

Course Unit Descriptor

Study Programme: Pharmaceutical Engineering			
Course Unit Title: Water Technology in Pharmaceutical Industry			
Course Unit Code: O6FIO1			
Name of Lecturer(s): Associate Professor Jelena Prodanović, Full Professor Marina Šćiban			
Type and Level of Studies: Undergraduate Academic Studies			
Course Status (compulsory/elective): Compulsory			
Semester (winter/summer): Summer			
Language of instruction: English			
Mode of course unit delivery (face-to-face/distance learning): Face-to-face			
Number of ECTS Allocated: 5			
Prerequisites: None			
Course Aims: Acquiring of basic scientific and academic abilities and skills in the field of water treatment in pharmaceutical industry, understanding of individual phases of water treatment and their interconnection as well.			
Learning Outcomes: Understanding of importance and role of water in pharmaceutical and industry of cosmetics; understanding of requirements for quality of water used for different purposes; obtaining of necessary knowledge and skills in water treatment: individual phases of the process and selection of the best treatment process; understanding of conduction and control of water treatment process.			
Syllabus: <i>Theory</i> General aspects of quality and usage of water. Quality requirements for water used in pharmaceutical industry. Classification of water treatment processes. Water clarification by depth and membrane filtration. Removal of unstable constituents from water. Removal of dissolved inorganic matter. Removal of organic matter. Removal of pollutants from water. Removal of dissolved gases. Disinfection basics and application of different disinfection means and techniques. Technological schemes for treatment of water used in pharmaceutical industry. <i>Practice</i> Calculations in the field of water technology.			
Required Reading: 1. MWH's Water Treatment: Principles and Design (Revised by: J.C. Crittenden at al.). 3rd Edition. John Wiley & Sons, Inc., 2012. 2. AWWA, ASCE: Water Treatment Plant Design. 4th Edition. McGraw-Hill. Inc., 2005. 3. D.L. Owens: Practical principles of ion exchange water treatment, Tall oaks publishing, Littleton, 1995.			
Weekly Contact Hours: 4	Lectures: 2		Practical work: 2
Teaching Methods: Lectures, practical lectures and tutorials.			
Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class	6	written exam	/

participation			
Practical work	/	oral exam	60
Preliminary exam(s)	10+14+10		
Seminar(s)	/		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			