

NATIONALLY HARMONISED B.Sc. CHEMICAL ENGINEERING PROGRAM				
Course Code	ChEg2082			
Course Name	Chemical Engineering Thermodynamic II			
Degree Program	B.Sc. in Chemical Engineering			
Module Name	Chemical Engineering Basics			
Module Coordinator	N.N.			
Lecturer	N.N.			
Instructor's Contact Information	Office Phone Email Office hour			
ECTS	5			
Student Work Load	Lecture	Tutorial	Laboratory or Practice	Home study
Weekly basis	3	3	0	2
Semester basis(total)	48	48	0	32
Mode of delivery	Parallel (per semester)			
Course Objectives & Competences to be Acquired	<p>The course aims to introduce students with basic principles of thermodynamics in understanding efficiency of heat and mass transfer, and extent of chemical reaction in process units in process industry.</p> <p>After the completion of this course, the students will be able:</p> <ul style="list-style-type: none"> to understand the application of thermodynamics to optimize process parameters to know how heat and mass flux can be modeled for a system with reactions. Estimate thermodynamic properties of ideal non-ideal solutions, and reactions. 			
Course Description/Course Contents	<p>1. Thermodynamic property relations</p> <p>1.1. The Maxwell Relations</p> <p>1.2. General Relations for du, dh, ds, C_v, & C_p</p> <p>1.3. internal Energy Changes</p> <p>1.4. Enthalpy Changes</p> <p>1.5. Entropy Changes</p> <p>1.6. Specific Heats C_v and C_p</p>			

	<p>1.7. The Δh, Δu, and Δs of Real Gases 1.8. Enthalpy Changes of Real Gases 1.9. Internal Energy Changes of Real Gases 1.10. Entropy Changes of Real Gases</p> <p>2. Heat of reactions & heat effects 2.1 The standard heat of reaction 2.2 Standard heat of formation 2.3 Standard heat of combustion 2.4 Effect of temperature on the standard heat of reaction 2.5 Relation between heat of reaction at constant pressure 2.6 Heat effects of industrial reactions</p> <p>3. Chemical equilibrium 3.1 sensible heat effect 3.2 Change of Gibbs energy with extent of Reaction 3.3 Spontaneous reaction – equilibrium 3.4 Law of mass action for a gas mixture 3.5 Chemical equilibrium in the presence of pure condensed phase; 3.6 Independent reactions; 3.7 Phase rule for system with chemical reactions; 3.8 Effect of temperature on equilibrium constants; 3.9 Displacement law of equilibrium</p> <p>4. Ideal solutions 4.1 Perfect solutions 4.2 Mixing properties of ideal solutions 4.3 Effect of temperature and pressure on vapor liquid equilibrium 4.4 Effect of solutes on the freezing point of solvent 4.5 Effect of non-volatile solute on the boiling of solvents 4.6 Osmotic pressure</p> <p>5. Non-ideal solutions 5.1 Variables & excess variables of mixing 5.2 Effect of T & P on activity coefficient 5.3 Different composition scales and standard states 5.4 Vapor-liquid equilibrium 5.5 Liquid-liquid equilibrium 5.6 Law of mass action for liquid phase systems</p>
Pre-requisites	Chemical Engineering Thermodynamics I
Semester	Year II, Semester II
Status of Course	Compulsory
Teaching & Learning Methods	1. Lectures, tutorial

Assessment/Evaluation	Continuous Assessment.....50% <ul style="list-style-type: none"> • Assignments.....15% • Quizzes.....15% • Tests.....20% Final exam.....50%
Course Policy	<p>Attendance: As per harmonized academic policy</p> <p>Assessments: students are supposed to handle all assessments on time.</p> <p>Cheating/plagiarism: it is strictly forbidden and any misconduct is accountable per the students' code of conduct.</p> <p>Also, please do not chew gum, eat, listen to recorders or CD players, wear sunglasses, or talk about personal problems. Please be sure to turn off pagers and cell phones before class and exam sessions</p>
Literature	<p>Text Book:</p> <ol style="list-style-type: none"> 1. Smith J. M., Van Ness H. C., and Abbott M. M.(2001). Introduction to chemical engineering thermodynamics.6th Ed.McGraw-Hill, New York. <p>Reference Books</p> <p>Perry's Chemical Engineering Handbook</p> <p>Michael J. Moran, Howard N. Shapro, Fundamentals of Engineering Thermodynamics, 5th Ed. John Wiley and Sons, Inc</p>
Approval Section	Module coordinator/module team