Colloids, Interfaces, and Surfaces - Course Syllabus

Course Number: ENSE310/CBE310

Course Title: Colloids, Interfaces, and Surfaces

Academic Semester:	Spring	**Academic Year:**	2015/ 2016
Semester Start Date:	Jan, 24, 2016	**Semester End Date:**	May, 19, 2016

Class Schedule: 3 hours /week

Classroom Number:

Instructor(s) Name(s): Suzana Nunes
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Teaching Assistant name:
Email:

Office Location: Bdg 4, 3274

COURSE DESCRIPTION FROM PROGRAM GUIDE

The course covers a variety of topics in surface science, including surface tension and surface free energy (theory and measurement methods), surface films on liquid substrates (surface potential, monomolecular films, Langmuir-Blodgett layers), capillarity, gecko effect, electrical aspects of surface chemistry (electrical double layer, zeta potential, DLVO theory), surface of solids, solid-liquid interface, stability of dispersions, stabilization of suspensions, contact angle (theory and measurement methods), emulsions, foams and aerosols, wetting of surfaces by liquids, lotus effect, flotation, aggregation and flocculation, detergency, surfactants, self-assembly, micelles and vesicles, friction, lubrication and adhesion, adsorption, characterization of colloidal particles, etc. Applications of colloid and surface science in petroleum recovery, coating and painting, food, pharmaceutical and cosmetic industry will also be covered. Surface characterization methods will be introduced.

COMPREHENSIVE COURSE DESCRIPTION

Surface tension and surface free energy (theory and measurement methods)

Capillarity

Contact angle (theory and measurement methods), wetting, Lotus effect

Surface forces

Detergency, surfactants, self-assembly, micelles and vesicles

Surface films on liquid substrates (surface potential, monomolecular films, Langmuir-Blodgett layers)

Emulsions, foams and aerosols

Electrical aspects of surface chemistry (electrical double layer, zeta potential, DLVO theory)

Surface of solids

Solid-liquid interface, stability of dispersions, stabilization of suspensions

Flotation, aggregation and flocculation

Friction, lubrication and adhesion

Adsorption

Characterization of colloidal particles

Applications of colloid and surface science in petroleum recovery, coating and painting, food, pharmaceutical and cosmetic industry

Surface characterization methods

GOALS AND OBJECTIVES

The course gives the fundamentals of physical chemistry of surfaces, interfaces and colloids with practical examples relevant for the environment, petrochemical industry, food, etc

REQUIRED KNOWLEDGE

Basics of thermodynamics

REFERENCE TEXTS

A. W. Adamson and A. Gast, Physical Chemistry of Surfaces (Main text)

J. C. Berg, An Introduction to Interfaces and Colloids

J. N. Israelachvili, Intermolecular and Surface Forces

METHOD OF EVALUATION

Percentages %	Graded content (Assignments, Oral quizzes, Projects, Midterm exam, Final Exam, Attendance and participation, etc)
40%	**Midterm exam**
40%	**Final exam**
20%	**Project (Oral presentation)**

COURSE REQUIREMENTS

Assignments

Nature of the assignments (assigned reading, case study, paper presentation, group project, written assignment, etc)
Oral presentation on methods of surface characterization

Course Policies

Absences, Assignments, late work policy, etc.

Each student is expected to prepare for, be punctual and attend all of the class sessions during the semester. Participation in class is strongly encouraged. Academic integrity is essential.
Missing the exams or not delivering the oral presentation without a strong justification corresponds to a zero grading in that category.

Additional Information

NOTE
The instructor reserves the right to make changes to this syllabus as necessary.