



UNIVERSITI TEKNOLOGI MARA

CHE469: MATERIALS AND ENERGY BALANCE

Course Name (English)	MATERIALS AND ENERGY BALANCE APPROVED
Course Code	CHE469
MQF Credit	4
Course Description	This course is presents an introduction to mass and energy balances. The students are exposed to advanced material and energy balances concepts to solve problems of unit operation in chemical processing of reactive and unreactive system.
Transferable Skills	KNOWLEDGE
Teaching Methodologies	Lectures, Tutorial
CLO	<p>CLO1 Ability to apply basic techniques for expressing the values of system variables and for setting up and solving equations that relate these variables.</p> <p>CLO2 Ability to identify the known information about process variables, setting up material balance equation, and solving these equations for unknown variables for non-reactive and reactive system.</p> <p>CLO3 Ability to identify the known information about process variables, setting up energy balance equation, and solving these equations for non-reactive and reactive system.</p>
Pre-Requisite Courses	No course recommendations
Topics	
1. INTRODUCTION 1.1) Units and Dimensions 1.2) Terminologies Used 1.3) Dimensional Homogeneity	
2. Material Balance for Non-Reactive Systems 2.1) Process Classification 2.2) Fundamental of Material Balances 2.3) Flow Chart, Flow Chart Scaling and Basis of Calculations 2.4) Degree of Freedom Analysis 2.5) General Procedure for Single-Unit Process Material Balance. 2.6) Balance on Multi-Unit Process 2.7) Solving Material Balance Problems Involving Tie Component 2.8) Recycle and Bypass Calculations	
3. Materials Balance for Simple Reactive Systems 3.1) Chemical Reaction Stoichiometry 3.2) Limiting & Excess Reactants, Fractional Conversion & Extent of Reaction, Yield & Selectivity 3.3) Multiple Reactions 3.4) Balances on Reactive Process 3.5) Theoretical & Excess Air	
4. Energy Balance for Non-Reactive System 4.1) Elements of energy balance calculations 4.2) Procedure for energy balance calculations 4.3) Changes in pressure at constant temperature 4.4) Changes in temperature 4.5) Sensible heat and heat capacity 4.6) Balances on phase operation 4.7) Estimation & correlation of latent heat 4.8) Psychometric chart 4.9) Heat of solutions and mixing 4.10) Balances on dissolution & mixing processes	

4.11) Enthalpy – concentration charts – single liquid phase

5. Energy Balance for Reactive System

5.1) Terminologies

5.2) Hess's Law

5.3) Formation Reactions & Heats of Formation

5.4) Heat of Combustion

5.5) General Procedure for Reactive System

5.6) Thermochemistry of Solutions

Assessment Breakdown	%
Continuous Assessment	40.00%
Final Assessment	60.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	ASSIGNMENT 1	10%	CLO1 , CLO2
	Assignment	ASSIGNMENT 2	10%	CLO2 , CLO3
	Test	TEST 1	10%	CLO1 , CLO2
	Test	TEST 2	10%	CLO2 , CLO3

Reading List	This Course does not have any book resources
Article/Paper List	This Course does not have any article/paper resources
Other References	This Course does not have any other resources