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Department of Chemical Engineering	
Thermodynamics I (64335)	
Total Credits	**3**
major compulsory	
Prerequisites	P1 : General Chemistry II (23102)

Course Contents

This course covers the principles of thermal sciences and presents the calculations of work, heat for ideal gas and real gases at constant pressure or volume, the calculations of heat capacities, latent heats, and changes of enthalpy and entropy are covered as well. The first, second and third law of thermodynamics are investigated. The uses of tables and diagrams and the calculations of different types of heat reactions and residual properties are considered and covered in this course as well; the calculations of the efficiency of different cycles, turbines, expanders, and compressors are part of this course.

	Intended Learning Outcomes (ILO's)	Student Outcomes (SO's)	Contribution
1	Apply knowledge of mathematics, science, &engineering principles to calculate PVT data at different conditions, heat capacities, residual properties fundamental property relations	A	40 %
2	Identify, formulate, &solve engineering problems related to steam tables, standard heats, heat capacities, residual properties homogeneous pure systems, Heat effects, thermodynamic laws, state functions.	E	60 %

Textbook and/ or Refrences

Text book: Introduction to Chem. Eng. Thermodynamics, Smith, Wan Ness, Abbot 7th, 2005. .McGraw-Hill international editions, ISBN 0-07-124708-4 References: 1. Fundamentals of classical thermodynamics,Version2, Gordon J., Van Wylen, Richard E. Sonntag. 1978 2. Application of thermodynamics: Bernard D. Wood, Addison Wesley Publishing company, 1969. 3. Engineering Thermodynamics: Fundamentals and applications: Francis F. Huang, Macmillan Publishing co., Inc., 1978

Assessment Criteria	Percent (%)
First Exam	20 %
Second Exam	20 %
Quizzes	10 %
Homeworks	10 %
Final Exam	40 %

Course Plan

Week	Topic
1	Introduction: pressure, work, energy, heat /Chapter 1/
2	First law of thermodynamics and basic concepts (?U, ?H, equilibrium, phase rule, reversible processes, constant V, constant P, heat capacities. /Chapter 2/
3_5	Volumetric properties of pure fluids: Virial equations, ideal gases, Cubic equation of state, Generalized correlations for gases and liquids../Chapter 3/
6	First examination
6_8	Heat effects: Sensible heat effects, ?U of ideal gases, latent heats, standard heat of reactions, of formation, of combustion, temperature dependence on DH, Heat effects of industrial reactions ./Chapter 4/
9_11	Second law of thermodynamics: heat engines , thermodynamic temperature and ideal gas

	scale, entropy, ?S of ideal gases, third law of thermodynamics. /Chapter 5/
11	Second examination
12_15	Thermodynamics properties of Fluids: properly relations, residual properties, two phase system, thermodynamic diagrams, Tables of thermodynamic properties. Generalized property correlations for gases. /Chapter 6/
15	Thermodynamics of flow properties: equations of balance, turbines, compression process. /Chapter 7/
16	Final examination