

# ECE 5410 – Semiconductor Devices

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Fall 2016

**Class:** ECE 5410  
MWF 2:30 pm – 3:20 pm

**Instructor:** William Thompson  
EL 260, [wnthompson.1066@gmail.com](mailto:wnthompson.1066@gmail.com)  
Office hours: MWF 3:30 pm – 4:30 pm, TTh 2:30 pm – 4:30 pm

**Prerequisites:** ECE 3410

**Required Text:** Donald E. Neamen, Semiconductor Physics and Devices: Basic Principles, 4<sup>th</sup> Edition, (ISBN 978-0-07-352958-5, MHID 0-07-352958-3)

**Course Description:** Introduction to semiconductor and physics. Students receive an introduction to the underlying physics that determine the operation of the most important devices used in integrated circuit technology.

<b>Major Topics:</b>	The Crystal Structure of Solids	(Ch. 1)
	Basic Quantum Theory	(Ch. 2 – 3)
	Semiconductor Fundamentals	(Ch. 4 – 6)
	Semiconductor Diodes	(Ch. 7 – 9)
	The MOSFET	(Ch. 10 – 11)
	The BJT	(Ch. 12)
	The JFET	(Ch. 13)
	Specialized Devices	(Ch. 14 – 15)

**Course Objectives:** At the conclusion of this course students are expected to:

- understand fundamental semiconductor material properties;
- understand basic quantum theory as it applies to semiconductors;
- understand carrier transport phenomena; and
- understand and analyze the operation of important semiconductor devices including PN junction diodes, Schottky diodes, MOSFETs, and BJTs.

**Lectures:** The lectures will cover the most important parts of the course material. Reading assignments will be given in advance for upcoming lectures and students are expected to study the textbook material prior to the lectures so questions can be addressed and meaningful discussions can be held to benefit all class members. Unannounced quizzes may be given throughout the semester covering topics from prior lectures or material covered in the reading assignments.

**Homework Assignments:** Homework assignments will be due at the beginning of class on the due date. The homework must:

- be done on 8½ x 11 inch paper;
- include student's name, assignment number, and course number at the top of the page. If the assignment consists of multiple pages, page numbers must also be included at the top of each page with all pages stapled;
- include appropriate diagrams, derivations, assumptions, and steps taken to arrive at answers; and
- be neat and easily followed.

**Exams:** There will be two midterm exams and one comprehensive final exam. The exams will be open book and cover material discussed in the lectures and covered in the homework.

<b>Grading:</b>	Homework and Quizzes	25%
	First Midterm	25%
	Second Midterm	25%
	Final Exam	25%