



**DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.**

Course Syllabus

- 1. Course number and name**
ME 345 Thermal Fluid Sciences
- 2. Credits and contact hours**
(3+0) 3 credit hours, 3 contact hours
- 3. Course type**
Face to face Learning Course (2+1)
- 4. Instructor's or course coordinator's name**
Eng. Dia' A. Afaneh
- 5. Textbook information**
6. Cengel, Y., Turner, R., and Cimbala, J., Fundamentals of Thermal-fluid Sciences, 5th edition. 2017: McGraw-Hill.
ISBN: 978-9-814-72095-3
 - a. Other supplemental materials**
Instructor's notes
- 7. Specific course information**
 - a. Catalog description**
Thermodynamics: basic concepts, energy, energy transfer by work, first law of thermodynamics, properties of pure substances, thermodynamics cycles. Fluid mechanics: viscosity, fluid statics, fluid kinematics. Heat transfer: mechanisms of heat transfer, and heat exchangers.
 - b. Prerequisites or co-requisites**
Prerequisite: CEE 203 Advanced Engineering Math I
 - c. The course is:**
Required in Industrial Engineering Department.
- 8. Specific goals for the course**
 - a. Course outcomes:**
After completion of the course, students are expected to be able to:



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1. Discuss of the moving boundary work, applying the general energy balance relation, and apply the energy balance to systems that involve steady-flow processes
2. Analyze certain power and refrigeration cycles.
3. Discuss of the hydrostatic forces applied on submerged bodies and buoyant force applied by fluids on submerged or floating bodies.
4. Describe the three basic mechanisms of heat transfer, which are conduction, convection, and radiation.

b. The following student outcomes are addressed by the course:

SO-(a): an ability to apply knowledge of mathematics, science, and engineering

SO-(e): an ability to identify, formulate, and solve engineering problems.

9. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
Discuss of the moving boundary work, applying the general energy balance relation, and apply the energy balance to systems that involve steady-flow processes	-	Lectures (Example and Problems)	Question in exam
Analyze certain power and refrigeration cycles.	-	Lectures (Example and Problems)	Question in exam
Discuss of the hydrostatic forces applied on submerged bodies and buoyant force applied by fluids on submerged or floating bodies.		Lectures (Example and Problems)	Question in exam
Describe the three basic mechanisms of heat transfer, which are conduction, convection, and radiation.	-	Lectures (Example and Problems)	Question in exam
Student Outcomes			
SO-(a): an ability to apply knowledge of mathematics, science, and engineering			



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SO-(e): an ability to identify, formulate, and solve engineering problems.			
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10. Weekly Teaching Plan

Week No.	Lecture	Topic	Method of Delivery
1	Sun (9-10)	Chapter 1: INTRODUCTION AND OVERVIEW	Lecture
	Tue (9-10)	Chapter 1: INTRODUCTION AND OVERVIEW	Lecture
	Thu (9-10)	Chapter 1: INTRODUCTION AND OVERVIEW	Lecture
2	Sun (9-10)	Chapter 2: BASIC CONCEPTS OF THERMODYNAMICS	Lecture
	Tue (9-10)	Chapter 2: BASIC CONCEPTS OF THERMODYNAMICS	Lecture
	Thu (9-10)	Chapter 2: BASIC CONCEPTS OF THERMODYNAMICS	Lecture
3	Sun (9-10)	Chapter 3: ENERGY, ENERGY TRANSFER, AND GENERAL ENERGY ANALYSIS (3.1-3.2)	Lecture
	Tue (9-10)	Chapter 3: ENERGY, ENERGY TRANSFER, AND GENERAL ENERGY ANALYSIS (3.3-3.5)	Lecture
	Thu (9-10)	Chapter 3: ENERGY, ENERGY TRANSFER, AND GENERAL ENERGY ANALYSIS (3.6-3.7)	Lecture
4	Sun (9-10)	Chapter 4: PROPERTIES OF PURE SUBSTANCES (4.1-4.2)	Lecture
	Tue (9-10)	Chapter 4: PROPERTIES OF PURE SUBSTANCES (4.3-4.4)	Lecture
	Thu (9-10)	Chapter 4: PROPERTIES OF PURE SUBSTANCES (4.5)	Lecture
5	Sun (9-10)	Chapter 4: PROPERTIES OF PURE SUBSTANCES (4.6)	Lecture
	Tue (9-10)	Chapter 4: PROPERTIES OF PURE SUBSTANCES (4.7)	Lecture
	Thu (9-10)	First Exam	Exam
6	Sun (9-10)	Chapter 5: ENERGY ANALYSIS OF CLOSED SYSTEMS (5.1)	Lecture



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	Tue (9-10)	Chapter 5: ENERGY ANALYSIS OF CLOSED SYSTEMS (5.2)	Lecture
	Thu (9-10)	Chapter 5: ENERGY ANALYSIS OF CLOSED SYSTEMS (5.3)	Lecture
7	Sun (9-10)	Chapter 5: ENERGY ANALYSIS OF CLOSED SYSTEMS (5.4)	Lecture
	Tue (9-10)	Chapter 5: ENERGY ANALYSIS OF CLOSED SYSTEMS (5.5)	Lecture
	Thu (9-10)	Chapter 5: ENERGY ANALYSIS OF CLOSED SYSTEMS (Examples)	Lecture
8	Sun (9-10)	Chapter 6: MASS AND ENERGY ANALYSIS OF CONTROL VOLUMES (6.1)	Lecture
	Tue (9-10)	Chapter 6: MASS AND ENERGY ANALYSIS OF CONTROL VOLUMES (6.2-6.3)	Lecture
	Thu (9-10)	Chapter 6: MASS AND ENERGY ANALYSIS OF CONTROL VOLUMES (6.4)	Lecture
9	Sun (9-10)	Chapter 6: MASS AND ENERGY ANALYSIS OF CONTROL VOLUMES (6.4)	Lecture
	Tue (9-10)	Chapter 6: MASS AND ENERGY ANALYSIS OF CONTROL VOLUMES (6.4)	Lecture
	Thu (9-10)	Chapter 6: MASS AND ENERGY ANALYSIS OF CONTROL VOLUMES (6.5)	Lecture
10	Sun (9-10)	Chapter 7: THE SECOND LAW OF THERMODYNAMICS (7.1-7.3)	Lecture
	Tue (9-10)	Chapter 7: THE SECOND LAW OF THERMODYNAMICS (7.4-7.6)	Lecture
	Thu (9-10)	Chapter 7: THE SECOND LAW OF THERMODYNAMICS (7.7-7.10)	Lecture
11	Sun (9-10)	Chapter 9: POWER AND REFRIGERATION CYCLES (9.1-9.3)	Lecture
	Tue (9-10)	Chapter 9: POWER AND REFRIGERATION CYCLES (9.4-9.5)	Lecture
	Thu (9-10)	Second Exam	Exam
12	Sun (9-10)	Chapter 9: POWER AND REFRIGERATION CYCLES (9.9-9.10)	Lecture
	Tue (9-10)	Chapter 9: POWER AND REFRIGERATION CYCLES (9.11-9.13)	Lecture
	Thu (9-10)	Chapter 9: POWER AND REFRIGERATION CYCLES (9.14-9.18)	Lecture



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13	Sun (9-10)	Chapter 10: INTRODUCTION AND PROPERTIES OF FLUIDS (10.1-10.2)	Lecture
	Tue (9-10)	Chapter 10: INTRODUCTION AND PROPERTIES OF FLUIDS (10.3-10.4)	Lecture
	Thu (9-10)	Chapter 10: INTRODUCTION AND PROPERTIES OF FLUIDS (10.5)	Lecture
14	Sun (9-10)	Chapter 11: FLUID STATICS (11.1-11.2)	Lecture
	Tue (9-10)	Chapter 11: FLUID STATICS (11.3)	Lecture
	Thu (9-10)	Chapter 11: FLUID STATICS (11.4)	Lecture
15	Sun (9-10)	Chapter 16: MECHANISMS OF HEAT TRANSFER (16.1-16.2)	Lecture
	Tue (9-10)	Chapter 16: MECHANISMS OF HEAT TRANSFER (16.3-16.4)	Lecture
	Thu (9-10)	Chapter 16: MECHANISMS OF HEAT TRANSFER (16.5)	Lecture

11. Grade Distribution:

Assessment	Grade	Date
- First Exam	20%	Fifth Week
- Second Exam	20%	10 th Week
- Assignments	10%	
- Final Examination	50%	16 th Week

* Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.