



ENPM808N

Solar Energy and Technologies

Fall 2022 Syllabus

Time: Tuesday 7:00pm – 9:40 pm

Instructor:	Yang Li, Ph.D.
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	Rigaku Innovative Technologies
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Office Hours:	M 7:00pm-9:00pm, Tu 6:00pm – 7:00 pm or by appointment for early morning before 8:00am or evening time after 7:00pm for other days in the week
Prerequisites:	None, – this is an elective class. However, students will benefit from some basic understanding in materials science, thermodynamics, elementary material and energy balance concepts, knowledge on basic calculus, and some skill using Excel will also be helpful
Objective:	This course is aimed at sharing knowledge and experiences in the solar energy and technology area. The goal is to provide students a general summary of the solar energy industries, their technologies, and prospectus in the future alternative energy field. It is also the hope that student will be able to utilize these knowledges in other related field such as battery and energies
Course Learning Objective:	Students who successfully complete ENPM808N will be able to <ul style="list-style-type: none"> • Estimate the solar energy resources, available energy, power, and spectrum • Familiar with solar thermal technologies • Understand the function and technologies of mass energy storage • Explain the basics physics of the semiconductor materials and their interactions with photons • Understanding of P-n junctions • Describe different type of solar cells and their fabrication techniques • Identify all necessary components of a PV system
Responsibility:	Students will be responsible for reading and comprehending all lecture materials, class participation, reading assignments, homework assignments, quiz, and final exam.
Textbook:	There will be no standard textbook. However, reference books list will be given
References:	There will be a reasonable number of web-based articles be given. Students are encouraged to utilize the web to further enhance their knowledge on any of the topics

Homework:	Each assignment will be given based on the progress of the lectures and is due on the day indicated in the following syllabus. Late submission will not be accepted. Students are encouraged to have group discussions on home works. However, each individual must complete his/her own homework. Copied homework will not be given any credit
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Exams:	All exams including quiz, and final are close book. Make-up exams will be given only by prior arrangement and only for valid reasons.
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Class	Date	Lecture Topic	HW out	HW due
1	30-Aug	Introduction to the course + Solar resources	1	
2	6-Sep	Solar thermal systems	2	1
3	13-Sep	Mass energy storage	3	2
4	20-Sep	Physics of semiconductor	4	3
5	27-Sep	PN junctions & Introduction to solar cells		4
6	4-Oct	Quiz1		
7	11-Oct	Introduction to solar cells continue	5	
8	18-Oct	Crystalline Si solar cells	6	5
9	25-Oct	Thin film solar cells: a-Si:H; CdTe; CIGS	7	6
10	1-Nov	Thin film solar cells - TiO ₂ ; Perovskite		7
11	8-Nov	Quiz2		
12	15-Nov	Techniques to characterize solar cell performance (IV, QE)	8	
13	22-Nov	Deposition techniques (Sputtering, PECVD)	9	8
14	29-Nov	PV systems I, pannel connections, installations	10	9
15	6-Dec	PV systems II, Balance of systems		10
	Dec 13/20	Final		

Grading:	Homework (3 points each)	3 x 10 = 30
	Quiz (15 points each)	15 x 2 = 30
	Final exam	40
	Total	100

Final grade is based on grade curve of the class