COURSE PLAN

FIRST: AUTOMOTIVE ENGINEERING

College	
College	Faculty of Engineering Technology
Department	Mechanical Engineering
Course	
Course Title	Thermal Engineering
Course Code	020201146
Credit Hours	2 (2 Theoretical, 0 Practical)
Prerequisite	
Instructor	
Name	Dr. Waleed Momani
Office No.	199
Tel (Ext)	199
E-mail	Momani.w@bau.edu.jo
Office Hours	
Class Times	

Building	Day	Start Time	End Time	Room

Text Book

Title : 1. محاضرات في الديناميكا الحرارية ، اعداد م .محمد حسن جبر
2. أساسيات الديناميكا الحرارية الكالسيكية، الطبعة الثانية ، وايلن وسوننتاج، مركز الكتب الأردن

References

1. Thermodynamics: An Engineering Approach, Y. Cengel, M. Boles, 4th edition, McGraw Hill
2. Thermodynamics: Dr. Waleed Momani , Eng. Ayad Aldahwki, and Eng. Mahmud Alomari

SECOND: PROFESSIONAL INFORMATION

COURSE DESCRIPTION

This course covers a theoretical knowledge of the concepts and definitions, work and heat, first law of thermodynamics, second law of thermodynamics, ideal gas, properties of a pure substance, principles of heat transfer, steady state conduction, fins, radiation and heat exchangers.

COURSE OBJECTIVES

The objective of this course is to enable the student to do the following:

~~Explain the concepts and definitions of thermal engineering~~
~~Explain the properties of a pure substance.~~
~~Explain the work and heat.~~
~~Explain the laws of thermodynamics~~
~~Explain thermodynamic tables~~
~~Explain the principles of heat transfer, conduction and radiation~~
~~Explain fins and heat exchangers~~

COURSE LEARNING OUTCOMES

By the end of the course, the students will be able to:

CLO1. Explain the concepts and definitions of thermal engineering
CLO2. Explain the properties of a pure substance
CLO3. Explain the work and heat
CLO4. Explain the first law of thermodynamics
CLO5. Explain the second law of thermodynamics
CLO6. Explain thermodynamic tables
CLO7. Explain the principles of heat transfer
CLO8. Explain the steady state conduction
CLO9. Explain the radiation heat transfer
CLO10. Explain fins and heat exchangers

COURSE SYLLABUS

Week	Topic	Topic Details	Reference (Chapter)	Proposed Assignments
1	Concepts and definitions 1	• System • Processes • Cycles • Specific Volume	CLO1	
2	Concepts and definitions 2	• Pressure • Temperature scales • Zeroth law of thermodynamics • Units	CLO1	Report
3	Properties of a pure substance 1	• Pure Substance • Phases of a Pure substance • Phase-Change Processes of Pure Substances a) Compressed Liquid and Saturated Liquid b) Saturated Vapor and Superheated Vapor c) Saturation Temperature and Saturation Pressure	CLO2	
4	Properties of a pure substance 2	• Property Diagrams for Phase-Change Processes a) The T-v Diagram b) The P-v Diagram • Extending the Diagrams to Include the Solid Phase a) The P-T Diagram • The P-v-T Surface	CLO2	Report
5	Work and heat 1	• Definition and units of work • Work done at the moving boundary of a simple compressible system. • Polytropic Process • Energy Balance for Closed Systems • Specific Heats	CLO3	
6	Work and heat 2	• Definition and units of heat • Relation between work and heat • Internal Energy, Enthalpy, and Specific Heats of Ideal Gases	CLO3	Report

Week	Topic	Topic Details	Reference (Chapter)	Proposed Assignments
		a) Specific Heat Relations of Ideal Gases		
7	First law of thermodynamics	• The change in state of a system • Internal energy • Enthalpy • Internal energy • Enthalpy and constant volume	CLO4	
8	**Midterm Exam**			
9	First law of thermodynamics	• Pressure specific heats for ideal gases • The first law of thermodynamics for a control volume • The steady state, steady flow process	CLO4	Report
10	The second law of thermodynamics	• Heat engine, refrigerator and heat pump • Reversible process • Carnot cycle and reverse Carnot cycle • Reversible process and entropy • Entropy change of an ideal gas • Polytrophic and adiabatic reversible process	CLO5	
11	Thermodynamic tables	• Properties of a pure substance • Vapor liquid-solid phase equilibrium in a pure substance • Equation of a state, tables of thermodynamic properties.	CLO6	
12	Principles of heat transfer	• Conduction heat transfer • Plane wall • Plane wall in series and parallel • Electro analog for conduction • Contact resistance • Convection heat transfer	CLO7	Report
13	Steady state conduction	• Steady one dimensional conduction equation in rectangular coordinates and cylindrical coordinates.	CLO8	
14	Radiation	• Physics of radiation, planks law • Radiation properties • Gray bodies • Black body	CLO9	
15	fins and heat exchangers	• Fins, types of fins • Fin efficiency • Heat exchangers types • Overall heat transfer coefficient • The log-mean temperature difference.	CLO10	
16	**Final Exam**			

COURSE LEARNING RESOURCES

The effectiveness of teaching in this course depends on making students familiar with the work and heat, first law of thermodynamics, second law of thermodynamics, ideal gas, properties of a pure substance, Principles of heat transfer, steady state conduction, fins, radiation, and heat exchangers.

Teaching methods:

• Lectures and Home Works: using PowerPoint for, example, by the teacher to provide the students with the all information that they need,

• Online research skills, watching related videos such as you tube, on topics related to course objectives and recent developments in the field of specific work.
• Learning skills.

ONLINE RESOURCES

https://www.barnesandnoble.com/w/automotive-technology-james-d-halderman
https://www.youtube.com/watch?v=3mhRD8yzB2E
https://www.youtube.com/watch?v=wfvVFA1Q2C0

ASSESSMANT TOOLS

(Write assessment tools that will be used to test students ability to understand the course material and gain the skills and competencies stated in learning outcomes

ASSESSMENT TOOLS	%
Quizzes	6
Quizzes	6
Researches and Reports	8
Mid Exam	30
Final Exam	50
TOTAL MARKS	100

THIRD: COURSE RULES

ATTENDANCE RULES

Attendance and participation are extremely important, and the usual University rules will apply. Attendance will be recorded for each lab. Absence of 10% will result in a first written warning. Absence more than 15% of the course with or without medical reasons will result in forfeiting the course and the student will not be permitted to attend the final examination

GRADING SYSTEM

Example:

0 – 49 Fail
50 – 100 Pass

REMARKS

{The instructor can add any comments and directives such as the attendance policy and topics related to ethics}

COURSE COORDINATOR

Course Coordinator: Dr. Waleed Momani	**Department Head:**
Signature:	**Signature:**
Date:	**Date:**