

EECS 598: Carbon Nanoelectronics and Nanophotonics

Winter 2012

Department of Electrical Engineering and Computer Science
University of Michigan, Ann Arbor

Carbon based nanomaterials, in particular carbon nanotube and graphene, have generated great excitement over the past decade due to their unique electrical, optical, and mechanical properties. This special topic course introduces theories and experimental works on carbon nanotube and graphene based electronic and photonic devices. The course will also have two student labs of experimental testing of graphene nanoelectronics. A tentative syllabus includes following topics:

1. Overview of carbon nanomaterials, including synthesis and fabrication methods.
2. Basic device physics, including lattice structure, density of states, band diagram, etc.
3. Electronic transport and carbon nanoelectronic devices.
4. Optical properties and carbon nanophotonic devices.
5. Mechanical properties and carbon based NEMS.
6. Other advanced topics if time permits.

Instructor: Zhaohui Zhong, zzhong@umich.edu

Credit Hour: 3 credits.

Class Size: No more than 20 students.

Pre-requisite: EECS 420, or instructor permission

Lecture: MW 1:30 – 3pm, EPB 214 (Engineering Program Building)

Lab: 2 Student labs over the final 4~5 weeks

Lab 1: Graphene transistors

Lab 2: Graphene transistor based RF circuit

Suggested Textbooks:

General Reference:

Kittel, *“Introduction to Solid State Physics”*

Misra, *“Physics of Condensed Matter”*

Aschcroft & Mermin, *“Solid State Physics”*

on Graphene and Carbon Nanotubes:

Saito, Dresselhaus & Dresselhaus, *“Physical Properties of Carbon Nanotubes”*

Jing Kong & Ali Javey, *“Carbon Nanotube Electronics”*,
available online through MLibrary.

Grading:	Homework:	20%
	Journal Club:	20%
	Mid-term Exam:	30%
	Labs:	30%