

BOSTON UNIVERSITY
Department of Mechanical Engineering
Division of Materials Science & Engineering
(ME/MS 555) MEMS: Fabrication and Materials
Spring 2021

Instructor and Class Information

Instructor:

- Dr. Xin Zhang: Professor, College of Engineering
- Email: xinz@bu.edu
- Phone: (617) 358-2702 or (617) 850-5866

Hours:

- Class Hours: Monday/Wednesday 8:00-9:45AM
- Office Hours: Friday 12:00-1:45PM, other times available via appointment

Course Websites:

- Blackboard: <http://learn.bu.edu>
- Gradescope: <https://www.gradescope.com/courses/222684>

Goals

- To explore the world of microelectromechanical systems (MEMS) by emphasizing the state-of-the-art science and technology in fabrication and materials of MEMS.

Course Summary

- This course will explore the world of microelectromechanical systems (MEMS) and NEMS. This requires an awareness of design, fabrication, and materials issues involved in micro/nanosystems. We will go over this through a combination of lectures, case studies, and individual homework assignments. The course will cover fabrication technologies, material properties, structural mechanics, basic sensing and actuation principles, packaging, and MEMS markets and applications. The course will emphasize the fabrication and materials of micro/nanosystems. This is not because the other parts aren't important. Instead, it is because with fabrication and materials expertise there is something concrete you can do that will always help. When we exam special topics and case studies, a lot of these other pieces will be put together.

Textbook

- *Foundations of MEMS*, Chang Liu Prentice Hall

Additional resources required (specify)

- None

Status in the Curriculum

- Graduate Students and Senior Undergraduates

Contribution of Course to Meeting the Professional Component

- Engineering topics: 100%

Prerequisites by topic

- This course is open for graduate students and senior undergraduates. Students are expected to be familiar with engineering mathematics (ME 400 or equivalent), materials science (ME 306 or equivalent), and solid and fluid mechanics (e.g., ME 305, ME 303, or equivalent).

Grading

The allocation of credit for the semester is as follows:

Participation:	12%
Case Studies:	24%
Take-home (Midterm) Exam #1:	20%
Take-home (Midterm) Exam #2:	20%
Course Project:	24%

Important Information

Websites:

Most materials (handouts, videos, assignments, etc) will be distributed via Blackboard.

- Blackboard: <http://learn.bu.edu>

Work will be submitted via Gradescope.

- Gradescope: <https://www.gradescope.com/courses/222684>

Participation:

Generally speaking, you don't need to inform the instructor if you must miss class; however, there are ~26 lectures in the semester, and ***you will get a full 12% for attending 24 lectures (>90mins per lecture)***. Excused absences for either health or religious reasons (see [BU Policy on Religious Observance](#)) will be granted provided notification is given not later than the day of the absence; exceptional circumstances will be considered on a case-by-case basis.

Homework:

Homework will be assigned. It will *not* be collected or graded. Solutions will be discussed in class and/or posted online.

Case Studies:

There will be three case studies for this course. The topic will be chosen by the students from a list of topics that the instructor has prepared. Partners are encouraged, but no more than three people may work in the same team. Case studies submitted late will receive partial or no credits (within 24 hours, 75%; within 48 hours, 50%; within 72 hours, 25%; beyond 72 hours, 0%).

Take-home (midterm) Exams:

There will be two take-home (midterm) exams this semester. Take-home (midterm) exams are open book, open notes. Take-home (midterm) exams typically are due one week after the assignment, on Monday or Wednesday (11:59PM EST). Take-home (midterm) exams submitted late will receive partial or no credits (within 24 hours, 75%; within 48 hours, 50%; within 72 hours, 25%; beyond 72 hours, 0%). ***Failure to turn in any one of the take-home (midterm) exams will result in automatic failure of the course.***

Course Projects:

There will be one course project for this course, which will be assigned in the mid of the semester and will be due in the last class of the semester. The topic will be chosen by the students from a list of topics that the instructor has prepared. Partners are encouraged, but no more than three people may work in the same team. Course project (final report and final presentation) submitted late will receive partial or no credits (within 24 hours, 75%; within 48 hours, 50%; within 72 hours, 25%; beyond 72 hours, 0%). ***Failure to turn in the course project (final report and final presentation) will result in automatic failure of the course.***

Group Work and Interaction:

Much of the class structure for this semester will be based on group work, including case study groups and project groups.

Grading:

All assessments will be accessible on-line. All complaints related to grading must be reported to the instructor (Xin Zhang, xinz@bu.edu) ***within one week*** after the grades are announced.

Deadlines and Late Work:

Generally speaking, any take-home (midterm) work submitted late will receive partial or no credits (within 24 hours, 75%; within 48 hours, 50%; within 72 hours, 25%; beyond 72 hours, 0%). Deadlines help keep the class working together. Mutual respect for your group mates requires that you keep up with the course. Circumstantial uncertainty, however, suggests that we won't all keep up all the time with everything. Therefore, limited flexibility will be available for assignment deadlines on a case-by-case basis, but there will be no flexibility on requirements of those assignments.

Accommodations:

If you require accommodations, requests must be made in a timely fashion to Disability & Access Services, 25 Buick St, Suite 300, Boston, MA 02215; 617-353-3658 (Voice/TTY). Students seeking academic accommodations must submit appropriate medical documentation and comply with the established policies and procedures <http://www.bu.edu/disability/accommodations/>

Inclusion and Mutual Respect:

All individuals are welcome. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class.

Academic Conduct

All students are required to review the BU Academic Conduct Code. The following rules will be observed for assignments in ME/MS 555 during Spring Semester 2021:

Take-home (midterm) Exams: These assignments are to be completed by each student individually with no consultation with any other person other than the proctor.

Case Studies and Course Projects: Students are permitted to consult with each other regarding approaches to solving problems in these assignments. However, everything that is written down and turned in must be authored by the student getting credit for the assignment, and any sources that were consulted while completing the assignment must be referenced. For example, if you consult with another person in preparing one section of a course project report, you should write “Consulted with <person’s name> in preparing this section” in that section of the report. Similarly, if you consult with a textbook other than the course text or a webpage, acknowledge this in writing in the relevant section of the report or project.

Academic Misconduct

Academic misconduct is conduct in violation of the conduct code, and/or other unethical conduct. I will report to the COE Academic Conduct Committee any action that I believe constitutes misconduct. Some examples of misconduct are listed below. More information on BU's Academic Conduct Code, with examples, may be found at <http://www.bu.edu/academics/policies/academic-conduct-code> The following list contains examples of academic misconduct, and is not intended to be complete. Note that, although the examples refer to written assignments and exams, the same rules apply to assignments and exams that are administered or presented orally or by some other non-written means. (Adapted from Academic Dishonesty among College Students, S. Maramark and M. B. Maline, US Dept. of Education report no. OR-93-3082, August 1993.)

- Copying from another student's exam or assignment
- Allowing another student to copy from your exam or assignment
- Allowing another student to see your exam or to see part or all of your assignment before you hand it in, unless authorized by the instructor
- Collaborating on assignments or take-home exams when instructions (or the syllabus) call for independent work
- Providing or receiving answers to an exam using a system of signals or other means of communication with another student
- Bringing unauthorized materials to an exam without placing them where they cannot be used during the exam
- Altering the answers to, or otherwise tampering with, exams or assignments after they have been handed in, without the consent of the instructor
- Taking an exam or completing part or all of an assignment for another student
- Having another person take an exam for you or complete part or all of one or more of your assignments
- Hiring a ghostwriter to write part or all of an assignment
- Submitting all or part of a purchased term paper as your own
- Using course materials, including lecture notes and excerpts from textbooks, in written assignments without proper citation
- Using paraphrased materials in a written assignment without proper citation of the source
- Downloading text, drawings, images, and other materials from the Internet and using these in written assignments without proper citation of the sources
- Copying material without proper citation
- Feigning illness to avoid taking an exam or handing in an assignment on time
- Submitting the same term paper from credit to more than one course without permission
- Reviewing a copy of the regularly scheduled exam prior to taking a make-up exam
- Reviewing a stolen copy of an exam prior to taking the exam
- Providing questions from a test given in one section of a course to students in another section before they have taken the test
- Receiving questions from a test given in one section of a course from another student in another section before you have taken the test
- Altering or forging an official document

I have read all four pages (page 1-page 4) of this document and understand its contents.

Name (printed): _____

Signed: _____

Dated: _____