

Winter

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Y. Wang

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ENGRMAE 117 SOLAR AND RENEWABLE ENERGY SYSTEMS

Catalog Data: ENGRMAE 117 Solar and Renewable Energy Systems (Credit Units: 4) Basic principles, design, and operation of solar and other renewable energy systems including solar photo-voltaic, solar thermal, wind, and hydrogen technology (e.g. fuel cell/electrolyzer). Prerequisite: MAE91 Thermodynamics (Design units: 1).

Textbooks: Required: Kreith, Frank, and Susan Krumdieck. Principles of Sustainable Energy Systems. CRC Press, 2013.

References:

- Cha, Suk-Won, Whitney Colella, and Fritz B. Prinz. "Fuel Cell Fundamentals." (2006) (reserved).
- Y. Wang, K.S. Chen, and S. C. Cho, PEM Fuel Cells: Thermal and Water Management Fundamentals, Momentum Press, 2013 (reserved).
- Ali, Mohd Hasan. Wind Energy Systems: Solutions for Power Quality and Stabilization. CRC Press, 2012 (available online).

Instructor: Prof. Wang (4231EG) email: yunw@uci.edu Office Hour: MW 11:00-11:45 Am
TA: Yiheng Pang: yihengp@uci.edu; Daniela Fernanda Ruiz Diaz: druizdia@uci.edu

Course Outcomes: Students will be able to:

1. Understand the basic principles of design and operation of solar, wind, and PEM fuel cell.
2. Apply those principles to a wide variety of renewable systems and applications.
3. Calculate thermodynamic efficiencies, and design system cycles in the construct of key performance goals.

Prerequisites By Topic: Introduction to Thermodynamics (MAE 91)

Lecture Topics:	Introduction to Renewable Energy	(~3 hours)
	Fundamentals of Solar Radiation	(~3 hours)
	Solar Photo-voltaic Cells	(~3 hours)
	Solar Heating and Cooling	(~3 hours)
	Solar Process Heat and Thermal Power	(~3 hours)
	Wind Energy	(~4.5 hours)
	H2 Economy, Fuel Cell, and Batteries	(~9.5 hours)

Class Schedule: Each class meets ~3 hours per week for 10 weeks

Design Content Description Project 1 is to review journal papers related to solar, wind, or PEM fuel cell.
Project 2 is to solve an energy-related problem at UCI.
Lectures: 100% *Laboratory Portion: 0%*

Grading Criteria:	Problem Sets	25%
	Class Project 1	12.5%
	Class Project 2	22.5%
	Others (e.g. quiz, attendance...)	5%
	Final	<u>35%</u>
		100%

Prepared by Prof. Wang