COURSE NUMBER: Vm235	**COURSE TITLE:** Thermodynamics
CREDIT: 3	**PREREQUISITES:**Vc210 and (Vv156 or Vv186)
TEXTBOOKS/REQUIRED MATERIAL: "Thermodynamics: An Engineering Approach," Y. A. Cengel and M. A. Boles (Previously: "Fundamentals of Thermodynamics," C. Borgnakke and R. E. Sonntag)	**PREPARED BY:** Kwee-Yan Teh **DATE OF PREPARATION:** Oct. 8, 2012 **DATE OF UC APPROVAL:** Oct. 30, 2013
INSTRUCTOR(S): Kwee-Yan Teh (Previously: Lipo Wang)	**SCIENCE/DESIGN:** n/a
CATALOG 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. Ideal gas mixtures and moist air applications.	**COURSE TOPICS:** 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. Refrigerator and heat pumps
COURSE STRUCTURE/SCHEDULE: Lecture: twice per week, 90 minutes each (13-week Summer schedule)	

COURSE OBJECTIVES [Course Outcomes in brackets]	1. To make student familiar with basic concepts, devices and properties used in thermal science [1] 2. To teach the behavior of a simple pure substance including solid-liquid and gas phases [2, 3, 4] 3. To teach evaluation of work, heat transfer and power in processes [1, 3, 4, 8] 4. To teach the formulation of conservation laws for mass, energy and entropy for various physical systems [4, 5, 6] 5. To teach application of process knowledge to the analysis of complete systems [5, 6, 7, 8] 6. To make students familiar with how various engines and refrigerators function [5, 6, 7, 8]
COURSE OUTCOMES [Program Outcomes in brackets]	1. Identify different subsystems, indicate where there is work, heat transfer and the importance of temperature, pressure and density [a, c, k] 2. Given a set of properties, find the correct phase and remaining properties for a substance [e, h] 3. Given a physical setup, find process and compute associated work/heat transfer that is the most reasonable approximation [a, e, h] 4. Given a physical device and process, compute the work and heat transfer [a, e] 5. Given a physical setup, formulate the ideal approximation to the behavior and compute the corresponding work and heat transfer [a, e, j, k] 6. Given an actual device, analyze the corresponding ideal device [a, e, k] 7. Evaluate performance and power for simple heat engines/refrigerators [a, e, k] 8. To have an understanding of how processes affect the environment [h]
ASSESSMENT TOOLS [Course Outcomes in brackets]	Regular homework problem sets [1–8], midterm and final exams [1–8]