

## Faculty of Engineering & Technology

### Thermal Power Systems

#### Information :

**Course Code :** MPR 355

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Specialization of Mechatronics Engineering

#### Instructor Information :

Title	Name	Office hours
Lecturer	Anas Mohamed Abdelrahman Ali	
Assistant Lecturer	Zakaria Mostafa Abdo Salim Marouf	10

#### Area Of Study :

- 1) Understand fundamentals of Thermal Power Systems
- 2) Apply the fundamental principles of Thermodynamics and Fluid Mechanics
- 3) Explore the fundamental principles of Heat Engines through analysis and experimentation
- 4) Develop skills for analyzing engines data and working in teams
- 5) Share ideas and work in a team.

#### Description :

Basic characteristics, analysis and performance of different types of engines and thermal power systems, including: steam power, combined cycles, petrol engines, diesel engines, gas turbines and jet engines. Latest developments in automotive engines technology.

#### Course outcomes :

##### a. Knowledge and Understanding: :

1 -	Identify principles in the field of design of fluid flow, thermodynamics, gas dynamics, turbo- machinery, heat transfer engineering and fundamentals of thermal and fluid processes
2 -	Describe conceptual and detailed design of fluid power systems
3 -	Explain the constraints which mechanical power engineers have to judge to reach at an optimum solution for thermal power systems.
4 -	Describe basic types of internal combustion engines and vapor power plants.

##### b. Intellectual Skills: :

1 -	Derive different solution alternatives for the engineering problems in thermal power systems, and evaluate different power losses.
2 -	Analyze the performance of the basic types of internal combustion engines and vapor power plants.
3 -	Demonstrate creative thinking.

##### c. Professional and Practical Skills: :

1 -	Classify different types of internal combustion engines based on different criteria.
2 -	Connect engine performance to design parameters, fuels and environmental conditions.

**d.General and Transferable Skills: :**

1 -	Write reports in accordance with the standard scientific guidelines.
2 -	Use digital libraries and/or Learning systems and demonstrate efficient IT capabilities.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Ideal Air and Gas Power Cycles(Otto Cycle . Petrol Engine)	4	2	2
Ideal Air and Gas Power Cycles(Diesel Engine, Brayton Cycles-Gas Turbine)	8	4	4
Vapor Power Cycles (Basic Rankine and Superheat Cycles) + Midterm Examination 1	8	4	4
Improving Efficiency of Vapor Power Cycles (Reheat, Regeneration and Co-generation)	4	2	2
Improving Efficiency of Vapor Power Cycles (Combined and Binary Cycles)	4	2	2
Actual Cycles, Reheat, Regeneration	8	4	4
Gas Turbines and Jet Propulsion Systems (Jet Propulsion, Modifications to Turbojet Engines, Ramjets) + Mid-term Examination 2	8	4	4
Revision of Basic Principles of Thermodynamics (Definitions, Concepts, Fluid Properties Fundamental Laws)	8	4	4
Operating Characteristics of Reciprocating Engines(Engine Parameters, Efficiencies, Emissions and Noise)	8	4	4

**Teaching And Learning Methodologies :**

Interactive Lecture
Problem based learning
Discussion
Experimental learning
Project based learning
Research

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
1st -Mid-term examination	25.00	6	
2 nd -Mid-term examination	25.00	11	
Final examination	40.00	16	
General Performance	10.00	15	

**Recommended books :**

