Course Information

Title:	**Thermal Power Plant(620526)**
Prerequisite:	Thermodynamics 1 & 2
Credit Hours:	3 credit hours (16 weeks per semester, approximately 44 contact hours)
Textbook:	**Power-plant technology, M. M. El Wakil, 1984.** McGraw-Hill International Edition 1984
References:	1. (References) Power Plant Theory and Design, Phlip J. Plotter John Wiley & Sons, Inc. New York. 2. (References) Analysis of Engineering Cycles R. W. Haywood Pergamon Press, Oxford 3. Power Plant Engineering by PK Nag 4. Power Plant Engineering. by K. Raja, Amit prakash Srivastava, Manish Dwivedi
Catalog Description:	To provide an understanding of the thermodynamics of different power plant processes, efficiency (condensing power plant, advance power plants, gas turbine power plants, combined cycle power plants). Systems required for high performance within the thermal power plant engineering.
Website:	http://www.philadelphia.edu.jo/academics/adaraje /page https://simple.wikipedia.org/wiki/Thermal_power_plant http://www.electrical4u.com/thermal-power-generation-plant-or-thermal-power-station/ http://www.learnengineering.org/2013/01/thermal-power-plant-working.html
Instructor:	**Email**: aadaraje@philadelphia.edu.jo assim_yousif20000@yahoo.com **Office**: Mechanical Engineering building, room **E 61306**, ext: 2206 **Office hours**: Sun, Tues, Thurs: 14:15-15:30 and Mon, Wed: 10:00 -11:00

Course Topics

Course Learning Outcomes and Relation to ABET Student Outcomes:

Knowledge and understanding

- Understanding of Basic Concepts of Thermodynamics
- Working Fluid (Vaporization and Condensation)
- Basic understanding of thermal cycle's concepts.
- Knowledge of practical Carnot cycle, heat addition and ejection, isobaric (and not isothermal)

Theory of producing steam

- Steam generator versus steam boiler.
- Steam Generation Theory.

Understanding of Combustion Air Requirements: Gaseous Fuel

- How to solve the Combustion and Air Requirements for Solid andLiquid Fuels
- Understanding and analyzing, coal ultimate analysis.
- Combustion Products-Solid and Liquid Fuels

Understanding of the Generation of power plants

- Practical and subject specific skills (Transferable Skills)**.**
- Understanding how to improve the performance of power plant generation.
- Knowledge of Brayton Cycle and Combining Rankine and Brayton cycles.
- Turbomachinery, Describe in words the energy exchange process in each of the two blade rows

week	Basic and support material to be covered	Homework/reports and their due dates
(1)	Introduction and Basic Concepts of Thermodynamics	
(2)	Introduction to Thermal power plant	Report1Week 2
(3)	Introduction to Energy cycles	Assingment1 Week 4
(4)	Steam generators	Assingment2 Week 5

(5)	Boilers	Assingment3 Week 6
(6)	Tutorials, review and study guide of first exam material	Report2 Week 7
(7)	The Combustion Chemistry of Fuel	
(8)	Exhaust and Flue Gas Analysis	Assingment4 Week 9
(9)	Working Fluid (Vaporization and Condensation)	Assingment5 Week 10
(10)	Steam Turbine Cycles	Report3 Week 11
(11)	Rankine Cycle Rankine – Superheating and reheating	Assingment6 Week 12
(12)	Rankine - Regenerative	Assingment7 Week 13
(13)	Ges turbine plant	Assingment8 Week 14
(14)	Gas turbine plant, reheating and regenerative	Assingment9 Week 15
(15)	Turbomachinery	Report4 Week 15
(16)	Tutorials, review and study guide of final exam material	

Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should:

1	Knowledge and understanding - Basic Understanding of Basic Concepts of Thermodynamics - Working Fluid (Vaporization and Condensation)	[1]
2	- Basic understanding of thermal cycle's concepts. - Knowledge of practical Carnot cycle, heat addition and ejection, isobaric (and not isothermal)	[1]
3	Theory of Producing Steam. Steam generator versus steam boiler. Steam Generation Theory.	[1 & 2]
4	-Understanding of Combustion Air Requirements: Gaseous Fuel - How to solve the Combustion and Air Requirements for Solid, Liquid Fuels and tested of gaseous fuel combustion analysis.	[1 & 2]
5	- Understanding and analyzing. Coal ultimate analysis. Tested of Combustion Products-Solid and Liquid Fuels Understanding of the Generation of power plants Practical and subject specific skills (Transferable Skills)**.**	[2 & 7]
6	Understanding how to improve the performance of power plant generation and design application.	[2 & 7]
7 8	Knowledge of Combining Rankine and Brayton cycles, Understanding the Brayton cycle: the ideal cycle for gas turbine engine and how Gas Turbine works as an Electric power Generation.	[1 & 2]
9	The Brayton Cycle with Intercooling, Reheating, and Regeneration	[2 & 7]
10	Turbomachinery, Describe in words the energy exchange process in each of the two blade rows.	[1 & 2]

Assessment Instruments:

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

Exams: Two written exams will be given. Each will cover about 3-weeks of lectures

Quizzes: 10-minute quizzes will be given to the students during the semester. These quizzes will cover material discussed during the previous lecture(s).

Homework: Problem sets will be given to students. Homework should be solved individually and submitted before the due date.

Copying homework is forbidden, any student caught copying the homework or any part of the homework will receive zero mark for that homework

Participation: Questions will be asked during lecture and the student is assessed based on his/her response

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

Grading policy:

First Exam	20%
Second Exam	20%
Homework	5%
Quizzes and participation	15%
Final Exam	40%
Total:	100%

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.