

<b>Department of Industrial Engineering</b>			
<b>Fluid &amp; Thermal Sciences (65304)</b>			
<b>Total Credits</b>	<b>3</b>		
<b>major compulsory</b>			
<b>Prerequisites</b>	P1 : Calculus II (21102)		
<b>Course Contents</b>			
This course begins with an introduction to properties of fluids, fluid statics and fluid dynamics applications of conservation of energy to fluid systems. Then it moves to first and second laws of thermodynamics, irreversibility and availability with application to pure substances and Ideal gases, one dimensional conduction, convection heat transfer.			
<b>Intended Learning Outcomes (ILO's)</b>		<b>Student Outcomes (SO's)</b>	<b>Contribution</b>
1	Apply knowledge of mathematics, science, & engineering in thermal fluid sciences.	A	40 %
2	Identify, formulate, & solve problems in Fluid mechanics, heat transfer and thermodynamics.	E	50 %
3	Design a system, component, or process to meet desired needs in thermal fluid sciences.	C	10 %
<b>Textbook and/ or References</b>			
Textbook (Online Resources) 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. ISBN: 0471204900. 1. Mott, R. L. (1994). Applied Fluid Mechanics (4th ed.). New Jersey: Prentice Hall. 2. Cengel, & Boles. (1989). Thermodynamics, An Engineering Approach. McGraw-Hill. 3. Kaminski, D. A., & Jensen, M. K. (2005). Introduction To Thermal And Fluids Engineering. John Wiley and Sons. 4. Potter, M. C., & Scott, E. P. (2004). Thermal Sciences: An Introduction to Thermodynamics, Fluid Mechanics and Heat Transfer. Thomson Learning.			
<b>Assessment Criteria</b>		<b>Percent (%)</b>	
First Exam		25 %	
Second Exam		25 %	
Homeworks		10 %	
Final Exam		40 %	
<b>Course Plan</b>			
<b>Week</b>	<b>Topic</b>		
1	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		
2-3.5	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		
3.5-5	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 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