Mechanical Engineering Dept. Department

Syllabus
ME 435: Thermal Power Plants (2-3-3)

Course Catalog Description:

Forms of energy, oil and gas. Combustion processes, Energy cycles. Steam generators and their component design, turbines, load curves. Field trips to power plants during laboratory hours.

Course Pre-requisites:

- ME 315: Heat Transfer

Course Objectives:

1. To familiarize the students with various energy resources and energy conversion methods available for the production of electric power
2. To provide the student with the tools to study and analyze thermal power plants performance

Course Learning Outcomes:

CLO1. Understand the energy resources and energy conversion methods available for the production of electric power

CLO2. Analyze and evaluate the performance of modern steam power plants

CLO3. Analyze and evaluate the performance of gas turbines with reheat and regeneration

CLO4. Analyze and evaluate the performance of combined cycles

CLO5. Understand and discuss power generation from renewable/alternate fuels and heat sources

CLO6. Enhancing team working and communication skills through field trips

CLO7. Discuss the environmental impact of electric power production on air quality and climate change

Learning Resources:

- No textbook covers more than 70 % of the material. Hence; a number of references are recommended. 1. Thermal Power Plant Performance Analysis, by Gilberto Francisco Martha de Souza, Springer, 2012 P.K. Nag. 2. Power plant engineering, Tata McGraw-Hill, 2008 3. Modem Power Plant Engineering by Wiesman and Eckert, Prentice Hall Inc., 1985

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Project	15	15.0%
Final exam	16	30.0%
Homework	4	10.0%
Quizzes	4	10.0%
Midterm exam	8	20.0%

Lab Assessment Plan:

Assessment Task	Week Due	Weight
Field trip report	15	15.0%

Lecture Weekly Schedule:

Week#	Topics
1	Introduction to power generation systems, load curves and Power Plants
2	Introduction to power generation systems, load curves and Power Plants (Continue)
3	Introduction to power generation systems, load curves and Power Plants (Continue)
4	Thermodynamics Review (1st and 2nd laws of thermodynamics)
5	Thermodynamics Review (1st and 2nd laws of thermodynamics) (Continue)
6	Steam Power Cycles (simple Rankine, reheat, regenerative)
7	Steam Power Cycles (simple Rankine, reheat, regenerative) (Continue)
8	Gas , Combined Power Cycles and Cogeneration Plants
9	Gas , Combined Power Cycles and Cogeneration Plants (Continue)
10	Fuels and combustion
11	Fuels and combustion (Continue)
12	Steam generators components: Superheaters, Reheaters , Economizers
13	Steam generators components: Superheaters, Reheaters , Economizers (Continue)
14	Turbines and cooling system
15	Turbines and cooling system (Continue)

Lab Weekly Schedule:

Week#	Topics
1	Field trips

Week#	Topics
2	Field trips (Continue)
3	Field trips (Continue)
4	Field trips (Continue)
5	Field trips (Continue)
6	Field trips (Continue)
7	Field trips (Continue)
8	Field trips (Continue)
9	Field trips (Continue)
10	Field trips (Continue)
11	Field trips (Continue)
12	Field trips (Continue)
13	Field trips (Continue)
14	Field trips (Continue)
15	Field trips (Continue)