

**The University of Jordan  
School of Engineering**



Department	Course Name	Course Number	Semester
Mechanical Engineering	Thermodynamics II	0904342	

**2005 Course Catalog Description**

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

**Instructors**

Name	E-mail	Sec	Office Hours		Lecture Time	

**Text Books**

	Text book 1	Text book 2
<b>Title</b>	Thermodynamics / An Engineering Approach	
<b>Author(s)</b>	Y. Cengel and M. Boles	
<b>Publisher, Year, Edition</b>	McGraw Hill, 2011, 7 <sup>th</sup> SI	

**References**

<b>Books</b>	<ol style="list-style-type: none"> <li>Fundamentals of Thermodynamics, R. Sonntag, C. Borgnakke, and G. Van Wylen, sixth edition, 2003, John Wiley and Sons, Inc. USA.</li> <li>Fundamentals of Engineering Thermodynamics, H. Shapiro and M. Moran, Fifth edition, 2004, John Wiley and Sons, Inc. USA.</li> </ol>
<b>Journals</b>	Journal of Thermodynamics
<b>Internet links</b>	<a href="http://www.hindawi.com/journals/jther/">http://www.hindawi.com/journals/jther/</a>

**Prerequisites**

<b>Prerequisites by topic</b>	Steam properties, first and second law, ideal gas laws and entropy
<b>Prerequisites by course</b>	Thermodynamics I
<b>Co-requisites by course</b>	-
<b>Prerequisite for</b>	Internal Combustion Engines ; Power plant ; Air conditioning and Energy Conversion

**Topics Covered**

Week	Topics	Chapter in Text	Sections
1	<ol style="list-style-type: none"> <li>Refrigeration cycles with exergy application</li> <li>Gas mixtures</li> <li>Chemical reactions</li> <li>Compressible fluid flow (If time permits)</li> </ol>	12 14 16	
2	5. Gas-Vapor Mixtures and Psychrometry	15	
2-3	6. Air standard power cycles with exergy application	9-11	
4	7. Vapor power cycles with exergy application	10	

### 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 chemical thermodynamics processes. 2. Calculate stagnation properties of high-speed flows and apply these properties for one-dimensional, compressible flow to isentropic flow through nozzles and to the process occurring across a normal shock wave.
2	3. Understand how thermodynamics cycles work and apply first and second law concepts to thermodynamic cycles to calculate their performance parameters and methods for their improvement

#### Evaluation

Assessment Tools	Expected Due Date	Weight
First Exam		30 %
Second Exam		30 %
Final Exam		40 %

#### 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

#### ABET Student Outcomes (SOs)

<b>1</b>	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
<b>2</b>	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
<b>3</b>	An ability to communicate effectively with a range of audiences
<b>4</b>	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
<b>5</b>	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
<b>6</b>	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
<b>7</b>	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

**Updated by ABET Committee, 2019**