

INTRODUCTION TO CARBON NANOTUBE AND GRAPHENE

NANOELECTRONICS - EE 396V (16990)

Spring 2010 (MW 3:30pm – 5:00pm, ENS 306)

Instructor:

Professor Deji Akinwande (deji@ece.utexas.edu)

Description:

Over the past decade, there has been an intense interest in all things made of carbon particularly applications employing carbon nanotubes and graphene. This course will introduce the science and technology of carbon nanomaterials and their electronic, optical, and sensor properties. The course will begin with a basic review of quantum mechanics and elementary theory of solids, and progress to contemporary topics including carbon synthesis, sensor devices, interconnects, transistors, and analog and digital circuit applications of carbon nanomaterials.

Prerequisites:

EE 339 Solid State Electronic Devices, EE 438 Electronic Circuits I, and either PHY 373 Modern Physics II: Quantum Mechanics or EE 396V Physical Principles of Electronic Materials or consent of instructor.

Tentative course topics:

- History of carbon, carbon fibers, carbon nanotubes, graphene and nanoelectronics
- Brief review of quantum mechanics and solid state physics in reduced dimensions
- Graphene nanomaterials and band structure
- Carbon nanotubes and band structure
- Electrical properties of carbon nanomaterials
- Carbon nanomaterial devices and transistors
- Carbon nanomaterial analog, RF and digital circuits
- Optical and sensor applications of carbon nanomaterials
- Fabrication and characterization techniques
- Non-carbon nanotubes and nanoribbons

Textbook:

Class notes will be the primary reading material. Suggest references include

- Physical Properties of Carbon nanotubes, by R. Saito, et. al., Imperial College Press, 1998
- Current *broad audience* literature articles

Grading:

40% Homework, 30% Midterm Project, 30% Final

(optional) Extra Credit available

Office Hours:

Mondays 2:00pm – 3:30pm

Wednesdays 5:00pm – 6:30pm

Add/Drop Policy:

Graduate ECE students have the first 12 days of the semester to add and drop graduate ECE courses. Dropping a course after the 12th day of the semester must be approved by the Graduate ECE advisor and Dean of the Graduate school, among others.

Academic Honesty:

Discussion of homework questions is encouraged. However, please submit your own independent homework solutions. Plagiarism of any form of academic misconduct (including but not limited to, copying another student's work, copying material directly from a book, article or web site without proper acknowledgement, falsifying data, doing someone else's work) is a violation of University rules and will result in disciplinary actions.

Students with Disabilities

The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean Students at 471-6259, 471-4241, TDD, or the College of Engineering Director of Students with disabilities at 471-4382