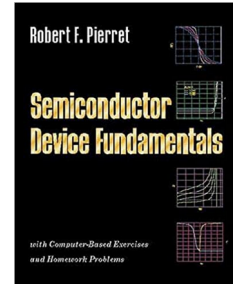


ECE344 Fundamentals of Semiconductor Devices Fall 2022

Instructor: Prof. Eric Polizzi, *Marcus 201C*
TA: DongMing Li

Day and Time: Tue-Thu 10:00-11:15am
Place: ELAB 304
Office hours: TBD

Textbook : Robert F. Pierret, "Semiconductor Devices Fundamentals",
Addison-Wesley 1996.



Suggested Reading:

Basic:

- B. G. Streetman and S. Banerjee, "Solid State Electronic Devices"
- D. A. Neamen "Semiconductor Physics and Devices"
- S. Dimitrijevic, "Principle of Semiconductor Devices"
- C. C. Hu, "Modern Semiconductor Devices for Integrated Circuits"

Advanced:

- R. F. Pierret "Advanced Semiconductor Fundamentals"
- J. P. Colinge and C. A. Colinge, "Physics of Semiconductor Devices", (Kluwer Academic, Boston, 2002).

Technology Oriented

- S. M. Sze, "Semiconductor Devices: Physics and Technology", (John Wiley and Sons, 1985).
- Y. Taur and T. H. Ning, "Fundamentals of Modern VLSI Devices", (Cambridge University Press, New York, 1998)

Purpose of the Course:

- Provide the foundations to understand what is a semiconductor
- Provide the foundations to understand the electronic properties and the physics of charge transport in semiconductors
- Explain the operating principles in semiconductor devices (diodes, capacitors and transistors)
- Perspectives of emerging device technology and future directions for electronics

Outline

Part I- From Atoms to Semiconductors

- I - Introduction
- II - Semiconductor: Definitions
- III- Semiconductor: Fundamentals

Part II- Theory of the Electrical Conduction

- I- Introduction
- II- Drift-Diffusion Equations
- III- Transport Equations

Part III- Device Operations

- I - P-N junction
- II - MOS capacitor – (MS contacts)
- III- MOSFET – (BJT)

Class Scheduling (Proposal)

	Mon	Tue	Wed	Thu	Fri
Sep		6		8	
		13		15	
		20		22	
		27		29	
Oct		4		6	
		11		13	
		18		20	
		25		27	
Nov		1		3	
		8		10	
		15		17	
		N/A			
		29		1	
Dec		6		8	

	New Quiz
	New HW
	HW due at 11:59pm
	Mid-term
	Review session for Mid-Term or Final

Grading:

Homework	15% (5 HW)
Quiz	20% (6 tests ~25 minutes on Course Material/ Lectures)
Midterm	30%
Final	35% (cumulative)

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Total	100%

Course Policies and Friendly Advices

- **Homework**
 - **By group of three, two or alone.**
 - **You need to answer on the provided form. Failure to do so will lead to a 20% reduction of your grade.**
 - Late HW will be accepted but 10 points will be withdrawn every hours (starting as soon as the beginning of the class when it is due- 10:00am).
- **Quiz:**
 - in class or on Moodle. To do it alone.
 - lowest grade dropped.
 - Missing Quiz: There will be **no make-up**. You are allowed to miss 1 quiz **with or without** excuses, you will get a 0 grade but the lowest grade will be dropped at the end of the semester. If you miss a second time, however, you can provide me with a valid excuse (doctor notes) for at least one of the times that you have missed.
- **It is mandatory to pick up ALL your HW, Quiz or Exams when they have been corrected. Failure to do so will lead to a 20% grade reduction for each corresponding HW or exams.**
- Make-up exams will be given only if you provide a valid written excuse (as defined in Undergraduate Rights and Responsibilities) and notify me prior to the missed exam. Other missed exams will be considered failures.
- Class start at 10:00am. Late arrival is distracting and inconsiderate.
- Homework quiz and exams will be based heavily on class notes and discussions. Examinations assume familiarity with all lectures and homework problems. You are expected to attend all classes and are responsible for knowing the material and assignments from every class.
- **If you are having difficulties with any of the material (or basic background), come to see me or my TA for help during our office hours. Do so before you fall behind.**
- Homework, Handouts, Class Notes will be posted on-line on Moodle. Announcement will be sent by e-mail.