ECE410/510 SPST: NANOELECTRONICS

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Course information posted for download at http://www.ece.pdx.edu/~jmorris/ece410&510nanoelectronics

Week		Mon Lecture	Wed Lecture	Notes
1	April 03/05	Intro: Nanotechnology & CMOS	Quantum mechanics review	
2	April 10/12	Electron tunneling	Tunnel diode & RTD	
3	April 17/19	TD & RTD circuits	Mesoscopic conduction	
4	April 24/26	TF deposition, nucleation, growth	Discontinuous thin films (DTF)	
5	May 0l/03	Single electron transistor (SET)	SET circuits	
6	May 08/10	Instrumentation	MID-TERM TEST	ISSE
7	May 15/17	Carbon nanotubes (CNT)	Spintronics	
8	May 22/24	Molecular Electronics	(Superconducor Nanoelectronics?)	
9	May 29/31	MEMORIAL DAY	Summary; thermodynamics view	ECTC
10	June 05/07	Project presentations	Project presentations	
	June12/14	Final Exam:		

The course is focused on the operational principles and circuit applications of nanoelectronic devices, especially those based on electron tunneling, i.e. tunnel diodes, resonant tunnel diodes, single electron transistors, and discontinuous thin film arrays of nanodots. Carbon nanotube and nano-dot fabrication will also be considered. There will be occasional problem assignments. One mid-term test and one final exam are planned. ECE510 students will be required to do a literature survey project on an assigned topic, with a written report and an informal discussion/presentation June 5th or 7th.

	ECE410	ECE510
Assignments	20%	15%
Mid-term test	40%	30%
Final exam	40%	30%
510 project	XXXX	25%

Text:

- Mircea & Daniela Dragoman “Nanoelectronics: Principles & Devices” Artech House (2006)

Recommended references:

- Rainer Waser (ed) “Nanoelectronics & Information technology” Wiley-VCH (2003)
- K.Goser, P. Glosekotter, & J. Dienstuhl “Nanoelectronics & Nanosystems“ Springer (2004)

Other references:

- Poole & Owens “Introduction to Nanotechnology” Wiley (2003)
- Edward Wolf “Nanophysics & nanotechnology” Wiey-VCH ((2004)
- Kwok Ng “Complete Guide to Semiconductor Devices (2e)” Wil;ey/IEEE (2002)
- Christoph Wasshuber “Computational Single-Electronics” Springer (2001)
- Grabert & Devoret (eds) “Single Charge Tunneling” NATO ASI B294, Kluwer/Plenum
- Ferry & Goodnick “Transport in Nanostructures” Cambridge (1997)
- Ferry, Barker, & Jacoboni (eds) “Granular Nanoelectronics” PlenumNATO Series 251 (1991)
- Mizuta & Tanoue “Physics & Applications of Resonant Tunnelling Diodes” Cambridge (1995)
- Saito, Dresselhaus, & Dresselhaus “Physical Properties of Carbon Nanotubes” ICP (1998)
- Forrest L. Carter (ed) “Molecular Electronic Devices” Marcel-Dekker (1982)

Students are encouraged to collaborate in preparation for homework problem assignments, and in studying for tests. However, all work finally turned in must be the product of the individual student. Evidence of cheating can result in grade penalties and severe disciplinary action, in accordance with PSU policies. In this regard, a satisfactory (non-zero) performance on all assignments, tests, and projects is a requirement for course completion. There will be no “make-up” or “extra-credit” assignments or tests. Late assignments will not be accepted. Previously excused absences on test dates and those supported by medical documentation will be handled on an ad hoc basis.