This course is intended to give a broad understanding of various microfabrication techniques used in photonic and optoelectronic components. It covers epitaxial growth, lithography and processing steps of compound semiconductors frequently used in micro/nano-fabrication of optical and optoelectronic devices. Fabrication of waveguides and laser diodes and various integration techniques are also discussed. The course will be a combination of lecture and independent study followed by presentations on selected topics. The following topics are covered.

1. Introduction to Microfabrication  
   - Sources of Contamination  
   - Clean room and its operation

2. Lithography  
   - Photolithography  
   - Resist processing  
   - Exposure  
   - Lift-off process  
   - Electron Beam Lithography and nano-patterning

3. Epitaxial Growth  
   - MBE  
   - MOCVD  
   - CBE and ALE

4. Etching techniques  
   - Wet etching  
   - Dry etching: RIE, ICP  
   - What to choose

5. Contact Metallization  
   - Ohmic contact  
   - Schottky contacts  
   - Annealing

6. Optoelectronic Fabrication  
   - Waveguides  
   - Laser diodes  
   - OEIC  
   - Integration Techniques

7. Passivation and packaging
Micro/Nanofabrication in Optoelectronics
Opti-677, Spring 2023

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Reference Books

Handbook of Compound Semiconductors: Holloway & McGuire
Semiconductor Lithography: Moreau

The UA Libraries provide free access to the following e-books for OPTI 677:

SEMICONDUCTOR LITHOGRAPHY:
http://ezproxy.library.arizona.edu/login?url=https://doi.org./10.1007/978-1-4613-0885-0

TECHNOLOGY OF QUANTUM DEVICES:
http://ezproxy.library.arizona.edu/login?url=http://dx.doi.org/10.1007/978-1-4419-1056-1

Course Grading

4 Topics presentations: Each 20%

Final Project Report: 20%