Module code	SC-2242		
Module Title	Chemical Thermodynamics and Applications		
Degree/Diploma	Bachelor of Science (Chemistry)		
Type of Module	Major Core		
Modular Credits	4	**Total student Workload**	10 hours/week
		Contact hours	4 hours/week
Prerequisite	None		
Anti-requisite	None		

Aims

The aim of this module is to provide students with fundamental concepts of chemical thermodynamics and its applications in phase equilibria.

Learning Outcomes

On successful completion of this module, a student will be expected to be able to:

Lower order:	30%	- understand the concepts of enthalpy, entropy and Gibbs free energy - understand further the concepts of chemical thermodynamics with emphasis on phase equilibria and electrochemistry
Middle order:	60%	- define the terms and determine the change in enthalpy and entropy associated with a reaction; explain the concept of spontaneity of a reaction and determine the Gibbs free energy change associated with a reaction - explain and apply the concept of the thermodynamic equilibrium and able to predict the outcome of chemical reactions (equilibrium compositions) - calculate the equilibrium constants, standard Gibbs energy of reactions, and standard cell potentials for Galvanic cells -obtain information about the properties of materials from phase diagrams - apply thermodynamic concepts to understand the properties of mixtures and solution phase equilibria
Higher order:	10%	- present the results of a practical investigation in a concise manner. - analyse the experimental data, including the construction of appropriate graphs and evaluation of errors. - work co-operatively in a team for problem solving in the practical situation.

Module Contents

- Second law of thermodynamics: Entropy; Gibbs and Helmoltz functions; the Third Law entropies and absolute zero temperature; free energy; reversible and irreversible processes.
- Chemical equilibrium: Equilibrium constant; prediction of equilibrium composition; variation with temperature and pressure.
- Physical equilibrium: Phase transitions; phase rule; one-component phase diagrams; *Clausius-Clapeyron* equation; Application of thermodynamic principles to ideal and non-ideal solutions and mixtures in two-component systems (distillation, azeotropes, partially miscible liquids).

Assessment	Formative assessment	Tutorial and feedback
	Summative assessment	Examination: 60%
		Coursework: 40% - 1 Written assignment (10%) - 2 class tests (10%) - 3 practical reports (20%)