ECE440 Nanoelectronics

(Department of Electrical and Computer Engineering, Fall Semester 2015)

Course Information

- **Title:** ECE440 Nanoelectronics
  (CRN 35565 for undergraduates and 35566 for graduate students; 3 credits)
  
  **Required for BS in Engineering Physics. Technical Electives for BS in Electrical Engineering.**

- **Schedule:** 11:00 am~12:15 pm, Tuesday and Thursday (08/24~12/04, 2015)
- **Location:** Lecture Center Building A A007.
- **Instructor:** Zheng Yang (Email: yangzhen@uic.edu; Phone: 312-996-8367; Office: ERF3017)

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

Office Hours

- Regular office hours: 12:30 pm ~2:00 pm, Tuesday and Thursday (08/25~11/24, 2015).
- Additional office hours: Please send your requests to the instructor by email.

Course Materials and Website

- **Course materials:** Lecture slides & notes.
- **Course Website:** [http://www.ece.uic.edu/~zyang/Teaching/20152016Fall/index.html](http://www.ece.uic.edu/~zyang/Teaching/20152016Fall/index.html)


**Additional information can be found at the textbook website:**


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

**Nanoelectronics**


**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 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 four 45-min exams. The lowest-score one of the four exams counts 10% of the course overall score and the other three exams count 30% each for the course overall score. (i.e., $10\% + 30\% \times 3 = 100\%)$. No MAKEUP EXAMS will be given! The tentative schedules of the exams are listed below.

<table>
<thead>
<tr>
<th>Exam #1 (45 minutes)</th>
<th>9/10/2015 (Thursday)</th>
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<tbody>
<tr>
<td>Exam #2 (45 minutes)</td>
<td>9/29/2015 (Tuesday)</td>
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<tr>
<td>Exam #3 (45 minutes)</td>
<td>10/29/2015 (Tuesday)</td>
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<tr>
<td>Exam #4 (45 minutes)</td>
<td>12/01/2015 (Tuesday)</td>
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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.