

# EECS 598: Carbon Nanoelectronics and Nanophotonics

Winter 2016

Department of EECS, 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 testing 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](mailto:zzhong@umich.edu)

**Credit Hour:** 3 credits

**Class Size:** 15

**Pre-requisite:** EECS 520, or instructor permission

**Lecture:** TBD

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

Lab 1: Graphene transistors

Lab 2: Graphene transistor based RF circuit

**Suggested Reference Books:**

**General Reference:**

- Kittel, *“Introduction to Solid State Physics”*
- Misra, *“Physics of Condensed Matter”*

**on Graphene and Carbon Nanotubes:**

- Saito, Dresselhaus & Dresselhaus, *“Physical Properties of Carbon Nanotubes”*
- Wong & Akinwande, *“Carbon Nanotube and Graphene Device Physics”*
- Jing Kong & Ali Javey, *“Carbon Nanotube Electronics”*, *available online through MLibrary.*

**Grading:**

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