

**Instructor:** Prof. David Citrin  
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office hours: by arrangement  
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**Text:**

*Optional: The Physics of Semiconductors with Applications to Optoelectronic Devices*, Kevin F. Brennan, Cambridge University Press, 1999. **Note: I do not recommend you buy this book unless you really like it. I will post notes on Canvas and give references to other sources where appropriate.**

**Prerequisites:**

Basic knowledge of linear algebra and differential equations. An exposure to modern physics and solid-state physics helpful, but not required.

**Grading policy:**

Quiz 1: 30 %  
Quiz 2: 30 %  
Research Review/Presentation: 40 % (20 %/20 %)

**Homework and exam policy:**

Homework sets will be assigned from time to time; they will not be graded. Solutions will also be distributed. It will provide essential practice for the quizzes.

There will be in-class quizzes on dates TBD.

Failure to take a quiz may result in a grade of zero unless you present **written documentation** that you have a valid excuse and that I accept the excuse. Unless the excuse is related to an obviously unforeseen emergency, this documentation must be presented one week prior to the quiz or a grade of zero may result.

**Review/Presentation:**

This assignment will have a written part (Proposal) and an oral presentation (Presentation). The aim is to review a device, materials, or system related to the course. More information will be provided shortly.

**Academic Conduct:**

Students in this class are expected to abide by the Georgia Tech Honor Code and avoid any instance of academic misconduct, including but not limited to:

*Possessing, using, or exchanging improperly acquired oral or written information in the preparation of a quiz.*

*Submission of material that is substantially identical to that created or published by another individual, except as noted below.*

*False claims of performance or work that has been submitted by the student.*

**Be sure to report observed instances of violations of the Honor Code!**

Remember, the Honor Code is about honor. Apart from devaluing your own work, the work of your classmates, and the Georgia Tech degree, violations of the Honor Code carry significant penalties, here at Tech and for life. Do you want to be labeled as having cheated? The trustworthiness of engineering and science (as well as the reliability and safety of products!) relies on the basic honesty of engineers and scientists.

Further information concerning materials and other aids allowed in quizzes and exams will be given later.

See the Georgia Tech Honor Code for further information or ask instructor.

### **Communications:**

You are responsible for all announcements (which may include information about the problem sets, midterm, and the final exam) made in class. The midterm and the final exam will likely strongly reflect material covered in class. If you miss class, do not ask me what was covered. Handouts may also be distributed from time to time in class; *it is your responsibility to obtain information from classmates if you are not present when information is given or materials are distributed*. I will also email the class various information. *It is your responsibility to save emails containing information about the class*.

The best way to contact me is via email (put “ece6451” in the subject line) or briefly immediately after class (but another class may need the room).

### **Miscellaneous:**

Cell phone, pagers, and similar devices must be turned off in class.

### **Tentative Outline of Topics**

#### I. Quantum Mechanics

- A. Basic Concepts, Chap. 1, Sec. 1.1-1.7
- B. One-Dimensional Problems, Chap. 2, Sec. 2.1-2.6
- C. Approximative Methods, Chap. 4, Sec. 3.1-3.3

#### II. Statistical Mechanics

- A. Equilibrium, Chap. 5, Sec. 5.1-5.8
- B. Nonequilibrium, Chap. 6, Sec. 6.1-6.2

#### III. Solid State, Chap 7, Sec. 7.3, Chap. 8, Sec. 8.1-8.5

(Note: Chapter numbers refer to Brennan’s book; however, the material will be provided in the class notes to be distributed.)