

ECE 635/NE 353: Nano Probing and Lithography
University of Waterloo
Nanotechnology Engineering Program
Fall 2021

Lectures: No live lecture, two online office hours per week

Instructor: **Dr. Bo Cui**

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TAs:

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Course Objective and Content

This course provides an overview of all major lithography technologies capable of creating or duplicating sub-100 nm features.

It is a continuation of NE 343 “Microfabrication and thin film technology”, so you are encouraged to go over the course material for NE 343, particularly the chapters on thin film deposition and etching.

In the end, you should have a solid knowledge on how to fabricate nanostructures (and devices).

Topics:

1. Resolution enhancement techniques for photolithography
2. Other types of photon-based lithography
3. Extreme UV lithography
4. X-ray lithography
5. Electron beam lithography
6. Focused ion beam lithography
7. Nanoimprint lithography
8. Scanning probe microscopy and lithography
9. Soft lithography and other patterning techniques
10. Lithography based on self-assembly

Textbook:

Zheng Cui, Nanofabrication: Principles, Capabilities and Limits, Springer, 2017.

This is a good textbook, but we will learn much more than what is covered in it. The PDF version of this book is available at the Library, and I will upload it to LEARN.

References:

Ampere A Tseng (Editor), Nanofabrication: Fundamentals and Applications, World Scientific, 2008. (edited book, written by many authors, so it is not as consistent as the sole-author textbooks, but good to read if you have time)

Zheng Cui, Micro-nanofabrication: Technologies and Applications, Springer, 2006. (earlier version of the textbook by the same author)

Course Web Site:

A course homepage is available on LEARN.

If you want to know well in advance what will be covered, check:

http://ece.uwaterloo.ca/~bcui/NE_353.html (there are a lot more slides than we will cover, good for your reference if you go to graduate school and need to learn more in this topic)

Course Grading Criteria:

- Assignment 15 %
- Project/presentation 15%
- Five quiz (best 4 counted) 40%
- Final Exam 30 %

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

The quiz/exam will be open book. You must do it all by yourself (cannot talk to others to get help).