ECE440 Nanoelectronics

(Department of Electrical and Computer Engineering, Fall Semester 2018)

Course Information

- **Title:** ECE440 Nanoelectronics
  (CRN 35565 and 3 credits for undergraduates; CRN 35566 and 4 credits for graduate students)

  - **Required for BS in Engineering Physics. Technical Electives for BS in Electrical Engineering.**

- **Schedule:** 9:30 am~10:45 am, Tuesday and Thursday

- **Location:** Lecture Center A 006 (LC A006)

- **Instructor:** Zheng Yang (Email: yangzhen@uic.edu; Phone: 312-996-8367; Office: ERF3017)

Prerequisite ECE346 for undergraduate students; ECE346 or instructor’s consent for graduate students.

Office Hours

5:45pm~6:30pm, Monday and Wednesday (08/27/2018 to 12/05/2018); 8:00am~8:45am, Tuesday and Thursday (08/28/2018 to 12/06/2018).

(Additional office hour appointments can be requested by emails.)

Course Materials and Website

- **Course materials:** Lecture slides.

- **Course Website:** [http://www.ece.uic.edu/~zyang/Teaching/20182019FallECE440/index.html](http://www.ece.uic.edu/~zyang/Teaching/20182019FallECE440/index.html)

Reference Books


Further-reading books (for students with additional interests only)

**Quantum Mechanics**


**Solid-state physics**


**Semiconductor physics and devices**


Course descriptions

In the course, elementary level of quantum mechanics, fundamental knowledge of nanotechnology; preparation, fabrication and characterization techniques of nano-materials and nano-devices are discussed. Recent research progresses in nanotechnology-related topics are also briefly covered in the class. Representative two-dimensional (e.g. 2DEG in quantum wells, graphene, etc), one-dimensional (e.g. nanowire, nanotube), and zero-dimensional (e.g. quantum dots) nano-material systems are presented.

Specific goals and outcomes for the course

The student will be able to explain the significance of current research about a particular topic; to learn a knowledge of contemporary issues; to gain the ability to oral and written communicate effectively; to gain
the ability to apply knowledge of mathematics, science, and engineering; to gain the ability to identify, formulate, and solve engineering problems; and to achieve a recognition of the need for, and an ability to engage in life-long learning.

**Brief list of topics covered**  Wave-particle duality, Schrödinger equation, atomic orbitals, band theory of solids, semiconductors, nanoelectronic materials preparation, nanoelectronic device fabrication and measurements, fullerenes, quantum dots, carbon nanotubes, nanowire, graphene quantum wells, two-dimensional electron gas.

**Grading**  The grading is based on **three 75-min exams** in class and **one cumulative 120-min final exam** in the final exam week. The lowest-score one of the three 75-min exams is dropped, while the other two 75-min exams count 30% each for the overall score of the course. The 120-min final exam counts 40% for the overall score of the course. **No MAKEUP EXAMS will be given!**  Unless otherwise announced, a straight scale is used to determine the grades. For graduate students, A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F = 0-59%; for undergraduate students, A = 85-100%, B = 70-84%, C = 50-69%, D = 35-49%, F = 0-35%.

**Professional and Ethical Responsibility**

- Attend all lectures. Take exams on scheduled dates. No make-up exams or alternate arrangements will be allowed unless for reasons beyond a student’s control (supporting documents required).
- Read notice emails from the instructor regularly.
- Review lecture slides and notes posted/sent by the instructor.
- Policy on cheating and plagiarism: Dishonest actions by students will result in appropriate disciplinary action. Intentional use or attempt to use unauthorized assistance, materials, or information, in any quiz, examination, or assignment and plagiarism in literature review report may lead to penalties such as a failing grade. College of Engineering and University guidelines will be followed.

**Religious Holidays**

Students who wish to observe their religious holidays shall notify the instructor by the tenth day of the semester of the date(s) when they will be absent unless the religious holiday is observed on or before the tenth day of the semester. In such cases, the students shall notify the instructor at least five days in advance of the date when he/she will be absent.

**Policy on Incomplete (IN) Grades**

The UIC policy is that Incomplete (IN) grades should be given ONLY when the student is making satisfactory progress. Please see the current Undergraduate Catalog for a precise statement. In this course, any student looking for an IN grade needs to have a C average at the time he/she requests for an IN. If the student is earning a D or below, then and IN grade will not be given, regardless of other circumstances. Note that satisfactory progress is a necessary but not sufficient condition for an IN. There must also be an extraordinary reason why instructor should consider giving an IN.