The University of Jordan
School of Engineering

Department	Course Name	Course Number	Semester
Mechanical Engineering	Thermodynamics II (Blended)	0904342	

2019 Course Catalog Description

Review of basic laws and principles. Irreversibility and availability, gas and vapor power cycles, refrigeration cycles. Mixtures of real gases and vapors. Psychrometry. Combustion. Elementary chemical kinetics and flow of compressible fluid.

Instructors

Name	E-mail	Sec	Office Hours		Lecture Time	
			Su, Tu	Mon, We,	Su,, Tue, Thu	Mon, We

Text Books

	Text book 1	Text book 2
Title	Thermodynamics / An Engineering Approach	
Author(s)	Y. Cengel and M. Boles	
Publisher, Year, Edition	McGraw Hill, 2022, 10th SI or 9th, edition SI	

References

Books	1. Fundamentals of Thermodynamics, R. Sonntag, C. Borgnakke, and G. Van Wylen, sixth edition, 2003, John Wiley and Sons, Inc. USA. 2. Fundamentals of Engineering Thermodynamics, H. Shapiro and M. Moran, Fifth edition, 2004, John Wiley and Sons, Inc. USA.
Journals	Journal of Thermodynamics
Internet links	http://www.hindawi.com/journals/jther/

Prerequisites

Prerequisites by topic	Steam properties, first and second law, ideal gas laws and entropy
Prerequisites by course	Thermodynamics I (0904341)
Co-requisites by course	-
Prerequisite for	Internal Combustion Engines (0934545), Power plant and Desalination (0954443), Air conditioning I (0934445), and Energy Conversion (0904459)

Topics Covered

Week	Topics	Chapter in Text	Sections
1-2	1. Air standard power cycles with exergy analysis 2. Vapor power cycles with exergy analysis	9 10	All
3-4	3. Refrigeration cycles with exergy analysis 4. Gas mixtures 5. Gas-Vapor Mixtures and Psychrometry	11 13 14	All
5	6. Combustion and Chemical reactions	15-16	All
6	7. Compressible fluid flow (If time allows)	17	All

Mapping of Course Outcomes to ABET Student Outcomes

SOs	Course Outcomes
1	1. Understand how to calculate the properties of ideal/non-ideal gas mixtures and apply this to calculate the properties of air-water vapor mixtures (and psychrometric chart), and chemical thermodynamics processes including air fuel ratio and heat of combustion reactions. 2. Calculate input work for thermodynamics heat pumps and refrigeration cycles and apply first and second law concepts to cascade refrigeration cycles and calculate their performance parameters and methods for improvement.
2	3. Understand how thermodynamics power cycles work and apply first and second law concepts to thermodynamic steam and air standard power cycles to calculate their performance parameters including first and second law efficiencies.

Evaluation

Assessment Tools	Expected Due Date	Weight
Midterm Exam	TBA	30 %
Second exam	TBA	20 %
Final Exam	One or two days before final exams	50 %

Contribution of Course to Meet the Professional Components

The course contributes to building the skills of design and selection of basic gas and vapor power cycles, refrigeration, and air conditioning systems plants, and calculation of heat transfer from combustion.

Relationship to Student Outcomes

SOs	1	2	3	4	5	6	7
Availability	X	X					

Relationship to Mechanical Engineering Program Objectives (MEPOs)

MEPO1	MEPO2	MEPO3	MEPO4	MEPO5
H	M			

ABET Student Outcomes (SOs)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Updated by Jamil Al Asfar, 2024