Goals: (1) To develop fundamental understandings of quantum mechanics for electrical engineers, (2) to apply it to semiconductor materials, (3) to apply it to nanoscale devices

Instructor: Dr. Jing Guo (NEB 551, guoj@ufl.edu)

Prerequisite: Fundamentals of quantum mechanics

Text: (1) “Modern Physics for Engineers,” Jasprit Singh, John Wiley & Sons. (Chap. 2-8)
(2) Class notes

References: “Quantum Transport: Atom to Transistor,” S. Datta, Cambridge University Press, 2005 (not required, only for reference)

Office hours: Wed. 2-4pm.

Topics:

1. Wave behavior of particles (Chap. 2, 2 weeks)
2. Particles in periodic potentials (Chap. 4, 2 weeks)
3. Particles in attractive potentials (Chap. 5, 2 weeks)

4. Exam I: Tentatively scheduled on Oct. 16th, in class.

5. Tunneling of particles (Chap. 6, 2 weeks)
6. Perturbation theory and its application to semiconductors (Chap. 7, 2 weeks)
7. Transport theory in semiconductors and nanoscale devices (Chap. 8, 2 weeks)
8. Exam II: Scheduled on Dec. 4th, in class.

Grading:

1. 5% homework: Late homework or failure of submission results in loss of points.
2. 45% Exam I. An exam will be held in the week of Oct. 26th, which covers topics 1, 2, and 3 (Chap. 2 - 5 of the textbook)
3. 50% Exam II. The exam is scheduled in class on Dec. 7th, which covers all materials of the course.
4. Both exams are closed notes. A formula sheet limited to a piece of double sided letter paper is allowed.
5. EEE4420 and EEE5426 will be curved separately:
   For EEE4420, the overall class average determines the B and B- breakpoint. (A starts one standard deviation above the average, the C- ranges one standard deviation below)
   For EEE5426, the overall class average determines the A- and B+ breakpoint. (A starts 1/2 standard deviation above the average, and C+ ranges one standard deviation below the average).

6. A make-up exam will be administered only in extraordinary cases of an emergency nature. Makeup exam is contingent on appropriate justifications and legal documents (UF Dean of Students, certified physician, military active duty, judge for jury duty). Students must make every effort to contact the Instructor prior to the exam to discuss their circumstances. Students who miss an exam without extraordinary cases of an emergency nature receive 0 points for that exam.

Academic Honesty Statement:
All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.