ME/MSE4766 Syllabus

Micro Nano Fabrication & Properties of Nanoscale Devices, Section B, 3 credits

Fall, 2026

Instructor Information

Instructor: Peter J. Hesketh

Email: peter.hesketh@me.gatech.edu

General Course Information

Description

An introduction to fundamentals and applications of "bottom up" and "top-down" fabrication methods for nanoscale devices for photonics, NEMS/MEMS and sensors.

Course Learning Outcomes

Develop an understanding of the basic concepts of top-down micro and nanofabrication techniques.

Learn fundamental topics including quantum effects, nanomechanical properties and optical properties of nanostructures.

Demonstrate a basic knowledge and understanding of scaling effects on photonic, mechanical, and electrical properties of selected materials.

Learn how to calculate processing parameters for photolithography based on the properties of the resist and the wavelength of UV radiation.

Learn methods to solve problems related to thin-film growth by physical and chemical vapor deposition.

Learn how to use "top-down" fabrication methods to build nanoscale devices for photonics, NEMS/MEMS, and sensors.

Learn how to integrate knowledge learned in this course to analyze a topic in micro/nano-fabrication, carry out a literature review, critically analyze results, and make a presentation to the class.

Learn about application of nanostructures for optoelectronics and NEMS sensors to demonstrate enhance device performance.

Required Course Materials

" Handbook of Nanotechnology" by B. Bhushan (Editor) 4th Edition, Springer 2019.

"Advanced NEMS/NEMS Fabrication and Sensors," by Zhuoquing Yang, Springer 2021.

Both texts are available free of charge in the Georgia Tech library.

Grading Policy:

Exams 25%, 25%, Term Project 30%; Homework 20%.

A>90; B>80; C>70; D>60

Assignments

- Test 1, 25%
- Test 2, 25%
- Homework 20%
- Term Project 30%

Description of Graded Components

The exams are in class and open book and notes. Equation sheet are also provided.

Course Policies

Attendance and/or Participation

This will be an active classroom, where you will be expected to participate. I have noticed a drastic difference in the exam performance between students who regularly attend class and those who don't. Therefore, I will count attendance in determining your final grade.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your

special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Pre- &/or Co-Requisites

ME 3322 Thermodynamics or AE 3450 Thermodynamics and Compressible Flow or MSE 3001 Chemical Thermodynamics of Materials or PHYS 3141 Thermodynamics

Collaboration, Group Work, and Use of Generative AI

You are allowed to work in groups on all homework and out-of-class assignments, but any work you turn in must be written in your own hand. In-class tests and exams are to be your own work. All in-class tests and exams will be open book and notes, and I will provide an equation sheet.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Late homework will be penalized accordingly. Make-up exams are given for illness, approved Institute activities or religious observances.

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being (student-resource-guide (gatech.edu)