ECE440 Nanoelectronics

*Course Information*

**Course number and name** ECE440 Nanoelectronics (CRN: 35506 for undergraduate and 35507 for graduate students; 3 credits for undergraduate and 4 credits for graduate students.)

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

**Schedule** 4:00 pm–4:50 pm, Monday, Wednesday, and Friday (1/13~5/2, 2014) at LH 103

**Course website** [http://www.ece.uic.edu/~zyang/Teaching/20132014Spring/index.html](http://www.ece.uic.edu/~zyang/Teaching/20132014Spring/index.html) and UIC Blackboard system.

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

**Regular office hours** 5:00 pm–5:30 pm, Monday, Wednesday, and Friday (1/13~5/2, 2014).

**Additional office hours** Appointments requested by email.

**Course materials** Lecture Slides and Lecture Notes posted in Blackboard or on course website.


**Course descriptions** In the course, elementary level of quantum mechanics, fundamental knowledge of nanotechnology; preparation, fabrication and characterization techniques of nanomaterials 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.

**Prerequisite** ECE346 or ECE448 or instructor’s consent *(Strictly enforced!)*

**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 indentify, 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 midterms (10%×3=30%), one final exam (30%), one research report (25%), and the popup quizzes (15%). No MAKEUP EXAMS will be given! No late research reports will be accepted. NO MAKEUP POPUP QUIZZEZ will be given!

*Final Exam* The Final exam is scheduled during the 16th week of the semester (May 5th-9th). The final is tentatively 120 minutes. Final exam counts 30% for the overall course grading.

*Midterms* Three midterms are given during the semester. Midterms #1, #2, and #3 are tentatively scheduled on 2/7/2014 (Friday), 3/5/2014 (Wednesday), and 4/7/2014 (Monday), respectively. All three midterms are of 50 minutes. Each midterm counts 10% for the overall course grading.

*Research Report* Each student needs to complete a report based on research of literature review by the end of the semester. Literature review on state-of-the-art papers under the scope of nanoelectronics or nanotechnology research area is required. The detailed guidelines of Research Report are posted separately. The research report counts 20% for the overall course grading.

*Popup quizzes* Popup quizzes using 5-10 minutes at the beginning or the end of the class will be given to test the knowledge discussed in the previous class or current class. The total of all popup quizzes counts 15% of the overall course grading.

**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 announcements on Blackboard and emails from the instructor regularly.
- Review lecture slides and notes posted on Blackboard.
- Submit the research report on time. No credit will be given to research report submitted late.
- 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 may lead to penalties such as a failing grade. College of Engineering and University guidelines will be followed.

**Regulations for Religious Holidays**
Students who wish to observe their religious holidays shall notify the instructor by the tenth day (i.e., 01/24/2014) 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.