Course Unit Descriptor

Study Programme: Food Engineering; Biotechnology; Pharmaceutical Engineering; Chemical Engineering; Materials Engineering

Course Unit Title: Selected chapters of mechanical operations

Course Unit Code: DZI17

Name of Lecturer(s): Prof. Branislava Nikolovski, PhD; Assoc.Prof. Marija Radojković; PhD; Prof. Oskar Bera, PhD

Type and Level of Studies: Doctoral Academic Studies

Course Status (compulsory/elective): Elective

Semester (winter/summer): Winter and Summer

Language of instruction: English

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

Number of ECTS Allocated: 10

Prerequisites: Unit Operations I, Unit Operations II

Course Aims:

The objective of the course is to provide the student with the latest scientific knowledge and academic skills in the field of the phenomenon of transfer of the amount of movement and the expansion of knowledge about the rest and movement of ideal and real fluids, as well as the movement and separation of heterogeneous fluid systems in order to solve the complex phenomena of transferring the amount of movement, heat and mass, which is necessary for understanding and considering many problems that arise, both in scientific research and in modern industrial plants.

Learning Outcomes:

The ability of the student to undertake self-solving problems of fluid flow and heterogeneous fluid systems in real, non-stationary conditions by applying the acquired knowledge on the laws of maintaining mass, energy and the amount of fluid movement. Using the mastered methods of differential analysis of the flow of compressible and incompressible fluids, dimensional analysis and similarity theory, the student is able to understand and improve processes related to the transport of fluids in the industry. Mastering the computer dynamics of fluids using modern software packages and mathematical models enables the student to simulate, optimize and graphically display the influence of parameters on fluid flow in the tube, as well as the free flow of fluids in open channels. With this complex approach, an increase in the efficiency of technological processes can be ensured in an adequate way.

Syllabus:

Theory

A brief overview of the basic concepts of mechanics and the properties of fluid in motion and motion; Laws on the maintenance of mass, energy and amount of fluid movement; Differential analysis of nonstationary flow of compressible and incompressible fluids; Application of dimensional analysis and similarity theory in fluid mechanics; Computer simulation of fluid flow (CFD); Application of software in fluid mechanics; Analysis and solving complex examples of fluid flow in industry; Selected chapters from the mechanics of heterogeneous fluid systems.

Practice

Review of contemporary scientific and professional journals and publications, selection and use of valid information on various mechanical operations. Practical application of theoretically acquired knowledge.

Required Reading:

McCabe. W., Smith., J., Harriott, P.: Unit Operations Of Chemical Engineering, 7th Ed, McCabe And Smith, McGraw Hill international editions, Chemical Engineering series, 2005

Geankoplis, Ch.: Transport processes and Unit Operations, Prentice Hall, New York, 1993.

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

Kundu, P., Cohen, I. Dowling, D.: Fluid Mechanics, Sixth Edition, Elsevier, 2016.

Çengel, Y., Cimbala, J.: Fluid Mechanics: Fundamentals and Applications, Third Edition, McGraw-Hill, 2014.

White, F.: Fluid Mechanics, Eighth Edition, McGraw-Hill Education, 2016.

Weekly Contact Hours: 6	**Lectures:** 4	**Practical work:** 2

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	50
Seminar(s)	40		