ME235 COURSE PROFILE

DEGREE PROGRAM: Mechanical Engineering

COURSE NUMBER: ME235	**COURSE TIII.E:** Thermodynamics I
REQUIRED COURSE OR ELECTIVE COURSE: Required	**TERMS OFFERED:** Fall, Winter, Spring
TEXTBOOK / REQUIRED MATERIAL: Fundamentals of Thermodynamics by Borgnakke and Sonntag, Wiley 8th Ed. And Thermodynamics: An Engineering Approach by Cengel and Boles 8th Ed.	**PRE / CO-REQUISITES:** Chem 130, 125 or Chem 210, 211, and Math 116. I, II, lla (3 credits)
COGNIZANT FACULTY: A. Violi	**COURSE TOPICS:**
BULLETIN DESCRIPTION: Introduction to engineering thermodynamics. First law, second law, system and control volume analyses; properties and behavior of pure substances; application to thermodynamic systems operating in a steady state and transient processes. Heat transfer mechanisms. Typical power producing cycles and refrigerators.	1. Pressure, temperature and general properties 2. Work and heat transfer in processes, power 3. Conservation principle for mass and energy 4. Reversible processes 5. The 2nd law of thermodynamics 6. Steady state devices 7. Transient processes 8. Heat engines, power producing cycles 9. Refrigeration and heat pumps
COURSE STRUCTURE/SCHEDULE: Lecture: 2 days per week at 1.5 hours	

COURSE OBJECTIVES: for each course objective, links to the Program Outcomes are identified in brackets.	1. To make student familiar with basic concepts, devices and properties used in thermal science [1, 2, 6] 2. To teach the behavior of a simple pure substance including solid-liquid and gas phases [1, 2] 3. To teach evaluation of work, heat transfer and power in processes [1, 4, 6] 4. To teach the formulation of conservation laws for mass and energy, and the increase of entropy for various physical systems [1, 6] 5. To teach application of process knowledge to the analysis of complete systems [1, 2, 4, 6] 6. To make students familiar with how various gas power cycles , vapor power cycles and refrigeration [1, 2, 4, 6] 7. To make students aware of issues related to energy [1, 4, 6]
COURSE OUTCOMES : for each course outcome, links to the Course Objectives are identified in brackets.	1. Identify different subsystems, indicate where there is work, heat transfer and the importance of temperature, pressure and density [1, 3] 2. Given a set of properties, find the correct phase and remaining properties for a substance [2] 3. Given a physical setup, find process and compute associated work/heat transfer that is the most reasonable approximation [2, 3, 4] 4. Given a physical device and process, compute the work and heat transfer [2, 3, 4] 5. Given a physical setup, formulate the ideal approximation to the behavior and compute the corresponding work and heat transfer [4, 5, 6] 6. Given an actual device, analyze the corresponding ideal device [4, 5, 6] 7. Evaluate performance and power for simple heat engines/refrigerators [5, 6] 8. Learning contemporary issues related to energy and impact of engineering solutions on society and environment [3, 5, 6]
ASSESSMENT TOOLS: for each assessment tool, links to the course outcomes are identified	1. Regular homework problems 2. Exams

PREPARED BY: A. Violi, ASO Staff
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