

Eng Phys 4X03
Introduction to Photovoltaics
Fall/Winter 2018/19
Course Outline

CALENDAR/COURSE DESCRIPTION

A review of photovoltaic devices including solar cell operation, characterization, manufacturing, economics and current and next generation technologies.

PRE-REQUISITES AND ANTI-REQUISITES

Prerequisite(s): [ELEC ENG 2E15](#), [ENG PHYS 3PN4](#), [MATLS 3Q03](#) or [PHYSICS 3BA3](#)
Antirequisite(s): None

INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION

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Office Hours:
By Appointment

TEACHING ASSISTANT OFFICE HOURS AND CONTACT INFORMATION

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Office Hours:
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COURSE WEBSITE/ALTERNATE METHODS OF COMMUNICATION

<http://avenue.mcmaster.ca/>

COURSE OBJECTIVES

By the end of this course, a successful student will be able to:

- Understand the basic economics and global status of photovoltaics (PV)
- Understand the characteristics of sunlight
- Understand the physics of pn junctions
- Understand PV optical design

- Understand PV electrical design
- Understand the limits to PV efficiency
- Understand Si cell technology
- Understand CdTe cell technology
- Understand CIGS cell technology
- Understand III-V cell technology
- Understand DSSC cell technology
- Understand Organic cell technology
- Understand third generation PV concepts
- Understand characterization techniques for PV cells

MATERIALS AND FEES

Required Texts:

None

Calculator:

Only the McMaster Standard Calculator (Casio) will be permitted in tests and examinations. This is available at the Campus Store.

COURSE OVERVIEW

1	Course outline
2	Introduction to PV
3	Characteristics of sunlight
4	Physics of PV
5	Optical design
6	Electrical design
7	Limits to efficiency
8	Si Solar Cells: c-Si
9	Si Solar Cells: mc-Si
10	GaAs cells (1 st generation)
11	a-Si Cells
12	CdTe Cells
13	CIGS
14	Multijunction Solar Cells
15	Concentrator Photovoltaics
16	DSSC
17	Organic Solar Cells
18	Space-Based Solar
19	Characterization Techniques
20	Course Summary and Evaluation

ASSESSMENT

Undergraduate Students (4X03):

Component	Weight
Assignments x 3	30%
Presentations	30%
Final Exam	40%
Total	100%

Graduate Students (6X03)

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Component	Weight
Assignments x 3	30%
Lecture (50 minutes)	30%
Report (in lieu of lecture)	15%
Presentation (in lieu of lecture)	15%
Final Exam	40%
Total	100%

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. If you are seeking relief for missed academic work because of an absence lasting less than five days in duration, you must use the [McMaster Student Absence Form](#).
2. Absences lasting more than five days must be reported to the Associate Dean's Office (JHE-A214) and appropriate documentation must be provided. For medical absences, the University reserves the right to require students to obtain medical documentation from the Student Wellness Centre.
3. 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 use the McMaster Student Absence Form or contact the Associate Dean's Office.
4. At the third request for relief of academic missed work, you will be asked to meet with the Assistant or Associate Dean (or delegate). Relief for missed academic work is not guaranteed.
5. You are responsible to contact your instructor(s) promptly to discuss the appropriate relief.
6. It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work in his/her course.

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.