ECE 4100 - Introduction to Microelectronic Fabrication Winter 2015

Course Objectives
This course introduces students to the various technologies used in the fabrication of integrated circuits (ICs). Emphasis is on silicon based devices. Topics include wafer preparation, oxidation, thin film deposition, diffusion and ion implantation, lithography, wet and dry etching, and metallization. The application of these topics to CMOS, Bipolar, and GaAs devices is discussed.

Course Content
The following topics will be covered:
- Introduction to Microelectronic Fabrication
- Silicon and GaAs Substrates
- Oxidation and Doping
- Pattern Transfer
- Thin Film Deposition
- Process Integration
- Introduction to Micromachining and MEMS.

Laboratories and Tutorials
Tutorials will be held in ??. Students should report to the tutorial room on their laboratory day at 2:30 pm. On select tutorial days, labs will be undertaken in the Nano-Systems Fabrication Laboratory in E3-450 EITC.

Textbook

Requirements/Regulations
- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with the University’s General Academic Regulations, as well as Section 3 of the Faculty of Engineering Academic Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.

Important Dates
- Term Test
  February 27th, 2015
- Voluntary Withdrawal Deadline
  March 19th, 2015
- Mid-term Break
  February 16–20, 2015
  No classes or examinations
- Good Friday
  April 3rd, 2015
  No classes or examinations

Course Outline

Instructor
- Prof. Cyrus Shafai, P.Eng.
  E1-534 EITC
  (204) 474–6302
  Cyrus.Shafai@umanitoba.ca

Office Hours
- Monday, Wednesday, Friday after class, or by appointment.

Teaching Assistant
- TBD

Contact Hours
- 4 credit hours
- Lectures
  3 hours × 13 weeks = 39 hours
- Tutorials
  3 hours × 5 weeks = 15 hours

Prerequisites:
- ECE 3670 Electronics 3

Course Website:
http://ece.eng.umanitoba.ca/undergraduate/ECE4100/
Learning Outcomes

1. Familiarity with semiconducting materials, atomic structure, and doping process.
2. Understand and apply lithographic and etching techniques.
3. Understand and apply thin film deposition technologies.
4. Familiarity with microelectronic device design and structure.
5. Familiarity with MEMS design and structure.

Expected Competency Levels

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<th>Outcome</th>
<th>A1</th>
<th>A2</th>
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Evaluation

The final course grade will be determined from a student's performance in laboratories, assignments, and on examinations. Programmable calculators are not allowed in the mid-term and final examination. Students must receive a minimum of 50% on the final examination and must complete all the laboratories in order to be eligible to receive a passing grade.

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<tr>
<th>Component</th>
<th>Value (%)</th>
<th>Method of Feedback</th>
<th>Learning Outcomes Evaluated</th>
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<tbody>
<tr>
<td>Assignments/Laboratories</td>
<td>20</td>
<td>F, S</td>
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<td>Term Test</td>
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<td>Final Examination</td>
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<td>S</td>
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*Method of Feedback: F - Formative (written comments and/or oral discussion), S - summative (numerical grade)*

Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations on Academic Integrity, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.