COURSE #: CHE 330 (4 credits)	**COURSE TITLE:** Chemical & Engineering Thermodynamics
TERMS OFFERED: Winter	**PREREQUISITES:** CHE 230: Introduction to Material and Energy Balances
TEXTBOOKS/REQUIRED MATERIAL: Fundamentals of Chemical Engineering Thermodynamics, 1st ed, (2015), K.D. Dahm, D.P. Visco, Cengage Learning. (SI edition)	**COGNIZANT FACULTY:** Glotzer, Goldsmith, Gong, Lenert, Lin, Tessier, Ziff
INSTRUCTOR: Lenert, Gong	**FACULTY APPROVAL:** 2019-11-05
CoE BULLETIN DESCRIPTION: Development of fundamental thermodynamic property relations and complete energy and entropy balances. Analysis of heat pumps and engines, and use of combined energy-entropy balances in flow devices. Calculation and application of total and partial properties in physical and chemical equilibria. Prediction and correlation of physical/chemical properties of various states and aggregates. Elements of statistical thermodynamics.	**COURSE TOPICS:** (number of hours in parentheses) 1. Thermodynamic definitions: equilibrium, energy transfers, etc. (1.5) 2. Material and energy balances (3) 3. Entropy, irreversibility, combined energy-entropy balances (3) 4. Thermodynamic processes and cycles (4.5) 5. Equations of state, measurable properties, property changes (3) 6. Phase equilibria of pure components (3) 7. Phase equilibria of multi-component systems (6) 8. Chemical reaction equilibrium (4.5)
COURSE STRUCTURE/SCHEDULE: Lecture: 3 per week @ 1 hour; Discussion: 1 per week @ 1 hour	
COURSE OBJECTIVES	Links shown in brackets are to course outcomes that satisfy these objectives. 1. Provide students with a lasting and solid understanding of thermodynamics. [a-e] 2. Effectively teach fundamental concepts such as enthalpy, entropy, fugacity, free energy, and chemical potential. [a-d] 3. Teach students how to set up and solve thermodynamics problems. [a-e] 4. Equip students to estimate or locate necessary thermodynamic data. [b,e] 5. Provide examples of applications of thermodynamics to chemical engineering processes and process safety, biological sciences, energy, and environmental sciences. [a] 6. Provide opportunities for students to become proficient using computer tools for solving problems. [a, c, e]
COURSE OUTCOMES	Links shown in brackets are to ABET student outcomes 1-7 a. Apply the laws of thermodynamics to chemical engineering processes. [1] b. Calculate differences in thermodynamic properties using equations of state, charts and tables, and computer resources. [1] c. Solve problems dealing with multi-phase chemical systems and reactive systems, some in the context of safety. [1,2] d. Explain the molecular basis of thermodynamics. [1] e. Interpret thermodynamic data for applications in chemical engineering processes, process safety, biological sciences, energy, and environmental sciences. [1]
ASSESSMENT TOOLS	1. Weekly homework problems assess course outcomes a-e. 2. Written examinations assess course outcomes a-e. 3. Group assignments assess course outcomes a-c, and e. 4. End of term course evaluation provides student self-assessment of course outcomes a-e.