



# Philadelphia University

Faculty of Engineering - Department of Mechanical Engineering  
First Semester 2017/2018

## Course Information

<b>Title:</b>	Special Topics in Mechanical Engineering (Energy Conversion) , 620555
<b>Prerequisite:</b>	Department Approval
<b>Credit Hours</b>	3 Cr. Hours
<b>:</b>	
<b>Textbook:</b>	Principles of Energy Conversion, by Archie W. Culp, McGraw-Hill, 2 <sup>nd</sup> ed. (1991)
<b>References:</b>	Solar Engineering of Thermal Processes, by John Duffie and William Beckman, Wiley, 3 <sup>rd</sup> ed., 2006
<b>Catalog</b>	
<b>Description:</b>	Energy classification, resources and utilization; Principal fuels for energy conversion; Production of thermal energy; Fossil fuel systems; Environmental impact of power plant operation; Production of electrical energy (by direct energy conversion); Wind energy; Energy storage and conservation. Introduction to nuclear energy; geothermal energy.
<b>Instructor:</b>	Prof. Ali A. Badran, Room E741, Tel.2338 e-mail: <a href="mailto:abadran@philadelphia.edu.jo">abadran@philadelphia.edu.jo</a> Office hours: Sun, Tue. Thurs: 10:00- 11:00

## Course Topics

Week	Topics	Chepter in Text	Sections
1, 2	1-Energy classification, resources and utilization.	Chapter 1	Sec 1.1, 1.4, 1.5, 1.7
3, 4	2- Principal fuels for energy conversion.	Chapter 2	
5,6,7	3- Production of thermal energy.	Chapter 3	
8,9,10	4- Fossil fuel systems.	Chapter 4	
11,12	5- Environmental impact of power plant operation.	Chapter 6	
	7- Introduction to wind and solar energy	Ch. 2 + Ch. 7	2.5, 7.3.3
13	6- Production of electrical energy(by direct energy conversion	Chapter 8	
14	9- Geothermal energy.	Ch. 1 + Notes	
15	10- Energy storage and conservation.	Ch. 9	
16	11- Introduction to Nuclear energy	Ch.2, 3,5	2.4, 2.4.3, 3.6.5, 3.6.7, 5.2.1, 5.2.2

## Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should:

SO's	Course Outcomes	
SO3, SO5, SO6, SO7, SO8.	1. Identify energy consumption and utilization features on the global, regional and local levels.	a, c, e
	2. Predict energy consumption in a certain country given the growth rate is known.	a, c, e
	3. Figure out various properties, including the heating values for a mixture of gaseous, liquid and solid fuels.	c, e, f
	4. Calculate theoretical and actual air/fuel ratios for the combustion of fuels, especially coals, given their values are known.	c, e, f,
	5. Select basic draft systems for a power plant.	c, e, i
	6. Size and select a windmill for a given job.	c, e, i
	7. Size and select a solar collector for a given Job.	c, e, i
	8. Assess environmental impact of power plant operation.	c, e, f, i
	9. Analyze and calculate energy costs for a certain power plant and find the breakeven point for that plant.	c, e, f, i
	10. Estimate boiler efficiency.	c, e, f, i, j

### Assessment tools:

Evaluation of students' performance (final grade) will be based on the following:

**Exams:** Two written exams will be given, each will cover about 6-weeks of lectures

**Quizzes:** 15-minute quizzes will be given to the students during the semester. These quizzes will cover material based on homework problems given to students earlier.

**Homework:** Problem sets will be given to students. Homework should be solved individually but they do not have to be turned-in. Instead, students should be able to sit for a quiz in one of the homework problems, or a problem similar to it..

**Participation:** The grade for participation will be based on quizzes

**Final Exam:** The final exam will cover all the class material.

### Grading policy:

First Exam	20%
Second Exam	20%
Quizzes and participation	20%
Final Exam	40%

Total: 100%

### Attention to basic attendance policy:

Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.