ECE 162A
"The Quantum Description of Electronic Materials"

Fall, 2008
Tuesdays and Thursdays
12:00 - 1:30, 1431 Phelps

Professor	Professor John Bowers bowers@ece.ucsb.edu Engineering Science Building, Room 2221C 893-8447
Teaching Assistant:	Sidharth Jain siddharthjain86@gmail.com Discussion period: Thursdays, 1:00 to 1:50
Office hours:	Bowers: Mondays, 3:00 to 4:00 pm By appointment Jain: Monday and Wednesday 2:00-3:00 pm By appointment

Text: Robert Eisberg and Robert Resnick, “Quantum physics: of atoms, molecules, solids, nuclei, and particles” 2nd edition (January 1985) John Wiley & Sons.

References:

A.P. French and Edwin F. Taylor, “An introduction to quantum physics” (Norton, 1978).

P.A. Cox, Introduction to quantum theory and atomic structure, Oxford Science Publications, OUP

Herbert Kroemer, “Quantum mechanics for engineering, materials science and applied physics” (Prentice Hall, 1994).

John Davies, “The Physics of Low Dimensional Semiconductors: An Introduction”, Cambridge University Press, (1998).

Grading:	
Homework	40%
Midterm	20%
Final exam	30%
Class Participation	10%

Rules:

There will be a homework set assigned every Tuesday which will be due at the beginning of class the following Tuesday. You are encouraged to work together on solving the homework problems but the final write up must be your own.

Homework which is one day late can earn a maximum of 75 % of the total score, two days late 50 %, three days late 0. Homework turned in after the Tuesday class is considered 1 day late. The purpose of this policy is to allow your TA to discuss solutions during the Thursday discussion time. Your lowest score won't count towards your grade, so you can skip one homework completely if you are sick/travelling/busy, etc.

You'll be allowed to bring in one single-sided page of notes (8.5 x 11) into the mid-term. For the final you can have notes on both sides.

Final: Tuesday, Dec. 9 from 12-3
Midterm: Thursday, Oct. 30 from 12-1:50.

ECE 162A Lecture topics and Reading, Fall, 2008

Lecture topics	**Reading**		
	Eisberg/Resnick	*Kroemer*	*French/Taylor*
Electrons as particles and waves	2,3	1.1-1.2	2
Electron diffraction, wave equations	3	1.3, 2	3
Schrodinger equation, eigenstates	5	1.4-1.6	3
Square well	6, App. H	2.1-2.2	4
Harmonic oscillator	6	2.3	4
Approximation methods	Appendix J	14, 15	-
Computer calculation, matrix solution	Appendix G	-	4.5
Expectation values	5.4	2.4, 7.1	5
Time-dependence of quantum states	-	2.3-2.4, 2.6	8
Wave packets	3	4.1-4.2	8
Uncertainty relations	3	4.3	8
Tunneling and transmission	6	5.1-5.3, 6.4	9
Scattering	6	5.5-5.6	9
Hydrogen atom, atomic structure	7	3.1-3.2	10, 11, 12
Exclusion principle, periodic table	9.1-9.3	-	13
Free electrons in metals	13	-	13
Bonds	13	-	-
Periodic potentials	13	5.4, 14.3	-
Energy bands	13	5.4, 14.3	-