Course Unit Descriptor

Study Programme: Chemical Engineering

Course Unit Title: Fluid Mechanics

Course Unit Code: HO201

Name of Lecturer(s): Associate Professor Oskar Bera

Type and Level of Studies: Undergraduate Academic Studies

Course Status (compulsory/elective): Compulsory

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: 7

Prerequisites: Mathematics, Physics

Course Aims:

Fluid mechanics is the basic engineering discipline within the broad field of applied mechanics. The objectives of this course are:

Understanding and study of ideal and real fluids, either in motion or at rest.

Gaining knowledge about fluid mechanics necessary to apply thermodynamics lows, transport phenomena theory, lows of conversation of mass, energy and momentum on hydrodynamic processes in chemical industry.

Learning Outcomes:

Gaining basic knowledge about fluids statics and dynamics. Students will be able to solve and understand engineering problems based on fluid flow phenomena. Students will be capable to incorporate this knowledge with other fields of chemical engineering. Ability to design, simulate and optimize processes that include fluid flow.

Syllabus:

Theory

Introduction and basic concepts of fluid mechanics, Properties of fluids, Pressure and fluid statics, Fluid kinematics, Reynolds transport theorem and finite control volume analysis, Bernoulli equation, Differential analysis of fluid flow, Navier-Stockes equation, Dimensional analysis, similitude, and modeling, Inviscid and potential flow, Viscous flow in pipes, Boundary layer, Introduction to computational fluid dynamics (CFD).

Practice

Solving engineering problems in order to describe and illustrate topics presented on theory classes. Solving fluid dynamics problems using COMSOL Multiphysics CFD software.

Required Reading:

B. Munson, A. Rothmayer, T. Okiishi, W. Huebsch, Fundamentals of Fluid Mechanics, John Wiley & Sons, Inc., 2013

Y. Cengel, J. Cimbala, Fluid Mechanics Fundamentals and Applications, McGraw-Hill Education, 2018

P. Pritchard, Fox And Mcdonald's Introduction to Fluid Mechanics, John Wiley & Sons, Inc., 2011

F. M. White, Fluid Mechanics, McGraw-Hill Education, 2016

Weekly Contact Hours: 6	**Lectures:** 3	**Practical work:** 3

Teaching Methods:

Lectures and students group work

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation	10	oral exam	30
Test I and Test II	60		