Energy Materials, Fall 2020 (MEEN5800, MTSE5800)

Instructor: Professor Wonbong Choi  
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Date & Time: TuTh 5:30 -6:50PM (Remote via ZOOM)

Course Description: This course is a materials science approach towards high efficiency energy harvesting (solar cells) and energy storages (batteries, supercapacitors). Also the course introduces advanced materials and their application in future energy technologies.

Reference books:
- Photovoltaic Solar Energy, Wiley, Angele Reinders SBN 978-1-118-92746-s
- Supplementary materials will be provided

Grading plan:
1Midterm: 30%, 1 Final: 45%

Quizzes/Homework/Presentation 20%, Attendance 5% of grade
(A = 900-1000; B = 800-899; C = 700-799; D = 600-699; F = 500-599)

1. Midterm exam will cover Part1. Final exam will be comprehensive.
2. Attendance of the class is required.
3. Unethical conduct on quizzes or exams will automatically lead to failure of the course.
4. A term project will be given for the graduate students (the topic will be discussed during the class along with the type of delivery)
5. Policy:
   a. Canvas will be used as the primary communication tool.
   b. Class recordings and presentation materials are reserved for use only by students in this class for educational purposes. The recordings should not be shared outside the class in any form. Failing to follow this restriction is a violation of the UNT Code of Student Conduct and could lead to disciplinary action.
   c. Recording the ZOOM meetings is not allowed for the class.
   d. Your attendance/class participation will be evaluated based on your participation in Zoom sessions.

Make-up Policy: Make-up tests will not be allowed for any circumstance.

Course Objectives: The object of the course is to give the students an overview of energy materials which are the basis of modern energy technologies, solar cells and rechargeable batteries.

List of topics to be covered

Solar Cells
1. Basic principle of solar cell
2. Solar cell operational parameters
3. Semiconductor
4. Charge transport and optical properties of semiconductor
5. Photovoltaic device principles
6. Advanced photovoltaic devices

**Energy Storages**
7. The basic of rechargeable batteries
8. Basic of battery chemistry
9. Materials in Li-ion batteries
10. Battery characterizations
11. Advanced rechargeable batteries
12. Other energy storages (supercapacitors, fuel cells)

**Rules of Engagement**
- While the freedom to express yourself is a fundamental human right, any communication that utilizes cruel and derogatory language on the basis of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law will not be tolerated.
- Treat your instructor and classmates with respect in any communication online or face-to-face, even when their opinion differs from your own.
- Ask for and use the correct name and pronouns for your instructor and classmates.
- Speak from personal experiences. Use “I” statements to share thoughts and feelings. Try not to speak on behalf of groups or other individual’s experiences.
- Use your critical thinking skills to challenge other people’s ideas, instead of attacking individuals.
- Avoid using all caps while communicating digitally. This may be interpreted as “YELLING!”
- Be cautious when using humor or sarcasm in emails or discussion posts as tone can be difficult to interpret digitally.
- Avoid using “text-talk” unless explicitly permitted by your instructor.
- Proofread and fact-check your sources.
- Keep in mind that online posts can be permanent, so think first before you type.

**Technical Assistance**
Part of working in the online environment involves dealing with the inconveniences and frustration that can arise when technology breaks down or does not perform as expected. Here at UNT we have a Student Help Desk that you can contact for help with Canvas or other technology issues.

**UIT Help Desk:** [UIT Student Help Desk site](http://www.unt.edu/helpdesk/index.htm)
**Email:** helpdesk@unt.edu
**Phone:** 940-565-2324 **In Person:** Sage Hall, Room 130 (Walk-In Availability: 8am-9pm)

**Telephone Availability:**
- Sunday: noon-midnight
- Monday-Thursday: 8am-midnight
- Friday: 8am-8pm
- Saturday: 9am-5pm

**Laptop Checkout:** 8am-7pm
For additional support, visit [Canvas Technical Help](https://community.canvaslms.com/docs/DOC-10554-4212710328)