



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Thermal Power Plants – ERE174

Academic Year	2025/2026	Semester	Fall
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1. Basic Information

Course Title (according to the bylaw)	Thermal Power Plants				
Course Code (according to the bylaw)	ERE174				
Prerequisite:	Heat Transfer – GME221, Fluid Mechanics and Turbo-Machinery – GME212				
Department/s participating in delivery of the course	Electrical and Renewable Energy Engineering				
Number of credit hours/points of the course (according to the bylaw)	Credit Hours	Contact Hours			
		Lecture	Tutorial	Practical	Total
	3	2	2	0	4
Course Type	Elective - Minor Requirements of Electrical and Renewable Energy Engineering				
Academic level at which the course is taught	Fifth Level				
Academic Program	Bachelor of Engineering of Electrical and Renewable Energy				
Faculty/Institute	Faculty of Engineering				
University/Academy	Nahda University				
Name of Course Coordinator	Prof. Dr. Mohamed Mahmoud Samy				
Course Specification Approval:	Department council		Faculty council		
Date of Approval of the course Specification:	13 / 9 / 2025		16 / 9 / 2025		



2. Course Overview

Rankine Cycle Processes and Calculations, Methods of Improvement in Rankine Cycle Thermal Efficiency, Superheat, Reheat, Regenerative Rankine Cycles, Regeneration with an Open Type Feed Water Heater, Regeneration with a Closed Type Feed Water Heater, Fire Tube Boilers, Construction and Operation, Water Tube Boilers, Superheaters, Economizers, Air Heaters, Steam Generator Losses and Efficiency, Work of Turbines, Impulse Turbines, Reaction Turbines, Effect of Dryness Fraction on the Turbine Efficiency and Turbine Life-Time, Types of Condensers, Deaerators, Ejectors, Construction of Feed Water Heaters, Steam Pipes and Steam Traps, Cooling Towers, Natural Draft and Forced Draft, Water Pumps.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies	CLO1	Recognize the basic concepts of the Thermal Power Plants
B1	Select, model and analyze electrical power systems applicable to the Electrical Power and Renewable Energy Engineering Program by applying the concepts of: generation, transmission and distribution of electrical power systems	CLO3	Analyze the Thermal Power Plants
		CLO2	Explain the theory of the Thermal Power Plants
B3	Design and implement: elements, modules, sub-systems or systems in electrical / electronic / digital engineering using technological and professional tools.	CLO4	Design the Thermal Power Plants
		CLO5	Develop simulation to protect power systems using any ETAP packages
D1	Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations	CLO4	Design the Thermal Power Plants



4. Teaching and Learning Methods

1. Interactive Lectures
2. Self-Learning
3. Discussion
4. Tutorials
5. Field Visits

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours				
			Lecture Hours	Tutorial Hours	Practical Hours	Self-learning (Assignments/Project)	Other
1	Introduction to Mechanical system components, Rankine Cycle Processes and Calculations	7	2	2	0	3	-
2	Introduction to Mechanical system components, Rankine Cycle Processes and Calculations	7	2	2	0	3	-
3	Superheat, Reheat, Regenerative Rankine Cycles, Regeneration with an Open Type Feed Water Heater Regeneration with a Closed Type Feed Water Heater	7	2	2	0	3	-
4	Superheat, Reheat, Regenerative Rankine Cycles, Regeneration with an Open Type Feed Water Heater Regeneration with a Closed Type Feed Water Heater	7	2	2	0	3	-
5	Fire Tube Boilers	9	2	2	0	3	Quiz 1 (2 Hr)
6	Construction and Operation, Water Tube Boilers, Superheaters, Economizers	7	2	2	0	3	-
7	Mid Term Exam						
8	Construction and Operation, Water Tube Boilers, Superheaters, Economizers	7	2	2	0	3	-
9	Air Heaters, Steam Generator Losses and Efficiency, Work of Turbines, Impulse Turbines, Reaction Turbines	7	2	2	0	3	-



10	Air Heaters, Steam Generator Losses and Efficiency, Work of Turbines, Impulse Turbines, Reaction Turbines	9	2	2	0	3	Quiz 2 (2 Hr)
11	Reaction Turbines	7	2	2	0	3	-
12	Effect of Dryness Fraction on the Turbine Efficiency and Turbine Life-Time	7	2	2	0	3	-
13	Types of Condensers, Deaerators, Ejectors, Construction of Feed Water Heaters, Steam Pipes and Steam Traps, Cooling Towers, Natural Draft and Forced Draft, Water Pumps	7	2	2	0	3	
14	Types of Condensers, Deaerators, Ejectors, Construction of Feed Water Heaters, Steam Pipes and Steam Traps, Cooling Towers, Natural Draft and Forced Draft, Water Pumps	7	2	2	0	3	-
15	Revision	7	2	2	0	3	-
16	Final Term Exam						

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Mid-term written Exam	7	20	20%
2	Final Written Exam	16	40	40%
3	Assignments and attendance	1-15	30	30%
4	Quizzes	10	10	10%



6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	Er.R.K. Rajput, A Text Book of Power Plant Engineering, Laxmi publications (P) LTD, 2016.
	Other References	Rasul, Mohammad, ed. Thermal power plants. BoD–Books on Demand, January 13, 2012
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data Show
	Supplies	White Board
	Electronic Programs	MATLAB and ETAP Software Programs
	Skill Labs/ Simulators	–
	Virtual Labs	–
	Other (to be mentioned)	Lecture Hall and Laboratory Usage

Prof. Dr. Mohamed Mahmoud Samy
Course Coordinator

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Program Coordinator