



**SECOND SEMESTER 2018-2019**

**Course Handout (Part - II)**

Date: 07-01-2019

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CHEM F223  
Course Title : Colloid and Surface Chemistry  
Instructor-in-Charge : Dr. Ramakrishnan Ganesan

**1. Scope and Objective of the Course:** This course gives a comprehensive understanding about the intermolecular forces, dynamics, stability and characterization of colloids such as membranes, microemulsions and vesicles. The course will brief about the formulation, characterization and applications of such colloidal systems. The course will give an insight on the electrostatic forces prevailing on surfaces that give rise to stability and surface properties. In addition, this course will provide a brief overview on surface modification, its characterization and applications.

**2. Textbooks:**

- T1:** Pallab Ghosh, 'Colloid and Interface Science', 2009.  
**T2:** Drew Myers, 'Surfaces, Interfaces, and Colloids: Principles and Applications', Wiley, Second Edition, 1999.  
**T3:** I. N. Levine, "Physical Chemistry", 5th Edition, Tata McGraw-Hill, 2011.

**3. Reference books**

- R1:** Paul C. Hiemenz and Raj Rajagopalan, Principles of Colloids and Surface Chemistry, 3<sup>rd</sup> Edition, Marcel Dekker Inc, USA, 1997.

❖ *The syllabus also includes lecture notes*

**4. Course Plan:**

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-2	Basics; surface free energy	Surfaces, Colloids and Interfaces	T1: Chapter 1; T2: Chapter 1 and 2
3-7	Sedimentation, Brownian motion, Osmotic pressure, Gold number	Properties of Colloid Dispersions	T1: Chapter 2
8-12	Structural requirements of surface activity, classifications and building blocks of surfactants	Surface activity and surfactant structures	T1: Chapter 3; T2: Chapter 3
13-16	Surface mobility in solids, surface tension, interfacial tension, contact angle and their measurements	Surface and interfacial tension	T1: Chapter 4; T2: Chapter 7 and 8; R1: Chapter 6
17-20	van der Waals Forces, (Kessom, Debye, and London Interactions)	Intermolecular forces	T1: Chapter 5; T2: Chapter 4; T3:



			14.15, 22.10
21-25	Charged colloids, Sources of Interfacial Charge, Electrostatic Theory: Coulomb's Law, Electrokinetic Phenomena	Electrostatic Forces and the Electrical Double Layer	T1: Chapter 5; R1: Chapter 11 and 12
26-31	Mechanism for colloid formation, rules and sources of colloidal stability and coagulation, Association colloids (Micelles, vesicles and membranes & catalysis by micelles)	Colloids and colloidal stability	T2: Chapter 10
32-36	Formation, mechanistic details of stabilization and relationship between HLB and solubility parameter	Emulsions, microemulsions and foams	T1: Chapter 11 and 12; T2: Chapter 9
37-40	Properties of monolayers, Langmuir-Blodgett films, Surface diffusion	Monolayers and thin liquid films	T1: Chapter 8

#### 5. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid-sem Test	90 min	30	13/3 3.30 - 5.00 PM	Closed Book
Quiz*	-	10	Continuous	Closed Book
Assignments/seminar presentations/practical components	-	20	Will be announced by I/C	Open Book
Comprehensive examination	3 hrs.	40	07/05 AN	Closed Book

\* There will be a total of **5 surprise quizzes** out of which **best 4** will be considered for final evaluation and grading.

**6. Chamber Consultation Hour:** To be announced.

**7. Notices:** All notices concerning the course will be displayed **only** on the **Chemistry Group** notice board.

**8. Academic Integrity Policy:** It is expected that in compliance with institute rules and regulations, academic integrity should be adhered to in all the evaluation components. Malpractice in any form will have serious implications.

**9. Make-up Policy:** Make up would be considered only for very genuine reasons.

**INSTRUCTOR-IN-CHARGE**

**Ramakrishnan Ganesan**

