



UNIVERSITY OF
CALGARY

DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
WINTER 2017

COURSE: CHEMISTRY 579 – Surface and Colloid Chemistry for Engineers

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	MWF	10:00-10:50	ENA 103	Dr. V. Thangadurai	ES 656D	210 8649	vthangad@ucalgary.ca	By appointment

Course website: Desire 2 Learn (D2L)

TEXTBOOK: Not Required

PROPOSED TOPICS:

- 1. Surface and Colloid Chemistry and Importance**
 - 1.1 What is a colloid?
 - 1.2 What is a phase?
 - 1.3 Distinction between true solutions and colloids
 - 1.4 Technological applications of surface forces
 - 1.5 Surface area / Specific area
 - 1.6 Sedimentation & Diffusion
- 2. Surface Tension/Surface Energy**
 - 2.1 Surface Tension
 - 2.2 Contact Angle
 - 2.3 Experimental Methods for Surface Tension & Contact Angle
 - 2.4 Laplace-Young Equation
 - 2.5 Capillary Rise Technique
 - 2.6 Kelvin Equation
- 3. Thermodynamics of Interfaces – Fundamentals**
 - 3.1 Definition of System Variables
 - 3.2 Thermodynamic Potentials
 - 3.3. Thermodynamic definition of Surface Tension
 - 3.4 Gibbs Adsorption Isotherm
- 4. Practical Applications of Interface Sciences – Electrochemistry and Non-electrochemical Aspects**
 - 4.1 The Electric Double Layer – Introduction
 - 4.2 Helmholtz and Gouy-Chapman Model
 - 4.3 Poisson – Boltzmann Theory (Debye Length)
 - 4.3 Experimental Methods to Determine Surface Charges
 - 4.4 The Electrostatic Double-Layer Force (DLVO equation)
- 5. Experimental Techniques in Interface Science- Solid Surfaces, Adsorption**
 - 5.1 Introduction to Surface and Bulk Solid State Methods
 - 5.2 X-ray Diffraction Methods
 - 5.3 Adsorption Isotherms
(Types, Langmuir & Brunauer, Emmett & Teller (BET) Isotherms)
 - 5.4 BET Surface Area Analysis

This course does not have a laboratory component.

Department Approval: Approved by Department Head

Date: December 20, 2016