

Course Content

This course provides an overview of various microfabrication technologies utilized in VLSI semiconductor fabrication. They are also widely utilized for other micro-devices such as MEMS, microfluidics, sensors, data storage (hard drive).

Topics:

1. Introduction to semiconductor devices and technology
2. CMOS fabrication process overview
3. Crystal growth, wafer fabrication
4. Clean room, wafer cleaning and gettering
5. Lithography
6. Thermal oxidation
7. Dopant diffusion
8. Ion implantation
9. Thin film deposition
10. Etching.

Note that these topics are in the same order as the textbook chapters. Most topics take ~1 week to cover; yet thin film deposition and etching will each take ~2 weeks.

Textbook

Plummer, Deal & Griffin, *Silicon VLSI Technology: Fundamentals, Practice, and Modeling*, Prentice Hall, 2000. (ISBN-10: 0130850373)

Note that this is a big book. But you shouldn't be scared by its size; since for most chapters we will cover only the first half or so of that chapter (i.e. we won't cover Models and Simulations very much). The technical content is not up to date (since the book was published in 2000). If you want to learn start-

of-the-art IC fabrication technology, you should consider taking NE353 (*nanofabrication*) taught by me next term.

Reference:

Campbell, *Fabrication Engineering at the Micro and Nanoscale*, Oxford, 2008, ISBN:9780195320176 (this is third edition).

Second edition: *The Science and Engineering of Microelectronic Fabrication*, 2001

You are not encouraged to read the reference unless you have read and understand very well the textbook. The textbook is better written (clearer concept) than the reference, yet the reference is closer to textbook style (easier to read).

Course Web Site:

A course homepage is available on UW LEARN.

Course Grading Criteria (preliminary, not final)

- Assignment 10%
- Project/presentation 15%
- Quiz 10%
- Mid-term exam 25%
- Final Exam 40%

For assignment, you must do it by yourself (though you are allowed to talk to others to get some hint), as this will help you a lot for your exams.