ENG PHYS 4Z03
Semiconductor Manufacturing Technology
Winter 2017
Course Outline

CALENDAR/COURSE DESCRIPTION

Selected advanced experiments in two areas of applied physics, chosen from among these unique topics: Lasers & Optical Communication, Solar Cell Fabrication, Biomedical and Nuclear Labs. Students must take ENGPHYS 4U02 twice, in order to fulfill degree requirements (for a total of four units). Students must select two unique topics from the list above; the same topic cannot be repeated.
Two labs (three hours each); both terms

PRE-REQUISITES AND ANTI-REQUISITES

Prerequisite(s): ENGPHYS 3W04 A/B and PHYSICS 3B06, or both ENGPHYS 3BA3 and ENGPHYS 3BB3
Anti-requisite(s): ENGPHYS 4U04 A/B

INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION

Dr. Leyla Soleymani
ETB 407
soleyml@mcmaster.ca
ext. 27204

Office Hours: By appointment

TEACHING ASSISTANT OFFICE HOURS AND CONTACT INFORMATION

Paul Kuyanov
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Office Hours: By appointment

COURSE WEBSITE/ALTERNATE METHODS OF COMMUNICATION

http://avenue.mcmaster.ca/

COURSE ORGANIZATION AND COMPONENTS

The course includes one 3-hour laboratory session per week. The design project will be performed in groups of three; however the reports and demonstrations will be submitted and performed individually. The course includes the following components.

Device Architecture Document	The device architecture document will be due on January 19th at 11:59 PM. The detailed instructions for preparing this document are provided in the Demonstrations and Reports section of the Design Project Manual. The document must be submitted individually through Avenue to Learn Drop Boxes. Late documents will not be accepted and a grade of ZERO will

	be allocated.
Device Architecture Demonstration	Each laboratory group will present their device architecture in the form of an oral presentation. The oral presentation will be 12 minutes followed by a 3 minute questions and answer period. Oral presentations are evaluated individually for each presenter. Oral presentation instructions are provided in the Demonstrations and Reports section of the Design Project Manual. The presentation dates will be announced through Avenue to Learn and will be during the week of January 16th.
Mask Design and Process Flow Document	The Mask Design and Process Flow Document will be due on January 27th at 11:59 PM. This document must include sections (a)-(f) according to the information provided in the Demonstrations and Reports section of the Design Project Manual. The document must be submitted individually through Avenue to Learn Drop Boxes. Late documents will not be accepted and a grade of ZERO will be allocated.
Fabrication Update Report	The Fabrication update report will be due on March 3rd at 11:59 PM. This document will provide an update on the fabrication process according to the information provided in the Demonstrations and Reports section of the Design Project Manual. The document must be submitted individually through Avenue to Learn Drop Boxes. Late documents will not be accepted and a grade of ZERO will be allocated.
Device Testing Demonstration	During the week of March 27th and at the latest during the week of April 3rd, each group will demonstrate the testing of their devices to their TA. The TA will assess each student individually based on their experimental results and their understanding of the device operation, test setup, and the observed IV characteristics.
Final Report	The final report will be due on April 14th at 11:59 PM. The detailed instructions for preparing this document are provided in the Demonstrations and Reports section of the Design Project Manual *and* the Final Report Guidelines document. The document must be submitted individually through Avenue to Learn Drop Boxes. Late documents will not be accepted and a grade of ZERO will be allocated.

COURSE OBJECTIVES

The objective of this course is to design, fabricate, and test a semiconductor device that can be used in a wide range of biosensing applications. The students will learn to develop application-specific devices from the design to implementation stage. They will learn to design device architectures, lithography masks, and fabrication process flows. In addition, they will learn to develop the appropriate test setups to characterize and validate the device in the biomedical context.

MATERIALS AND FEES

Required Text:
N/A
Reference Text:
"Introduction to Microelectronic Fabrication: Volume 5 of Modular Series on Solid State Devices", Richard C. Jaeger, second edition, Prentice Hall, 2002

COURSE OVERVIEW

See course timetable on Avenue to Learn

ASSESSMENT*

	Weight
Device Architecture Document	15%
Device Architecture Demonstration	10%
Mask Design and Process Flow Document	20%
Fabrication Update Report	10%
Device Testing Demonstration	15%
Final Report	30%
Total	100%

*All students must be present during every lab session and participate in the lab activities to receive marks. Students absent from the lab will lose 10% per missed lab.

ACCREDITATION LEARNING OUTCOMES

5.1, 5.2, 7.1, 7.2, 7.3, 12.1

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at
http://www.mcmaster.ca/academicintegrity

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

ACADEMIC ACCOMMODATIONS

Students who require academic accommodation must contact Student accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contact by phone at 905.525.9140 ext. 28652 or e-mail at sas@mcmaster.ca. For further information, consult McMaster University's Policy for Academic Accommodation of Students with Disabilities.

NOTIFICATION OF STUDENT ABSENCE AND SUBMISSION OF REQUEST FOR RELIEF FOR MISSED ACADEMIC WORK

1. The McMaster Student Absence Form is a self-reporting tool for Undergraduate Students to report absences DUE TO MINOR MEDICAL SITUATIONS that last up to 3 days and provides the ability to request accommodation for any missed academic work. Please note this tool cannot be used during any final examination period.
2. You may submit a maximum of 1 Academic Work Missed request per term. It is YOUR responsibility to follow up with your Instructor immediately (NORMALLY WITHIN TWO WORKING DAYS) regarding the nature of the accommodation. Relief for missed academic work is not guaranteed.
3. If you are absent for reasons other than medical reasons, for more than 3 days, or exceed 1 request per term you MUST visit the Associate Dean's Office (JHE/A214). You may be required to provide supporting documentation.
4. This form must be submitted during the period of absence or the following day, and is only valid for academic work missed during this period of absence.
5. It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work in his/her course.
6. You should expect to have academic commitments Monday through Saturday but not on Sunday or statutory holidays. If you require an accommodation to meet a religious obligation or to celebrate an important religious holiday, you may submit the Academic Accommodation for Religious, Indigenous and Spiritual Observances (RISO) Form to the Associate Dean's Office. You can find all paperwork needed here: http://www.eng.mcmaster.ca/current/documents.html

NOTICE REGARDING POSSIBLE COURSE MODIFICATION

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

COURSE POLICIES

1. It is the students' responsibility to regularly check the course web page (Avenue to Learn) for updates and announcements.
2. Students are required to obtain and maintain a McMaster e-mail account for timely communications between the instructor and the students.
3. You are expected to behave in a way that does not disrupt the learning experience of your peers. Disruptive behavior including making noise, leaving and entering the classroom, and use of cellular phones is forbidden and students presenting this type of behavior will be asked to leave the classroom.

ON-LINE STATEMENT FOR COURSES REQUIRING ONLINE ACCESS OR WORK

In this course, we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

REFERENCE TO RESEARCH ETHICS

The two principles underlying integrity in research in a university setting are these: a researcher must be honest in proposing, seeking support for, conducting, and reporting research; a researcher must respect the rights of others in these activities. Any departure from these principles will diminish the integrity of the research enterprise. This policy applies to all those conducting research at or under the aegis of McMaster University. It is incumbent upon all members of the university community to practice and to promote ethical behaviour. To see the Policy on Research Ethics at McMaster University, please go to http://www.mcmaster.ca/policy/faculty/Conduct/ResearchEthicsPolicy.pdf.