ENEG/MECH3110 Materials for Energy Technologies (MET)

Instructor:
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Lecture times:
Tuesday 9:00 – 10:20 am Venue: LG3008 (Lift 10-12)
Thursday 9:00 – 10:20 am Venue: LG3008 (Lift 10-12)

Tutorial times:
Thursday 12:00 – 12:50 Venue: LSK1009
* TA will coordinate the tutorials based on the students' needs.

Course Introduction:

This course elaborates on the materials science and engineering of different energy technologies, including fuel, wind, nuclear, hydrogen, solar cells, batteries, and supercapacitors. The knowledge imparted from this course will be key to the future of chemical/materials engineers in the energy industry.

Course Intended Learning Outcomes (CILOs):

No.	Upon successful completion of this course, students should be able to:
1	Gain the background knowledge on the local and global energy issues.
2	Understand the fundamental principles of major energy technologies.
3	Understand the structure-property-performance relationship in energy materials.
4	Learn how to select and incorporate the materials for energy systems.

Assessment Methods:
Homework: 20% (3 assignments)
In-class quiz: 20%
Individual Project: 30% (15% presentation + 15% report)
Final Examination: 30% (Open class notes)

* The times for homework and quiz will be announced during the course progress.
* Presentation will be in the final teaching week. The project details are at the end of this syllabus.

Course Materials:
PPT materials will be uploaded before the lectures.

Tentative Lecture Content:

Date	**Topic**
2/9/2024	Syllabus
4/9/2024	Materials basics
9/9/2024	Materials basics
11/9/2024	Materials basics
16/9/2024	In-laboratory learning (Demonstration of energy materials and devices) Meet at LG3008 and then move to 7250.
18/9/2024	In-laboratory learning (Demonstration of artificial intelligence for energy) Meet at LG3008 and then move to 7250.
23/9/2024	PV
25/9/2024	PV
30/9/2024	Perovskite PV
2/10/2024	Perovskite PV
7/10/2024	NO class (public holiday)
9/10/2024	Battery
14/10/2024	Battery
16/10/2024	Battery
21/10/2024	Supercapacitor
23/10/2024	Supercapacitor
28/10/2024	Recycling
30/10/2024	In-class quiz
4/11/2024	Nuclear
6/11/2024	Nuclear
11/11/2024	Hydrogen
13/11/2024	Hydrogen
18/11/2024	Wind
20/11/2024	Wind
25/11/2024	Project presentation
27/11/2024	Project presentation

Project Task:

The students must choose one of the following areas and 'synthesize' knowledge from various resources.

- Science problems on the energy materials structure, synthesis, and processing
- Engineering problems on a specific type of energy technology
- Issues in the technology deployment and the mitigation pathways

Each project's deliverables include an oral presentation and a project report.