Course Unit Descriptor

Study Programme: Bachelor Academic Studies in Chemistry - Quality Control and Environmental Management, Bachelor Academic Studies in Environmental Protection – Environmental Protection Analyst

Course Unit Title: Basics of Physical Chemistry of Surfaces

Course Unit Code: IHN-402

Name of Lecturer(s): Full Professor Branislav Jović, Assistant Professor Branko Kordić

Type and Level of Studies: Bachelor of Science Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Winter

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 6

Prerequisites: None

Course Aims:

Introduction to processes at the phase boundaries, with special emphasis on the solid /liquid interface. Student will gain fundamental knowledge about thermodynamic analysis of surfaces and basic experimental skills for characterisation of surface processes which are important for understanding numerous environmental and adsorption-catalytic processes.

Learning Outcomes:

After the successful completion of the course, the student is able to: understand the processes at the surfaces and interfaces; understands modern thermodynamic interpretations of various surface phenomena; apply different instrumental, especially spectroscopic methods in explaining surface phenomena; conduct equilibrium and kinetic experiments in the characterization of solid surfaces.

Syllabus:

Theory

The liquid / gas interface. Surface tension of liquids and solutions. Surface tension of surfactant solutions. Experimental methods of surface tension measurements. Surface tension and surface free energy. Gibbs adsorption isotherms. Surface films. Adsorption of gases and vapors on solids. The solid-liquid interface – adsorption from solution. Capillary phenomena. Physical and chemical adsorption. Enthalpy of adsorption. Equilibrium and kinetics of adsorption process. Adsorption isotherms. Methods of solid surface characterization. Ion exchange.

Practice

The experimental part of the course follows theoretical part.

Required Reading:

1. Worch, E., Adsorption technology in water treatment,Walter de Gruyter GmbH & Co. KG, Berlin, 2012.

Weekly Contact Hours: 5	**Lectures:** 3	**Practical work**: 2

Teaching Methods: Lectures, practical and calculation exercises, consultation.

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Active class participation	5	Written exam	20
Practical work	25	Oral exam	30
Preliminary exam(s)	20		