

Syllabus

ECE 344—Fundamentals of Semiconductor Devices

ECE Department, UMass Amherst
Fall 2019

Instructor: Prof. Qiangfei Xia
Office: 201D Marcus Hall
Email: qxia@umass.edu

Lectures: TTh: 8:30 –9:45 am (ELAB 303)
Office Hours: TTh: 9:45 —10:45 am or by appointment (Marcus 201D)

TA: Arnab Majee
Email: amajee@engin.umass.edu
TA Office Hours: MW: 3-4 pm (Marcus 2)

Credits: 3
Grading: 10% homework; 30% midterm exam 1; 30% midterm 2; 30% final exam

Course Objectives:

- Provide the foundations to understand operating principles of semiconductor devices (diodes, capacitors and transistors)
- Inspire perspectives of emerging device technologies and future directions for electronics

Textbook: Robert F. Pierret, "Semiconductor Devices Fundamentals", 2nd edition, Addison-Wesley (1996). ISBN: 978-0201543933.

Course notes: Uploaded to Moodle on a weekly basis.

Suggested reading:

Basics:

- Donald Neamen, "Semiconductor Physics and Devices: Basic Principles", 4th edition, McGraw Hill (2011). ISBN: 978-0073529585.
- Ben Streetman & Sanjay Banerjee, "Solid State Electronic Devices", 6th edition, Prentice Hall (2005). ISBN: 978-0131497269.

Advanced:

- Richard S. Muller, Theodore I. Kamins & Mansun Chan, "Device Electronics for Integrated Circuits", 3rd edition, Wiley (2002). ISBN: 978-0471593980.
- S.M. Sze & Kwok K. Ng, "Physics of Semiconductor Devices" 3rd edition, Wiley (2006). ISBN: 978-0471143239.

Policies & Suggestions:

Auditing policies:

- Auditing students are required to hand in home works (HWs) and to take all exams

Homework policies:

- HWs are mandatory and are due at the beginning of the lecture on due date (8:30 am). Late HW will be accepted but 10 points will be deducted for each late hour.

- Not all HWs are graded but all solutions will be provided.
- You are allowed to discuss in groups on how you are going to solve the problems, but the HWs you submitted should be your own work. HW plagiarism is strictly prohibited and will lead to an F grade in this course.
- The instructor reserves the right to adjust your final grade if there is serious inconsistency in your HW and exam performance.

Exam policies:

- All exams are closed book exams, but you will be allowed to bring a one-page “cheat sheet” with you. A non-programmable calculator is usually necessary for the exams.
- Exams are designed on the assumption that you are familiar with all lectures and home works (you are expected to attend all classes) before each exam (that also means exams are cumulative).
- Make-up exams will be given only if you provide a valid written excuse (as defined in Undergraduate Rights and Responsibilities) and notify the instructor prior to the missed exam. Other missed exams will be considered failures.

Suggestions:

- The suggested after class/classroom time ratio is 3: 1. This is to say, for every single class room hour, you need to spend at least 3 hours afterwards on this course.
- If you have any difficulties in the course material or background knowledge, come to the office hours before you fall behind.
- Course materials such as homework, homework solutions, class notes, handouts will be uploaded to Moodle, normally once a week.
- Class start at 8:30 am, please arrive on time.

Important dates:

- Midterm 1: Tues. 10/8/2019, 7 pm, ELab 303
- Midterm 2: Tues. 11/5/2019, 7 pm
- Final exam: Fri. 12/13/2019, 8-10 am. ELab 303

Inclusivity:

The diversity of the participants of this course is a valuable source of ideas, problem solving strategies, and engineering creativity. If you feel that your contribution is not being valued or respected for any reason, please speak with me privately. If you wish to communicate anonymously, you may do so in writing, speak with Assistant Dean Dr. Paula Rees (rees@umass.edu, 413.545.6324, or in person in 128b Marcus Hall, within the Engineering Community, Equity and Inclusion Hub across from the coffee shop). You may also submit any concerns or comments through the College of Engineering Climate Concerns and Suggestions on-line form (<https://tinyurl.com/UMassEngineerClimate>) and/or the Positive and Negative Classroom Experience online form (<https://tinyurl.com/UMassEngineerClassroom>). We are all members of an academic community with a shared responsibility to cultivate a climate where all students/individuals are valued and where both they and their ideas are treated with respect.