Course Number	ME 311
Course Title	**Thermodynamics 1**
Course Structure	(3-0-3) (lecture-lab-course credit)
Course Coordinator	D. Datta
Course Description	Thermodynamic fundamentals. Introduction to the basic concept of energy and the laws governing the transfer and transformation of energy. Thermodynamic properties and the application of the first and second laws of thermodynamics in the analysis of closed and open systems. Availability analysis is introduced. These concepts are then integrated into the analysis of simple cycles.
Pre-requisite(s)	Math 211- Calculus 111; Phys 111-Physics 1
Co-requisite(s)	None
Required Materials	Yunus A. Cengel and Michael A. Boles. THERMODYNAMICS: An Engineering Approach , 8th Edition, McGraw-Hill, NY, 2016, ISBN 978-0-07-352932-5 Property Table to Accompany 7th Ed. McGraw Hill, 2011 Software: EES, McGraw-Hill
Computer Usage	EES Software -for Homework Problems, property values

COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:	Course Learning Outcomes	SOs*	Expected Performance Criteria
	1 Identify the properties of real substances, such as water from tabular data, ideal gases from tabular data or equation of state and other real gases P,v,T, data through the use of the compressibility charts.	1, 2	**Exam:** At least 70% of the students will successfully Identify the state, obtain correct property values and earn a grade of at least 65% of problem value for problems including this outcome.
	2. Analyze processes involving real substances and ideal gases as working fluid in both the open and closed systems, apply the first law, the conservation of mass to perform both mass and energy balances, sketch process diagrams, and to determine work and heat transfers.	1, 2	**Exam:** At least 75% of the students will identify the system and apply the correct laws of thermodynamics to analyze and model the given system and earn a grade of at least 65% of the problem value for problems including this outcome.

	3. Analyze open and closed systems through the application of the second law of thermodynamics as well as applying the energy concept.	1, 2, 4	**Exam:** At least 75% of the students will identify the system: Apply the correct laws of thermodynamics to analyze and model the given
	4. Analyze some simple thermodynamic cycles.	1, 2	**Exam:** At least 75% of the students will identify the cycle: Apply the correct laws of thermodynamics to analyze and model the given system and earn at least 65 % of the problem value for problems including this outcome.
Class Topics	1. Basic concepts. 2. Properties of pure substances. 3. Introduction to energy and the first law. 4. Closed system analysis using first law. 5. Open system analysis using first law. 6. Introduction to the second law of thermodynamics. 7. Entropy and 1st and 2nd law applications. 8. Introduction to energy. 9. Introduction to cycles. 10. Review and tests.		

Student Outcomes (Scale: *1-3*)	1	2	3	4	5	6	7
	3	*3*		2			
	3 – Strongly supported *2* – Supported *1* – Minimally supported						

* Student Outcomes