Module code	SC-4345			
Module Title	Equilibrium electrochemistry and ion transport			
Degree/Diploma	Bachelor of Science (Chemistry)			
Type of Module	Major Core			
Modular Credits	2	**Total student Workload**	4	hours/week
		Contact hours	2	hours/week
Prerequisite	None			
Anti-requisite	None			

Aims

The aim of this module is to introduce students to the fundamentals of electrochemistry and the analytical applications of electrochemistry.

Learning Outcomes

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

Lower order:	40%	- understand the departure of electrolyte solutions from ideality - understand the concepts of ionic activities, activity coefficients, the extent of ion and solvent interactions in electrolyte solutions
Middle order:	40%	- describe the equilibria existing at electrode/electrolyte interfaces - write down electrode and cell reactions - apply the dependence of electrode potential on ionic activities - calculate electrode and cell potentials - apply the role of ionic transport in understanding the conductivity of electrolyte solutions and to make calculations involving molar and ionic conductivities
Higher order:	20%	- present the results of analyses in a concise manner and work independently and collaboratively in a team in solving chemical problems

Module Contents

- *Thermodynamic properties of ions in solution*: thermodynamic functions of formation and ion activities and activity coefficients, modelling of electrolyte solutions using the Debye-Huckel theory and its extensions.
- *Electrochemical cells:* Half-reactions and electrodes, the electrode electrolyte interface varieties of cells, standard potentials, the Nernst equation relating electrode potentials to activities, electrode reactions and cell reactions.
- *Application of standard potentials*: The electrochemical series, the measurement of pH and pK_a, thermodynamic functions, electrochemical cells as power sources and electrolysis, analytical applications of electrochemical systems.
- *Molecular motions in liquids*: conductivities of electrolyte solutions, the mobilities of ions, molar and ionic conductivities, the dependence of conductivities on ionic activity and ionic strength, the uses of conductivity measurements.

Assessment	Formative assessment	Tutorial and feedback
	Summative assessment	Examination: 60%
		Coursework: 40% - 2 written assignments (20%) - 2 class tests (20%)