Course Profile

Summer 2019

Course Code: VE320

Course Name: Introduction to Semiconductor Devices

Course Credits: 4.0

Course Category: Required

Degree Program: General Courses for ECE Degree Programs

Classroom: Dong Shang Yuan (D) Room 111

Prerequisites: Ve215, Vp240(or Vp260)

Lecture time: Monday 10:00 – 11:40 am, Wednesday 10:00 – 11:40 am, Friday 10:00 – 11:40 am (even weeks)

Instructor:

Rui Yang (杨睿)
rui.yang@sjtu.edu.cn
Office Hours: Mo & We 1:30 – 2:30 pm, Rm. 434, UM-SJTU JI Building

Teaching Assistants:

Yijin Rui（芮意进）, iregion@sjtu.edu.cn
Sheng Shen（申晟）, shensheng97@sjtu.edu.cn

Textbook:

- 1: “Semiconductor Physics and Devices: Basic Principles”, 4th ed., Donald A. Neamen, Publishing house of electronic industry
- 2: “Semiconductor Device Fundamentals”, 2nd Ed., Robert F. Pierret

Course Description:

Introduction to semiconductors in terms of atomic bonding and electron energy bands. Equilibrium statistics of electrons and holes. Carrier dynamics; continuity, drift, and diffusion currents; generation and recombination processes, including important optical

processes. Introduction to: PN junctions, metal-semiconductor junctions, bipolar junction transistors, junction and MOSFETs.

Grading Policy:

Ve320 has 10 problem sets (homework assignments), and 3 exams:
In-class Quizzes: 5%
Problem Sets: 5%
Exam 1(Midterm Exam 1): 30%
Exam 2(Midterm Exam 2): 30%
Exam 3(Final Exam): 30%

Academic Integrity: (Any typesof honor code regulations like class rules, homework policy, exam rules or project collaboration policy could be defined here)

- Problem sets (homework assignments) may be discussed with partners, but the work you submit must be your own.
- Exams will be given under the JI's Honor Code and will require individual efforts. The exams will be closed book, even though you can take some cheating paper. Scientific calculators can be used for the exams. The use of other electronic devices such as electronic dictionary and cell phone during exams will constitute an Honor Code violation. If you miss an exam, real documentation is required stating why you could not attend (severe disease, for example).
- Homework will be assigned online at Canvas as scheduled. They are usually due one week later or specified otherwise. One day automatic grace period. Second day late penalty -25%, later no credit.
- Random quizzes are open book, but no cheating
- Any suspicious violation of the honor code will be reported to the honor council.

Course Outline: (Tentative and subject to change)

Week	Date	Lecture Topics	Homework
1	May 13	Inroduction to solids, crystal structures	
	May 15	Introduction to quantum mechanics	HW1
2	May 20	Introduction to quantum mechanics	
	May 22	Energy band	HW2
	May 24	Energy band	
3	May 27	DOS and Fermi distribution	
	May 29	DOS and Fermi distribution	HW3
4	Jun. 3	Carrier and transport	
	Jun. 5	Carrier and transport	HW4
	Jun. 7	No Lecture, National Holiday	
5	Jun. 10	Carrier and transport	
	Jun. 12	No Lecture, Midterm Exam 1	HW5
6	Jun. 17	Carrier and transport	
	Jun. 19	PN junction	HW6
	Jun. 21	PN junction	
7	Jun. 24	PN junction	
	Jun. 26	PN junction	HW7
8	Jul. 1	PN junction	
	Jul. 3	BJT	
	Jul. 5	Schottky diode	HW8
9	Jul. 8	Lecture will be rescheduled due to time conflict	
	Jul. 10	Lecture will be rescheduled due to time conflict	
10	Jul. 15	No Lecture, Midterm Exam 2	
	Jul. 17	MOS Capacitor	HW9
	Jul. 19	MOS Capacitor	
11	Jul. 22	MOS Capacitor	
	Jul. 24	MOSFET	HW10
12	Jul. 29	MOSFET	
	Jul. 31	MOSFET	
	Aug. 2	MOSFET	
13	Aug. 9	No Lecture, Final Exam	