



UNIVERSITI TEKNOLOGI MARA

CHM458: CHEMICAL THERMODYNAMICS

Course Name (English)	CHEMICAL THERMODYNAMICS APPROVED
Course Code	CHM458
MQF Credit	3
Course Description	This course is aimed at providing students the basic concepts of thermodynamics and applying these concepts to solve problems related to actual situation. The topic begins with an introduction to units and dimensional analysis, properties of pure substances, the three laws of thermodynamics and the free energy functions.
Transferable Skills	Understand the concept of thermodynamics and its functions
Teaching Methodologies	Lectures, Case Study, Discussion, Directed Self-learning
CLO	CLO1 Explain the basic concepts and the terms used in chemical thermodynamics CLO2 Analyse the phenomenon, concept and theories of thermodynamics CLO3 Able to communicate the scientific idea in written related to thermodynamics and applications
Pre-Requisite Courses	No course recommendations
Topics	
1. 1. Introduction 1.1) 1.1 Scope of subject 1.2) 1.2 Units and Dimensional analysis 1.3) 1.3 Terms and definitions: system, intensive and extensive properties, state and path functions, processes, reversible, equilibrium	
2. 2. Properties of pure substances 2.1) 2.1 Equation of State. 2.2) 2.2 Ideal gas, real gas 2.3) 2.3 Law of Corresponding state, critical properties 2.4) 2.4 Phase changes, property diagram 2.5) 2.5 Steam table	
3. 3. First Law of thermodynamics 3.1) Heat, work and internal energy 3.2) 3.2 First law: open and closed system 3.3) 3.3 Reversible isothermal and adiabatic expansion of ideal gas 3.4) 3.4 Enthalpy of reaction and Hess' law 3.5) 3.5 Effects of temperature on enthalpy change	
4. 4. Second and third law of thermodynamics 4.1) 4.1 Statements of second law, entropy 4.2) 4.2 Statistical interpretation of entropy 4.3) 4.3 Heat engine: Carnot cycle and thermodynamic efficiency 4.4) 4.4 Entropy calculations for physical and chemical processes 4.5) 4.5 Third law of thermodynamics	
5. 5. Free energy and chemical potential 5.1) 5.1 Free energy function and properties 5.2) 5.2 Free energy and spontaneity 5.3) 5.3 Differential energy expressions and Maxwell relation 5.4) 5.4 Gibb's free energy and its temperature dependence 5.5) 5.5 Phase transition: Clausius clapeyron equation 5.6) 5.6 Chemical equilibrium calculations	

Assessment Breakdown	%
Continuous Assessment	70.00%
Final Assessment	30.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Assignment topic : Discussion related to the applications of thermodynamics in industries.	30%	CLO3
	Test	Average of 4 Quizzes	10%	CLO2
	Test	Average of 2 test	30%	CLO1

Reading List	Reference Book Resources	<ul style="list-style-type: none"> • Devoe 2001, <i>Thermodynamics and Chemistry</i>, Prentice Hall • G. Hargreaves & G Socrates 1973, <i>Elementary Chemical Thermodynamics</i>, 3 Ed., Butterworth & Co • Cengel and M. A. Boles 1994, <i>Thermodynamics and Engineering Approach</i>, 2 Ed., Mc Graw Hill • Irving, M Klotz and Robert M. Rosenberg 2000, <i>Chemical Thermodynamics</i>, 6 Ed., John Wiley
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	