

EE3329, Fundamentals of Semiconductor Devices
Spring 2023
University of Texas at El Paso

Instructor: David Zubia, Ph. D.
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Office Room: A335 Engineering
Office Hours: T, Th: 3:00 – 4:00PM

Student Tasks:

- **Read:** Assigned textbook chapters
- **View:** View lecture presentations
- **Discuss:** Discuss concepts and methods from textbook and presentations
- **Complete:** Question Sets (13 sets. 1 set per week)
 - Answer conceptual and calculation questions
 - Can collaborate but submit individually and on-line
- **Complete:** Parameter Studies (4 studies. 1 study per module)
 - Study device parameter relationships using graphs
 - Work in teams and submit on-line as a team
- **Mid-Term Exam:** 8th week (on-line)
- **Final Exam:** Finals week (on-line)

Evaluation:

	Value
Attendance	10%
Question Sets	25%
Parameter Studies	25%
Exam 1 (Midterm)	20%
Exam 2 (Final)	20%
Total	100%

Required Textbook:

Semiconductor Devices: Physics and Technology, 3rd Edition, S. M. Sze and M. K. Lee, Wiley, 2012

Content Description:

This course combines theory of semiconductors with application of engineering analysis and design principles to predict the electrical performance of devices. Students will learn how to analyze and design semiconductor devices.

Learning Objectives:

After completion of this course, students:

1. Will learn to apply energy bands, density of states, and distribution functions to calculate carrier densities in semiconductors
2. Will learn to apply carrier transport theories to calculate current in semiconductors

3. Will learn to analyze and design the electrical performance of semiconductor devices.

Topics:

- Module 1: Energy bands and carrier concentration in thermal equilibrium
- Module 2: Carrier transport
 - Resistors
- Module 3: p-n Junctions
 - Diodes
 - Capacitors
- Module 4: Bipolar junction transistors
- Module 5: Field-effect transistors
 - MOSFETS
 - Survey of semiconductor devices

Grading Policy:

A: 90% - 100%
B: 80% - <90%
C: 70% - <80%
D: 60% - <70%
F: 0% - <60%

Prerequisites:

PHYS 2421 with grade of "C" or better.
EE 3338 with grade of "C" or better.

Content Delivery:

The course is listed as in-person however if needed all content will be delivered online through synchronous lectures and other online materials. Content will be provided in modules on a chapter-by-chapter basis and will follow a weekly routine. Initially and hopefully for the rest of the semester, there will be mostly face-to-face meetings. Depending on conditions, we will reserve the possibility to meet in low density at a later point in time.

Non-Compliance Policy:

Late Work: Late course work will not be accepted.

Make-up Work: No make-up work will be given.

Posting Netiquette: Postings that violate UTEP policy will be investigated and appropriate actions will be taken.

Attendance: Attendance in activities is mandatory to receive course credit. Excessive nonattendance will result in loss of credit.

Participation: Participation in assignments and discussions is mandatory to receive credit. Lack of participation will result in loss of credit.

Group Work: Lack of significant contribution to group work will result in zero credit. If lack of contribution persists for any one or more than one exercise, the

instructor will take action to ensure equity for group members that are contributing significantly and meaningfully.

Syllabus Changes: The content in the syllabus is subject to change for improvements or other factors. Any changes will be communicated.

Academic Dishonesty:

Incidents of academic dishonesty will be referred to the Director of Electrical Engineering and the Dean of Students. [Link to Dean of Students.](#)

The descriptions and definitions of academic dishonesty can be found at: [Link to Academic Dishonesty Descriptions and Definitions](#) Look under Student Affairs and then Chapter one, section 1.3.1.

Classroom Accommodations:

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to [Link to CASS email](#), or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [Link to CASS Website](#)

**UTEP ECE DEPARTMENT
SYLLABUS ADDENDUM**

COVID-19 PRECAUTIONS

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID 19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org