MENG 446 – Thermal Power Engines

Department:
Mechanical Engineering

Program Name: Mechanical Engineering	**Program Code:** 23	
Course Code: MENG446	**Credits:** 4 Cr	**Year/Semester:** 2016-2017/Spring

☐ Required Course ☐ Service Course ☒ Elective Course

Prerequisite(s):
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Catalog Description:
Application of basic principles of thermodynamics, fluid mechanics and heat transfer; steam generating units; Fuels and combustion; steam and gas turbines, nuclear reactors, pumps, Blowers and compressors; Design of power cycles and associated components.

Course Web Page:
staff.emu.edu.tr/devrimaydin/en/meng446

Textbook(s):
Dipak K. Sarkar, Thermal Power Plant Design and Operation, Elsevier 2015.
M.M. El Wakil, Power Plant Technology, McGraw Hill
Cengel, Boles, Thermodynamics, 5th Edition, McGraw Hill.
Lab Manual:
Lab manuals wıll be posted to the web.

Indicative Basic Reading List :
There are many books in the library

Topics Covered and Class Schedule:
(3 hours of lectures + 1 hour of lab or tutorial per week)

Week 1-2:	Fundamentals of thermodynamics, heat transfer and thermal power technologies
Week 3-4:	Steam generators
Weeks 5-6:	Fuels and combustion
Weeks 7-8:	Midterm examination
Week 9-10:	Gas Power Cycles: Bryton Cycle, Bryton Cycle with Regeneration,
Week 11-12:	Vapor and Combined Power cycles
Week 13:	Power from Renewable and Nuclear Energy
Week 14:	Codes and standards for power plant design and operation
Week 15:	Final Examination

Laboratory Schedule:
(2 hours of laboratory per week)

Week 6	The Heat Engine
Week 10	Take home experiment (to be designed by student): Determination of the power rating of an electric kettle

Course Learning Outcomes:

At the end of the course, student must be able to
1- Understand basic concepts of thermodynamics and terms of thermodynamics.

2- Understand the concept of “System”.
3- Understand energy and energy transfer.
4- Comprehend energy analysis of a system.
5- Understand how to find the properties of pure substances.
6- Comprehend the energy analysis of a closed system.
7- Comprehend mass and energy analysis of open system.
8- Understandin the 2nd Law of Thermodynamics.
9- Understand heat engine, refrigerator, and heat pump.
10- Understand the cycle for Gas-Turbine and Vapor Cycle

	Method	**No**	**Percentage**
Assessment	Midterm Exam	1	30 %
	Quizzes	2	15 %
	Lab Report (s)	2	15 %
	Final Examination	1	40 %

Contribution of Course to Criterion 5
Credit Hours for:

Mathematics & Basic Science : 0
Engineering Sciences and Design : 3
General Education : 0

Relationship of Course to Program Outcomes
The course has been designed to contribute to the following program outcomes:

(a) apply knowledge of mathematics, science, and engineering
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(e) identify, formulate, and solve engineering problems

Prepared by: Asst. Prof. Dr. Devrim Aydin	**Date Prepared: 25th Feb 2017**

Important Dates:
Quiz I: 30TH March Thursday 2017, 11:30 am
Lab 1: 30th March Thursday 2017, 2:30 pm

NG Policy:
Students who do not attend both mid-term and final exams will be given NG.