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Department of Mechanical Engineering	
Principles of Thermo-Fluids &Heat Transfer (67261)	
Total Credits	**3**
major compulsory	
Prerequisites	P1 : General Chemistry I (23101) P2 : Statics (61110) OR Statics (67211)

Course Contents

A study of concepts involved in fluid mechanics, heat transfer and thermodynamics. Applications of the continuity and energy equations. Properties of fluids, fluid statics and fluid dynamics. Further, a study on thermodynamic systems and boundaries and the basic concepts of thermodynamic properties including temperature, pressure, volume, enthalpy, entropy, internal energy, and specific heat. Basic laws of thermodynamics: conservation of mass, conservation of energy (first law) and second law of thermodynamics. Concepts of work and energy transfer by heat transfer by conduction, convection and radiation.

Intended Learning Outcomes (ILO's)		Student Outcomes (SO's)	Contribution
1	Apply knowledge of mathematics, science, and engineering in thermal fluid sciences.	A	40 %
2	Identify, formulate, and solve problems in thermodynamics,fluid mechanics and heat transfer .	E	50 %
3	Design a typical process to meet the desired needs in thermal fluid sciences .	C	10 %

Textbook and/ or Refrences

RECOMMENDED TEXTBOOK: Moran, M. J., (Shapiro, H. N., Munson, B. R., &DeWitt, D. P. (2003). Introduction to Thermal Systems Engineering: Thermodynamics, Fluid Mechanics and Heat Transfer. USA: John Wiley and Sons. References: Y. A. Gengel, Heat Transfer A Practical Approach, McGraw-Hill, 2003. Y. A. Çengel and M. A. Boles, Thermodynamics - An Engineering Approach, 4th Edition, McGraw-Hill, 2002.

Assessment Criteria	Percent (%)
First Exam	20 %
Second Exam	25 %
Quizzes	5 %
Final Exam	50 %

Course Plan

Week	Topic
1-2	CHAPTER 1: What is Thermal Systems Engineering? 1.1 Getting Started 1.2 Thermal System Case Studies 1.3 Analysis of Thermal System CHAPTER 2: Getting Started In Thermodynamics: Introductory Concepts and Definitions 2.3 Units and Dimensions 2.4 Two Measurable Properties: Specific Volume and Pressure 2.5 Measuring Temperature
3-4	CHAPTER 11:Getting Started In Fluid Mechanics: Fluid Statics 11.1 Pressure Variation In A Fluid at A Rest 11.2 Measurement of Pressure 11.3 Manometry 11.4 Mechanical and Electronic Pressure Measuring Devices 11.5 Hydrostatic Force on A Plane Surface 11.6 Buoyancy
4-5	CHAPTER 12: The Momentum and Mechanical Energy Equations 12.1 Fluid Flow Preliminaries 12.2 Momentum Equation 12.3 Applying The Momentum Equation 12.4 The Bernoulli Equation 12.5 Further Examples of Use of The Bernoulli Equation 12.6 The Mechanical Energy Equation 12.7 Applying The Mechanical Energy Equation
5	FIRST MIDTERM EXAM

6-8	CHAPTER 14:Internal And External Flow 14.1 General Characteristics of Pipe Flow 14.2 Fully Developed Laminar Flow 14.4 Fully Developed Turbulent Flow 14.5 Pipe Flow Head Loss 14.6 Pipe Flow Examples
9-10	CHAPTER 15:Getting started in Heat transfer: Modes, Rate Equations and Energy Balances 15.1 Heat Transfer Modes: Physical Origins And Rate Equations 15.2 Applying The First Law In Heat Transfer 15.3 The Surface Energy Balance
11-13	CHAPTER 16: Heat Transfer By Conduction 16.1 Introduction to Conduction Analysis 16.2 Steady State Conduction
13	Second Midterm Exam
14-14.5	CHAPTER 2:Getting Started In Thermodynamics: Introductory Concepts And Definitions 2.1 Defining Systems 2.2 Describing Systems and Their Behavior
14.5-15	CHAPTER 3:Using Energy And The First Law Of Thermodynamics 3.1 Reviewing Mechanical Concepts of Energy 3.2 Broadening Our Understanding of Work 3.3 Modeling Expansion Or Compression Work 3.4 Broadening Our Understanding of Energy 3.5 Energy Transfer By Heat 3.6 Energy Accounting: Energy Balance for Closed Systems 3.7 Energy Analysis of Cycles
16	FINAL EXAM