ECE440 Nanoelectronics

(Department of Electrical and Computer Engineering, Fall 2014)

Course Information
(1) **Title:** ECE440 Nanoelectronics (CRN 35565 and 3 credits for undergraduates and 35566 and 4 credits for graduate students.) **Required for BS in Engineering Physics. Technical Electives for BS in Electrical Engineering.**
(2) **Schedule:** 11:00 am~12:15 pm, Tuesday and Thursday (08/26~12/04, 2014)
(3) **Location:** Lecture Center Building A A007.
(4) **Instructor:** Dr. Zheng Yang (Email: yangzhen@uic.edu; Phone: 312-996-8367; Office: ERF3017)
(5) **Materials:** Lecture slides & notes posted in Blackboard or/and on course website.

Prerequisite ECE346 or ECE448 or instructor’s consent (**Need to be strictly fulfilled!**)

Course Resources
(1) Website: [http://www.ece.uic.edu/~zyang/Teaching/20142015Fall/index.html](http://www.ece.uic.edu/~zyang/Teaching/20142015Fall/index.html)
(2) UIC Blackboard system.

Office Hours
(1) Regular office hours: 12:30 ~13:30, Tuesday and Thursday (08/26~11/25, 2014).
(2) Office hours for final exam: 9:00 ~18:00, November 24th (Mon.) and 26th (Wed.).
(3) Additional office hours: Please send your requests by email one week ahead.


Further-reading books for students with additional interests
(1) George W. Hanson, “Fundamentals of nanoelectronics”, Pearson/Prentice, 2008 (for nanoelectronics).

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 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 two midterms (20%×2=40%), one final exam (30%), quizzes (15%), one research report (10%), and homework (5%). No MAKEUP EXAMS will be given! No late research reports will be accepted. NO MAKEUP POPUP QUIZZEZ will be given!

Final Exam Final exam is scheduled during week December 8th-12th. The final is 120 minutes. Final exam counts 30% for the overall course grading.

Midterms Two midterms are given during the semester. Midterms #1 and #2 are tentatively scheduled on 9/30/2014 (Tuesday) and 11/6/2014 (Thursday), respectively. All three midterms are of 75 minutes. Each midterm counts 20% for the overall course grading.

Quizzes Popup quizzes using 5-10 minutes will be given during the class 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.

Report Each student needs to complete a report based on research of literature review report 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 10% for the overall course grading.

Homework The total of all homework counts 5% 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 and plagiarism in literature review report 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., 09/05/2014) 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.