

Study program: Integrated academic studies of Pharmacy			
Type and level of the study program: integrated academic studies			
Course title: BASICS OF INDUSTRIAL PHARMACY(PhV-BIPH)			
Teacher: Veljko S. Krstonošić, Dejan M. Ćirin			
Course status: compulsory			
ECTS Credits: 4			
Condition: Pharmaceutical Technology II			
Course aim The aim of the subject is to introduce students to the basic properties and phenomena in liquid / liquid, gas / liquid, solid / gas and liquid / gas systems as well as properties of components and phases of pharmaceutical products. Also, the students will get the information about unit operations and principles and applications of the devices applied in the pharmaceutical and cosmetics industries, as well as the good manufacturing practices and regulations.			
Expected outcome of the course: Gaining knowledge about the specific properties of pharmaceutical raw materials and products. The acquisition of knowledge relevant to the application of unit operations, production technology, stabilization and stability observation, activity and implementation of various pharmaceutical preparations. Knowledge of modern regulatory requirements in the manufacture of drugs. Knowledge of the principles of operation and the type of the device used in the pharmaceutical industry. The application of theoretical knowledge in practice. The use of different sources of information. Performing at the laboratory level.			
Course description <i>Theoretical education</i> <ol style="list-style-type: none"> 1. Introduction to the basics of industrial pharmacy. Definition. Scientific field to which it is based the formulation of pharmaceutical preparations. 2. Colloidal basics: Classification system and classification of colloids. 3. Micellar systems and their role in pharmaceutical preparations. 4. Structure, function and role of macromolecular compounds in the pharmaceutical compositions. 5. Purification and separation of colloids. Formation of disperse systems. 6. Emulsions, suspensions, foams and aerosols. Microheterogeneous disperse systems. Basic concepts and classification. 7. Double phase and multiphase emulsions. The micro emulsions and nano emulsions. 8. Solubilised materials. Liposomes. Micro and nano capsules. 9. Physical properties of foams and aerosols. 10. Viscosity and rheological behaviour of colloidal systems. 11. Surface phenomena in colloidal systems. Cleaning processes. 12. Optical and electrical phenomena in colloidal systems. The determination of size and particle size distribution. 13. Pharmaceutical unit operations in the pharmaceutical and cosmetic industry. Size reduction, mixing, granulation, drying, compression, dispersion, fluid mechanics, and heat transfer. 14. Regulations. Good manufacturing practice in pharmaceutical industry. Legislation. The procedure for obtaining a marketing authorization. <i>Practical education: exercises, other forms of education, research related activities</i> <ol style="list-style-type: none"> 1. Pharmaceutical unit operations. Practical work. Size reduction, mixing, dispersing, formation of foams and aerosols, determination of types of disperse system. 2. The tasks of unit operations. 3. Industrial scale equipment and laboratory scale equipment. Introduction to the organization of work in factories and pharmaceutical laboratories. Scale up equipment. 4. Good manufacturing practice. Introduction to the principles of good manufacturing practice . 5. Sources of information. The development of optimal formulation and technological processes. Solving certain requirements for formulations (specific example). 6. Emulsions and suspensions. Production and testing of products. 7. Characterization of dispersion properties of the emulsion. 8. Determination of the critical micellar concentration of surfactants. 9. Foams. Foaming of surfactants. 10. The viscosity of solutions of macromolecules. 			
Literature <i>Compulsory</i> <ol style="list-style-type: none"> 1. M. Jovanović, Z. Đurić: "Basic industrial pharmacy", Nijansa, Zemun, 2005. (translated selected chapters from Serbian) 2. Lj. Đaković: "Colloid chemistry", Zavod za udžbenike i nastavna sredstva, Belgrade, 2006. (translated selected chapters from Serbian) 3. V. Krstonošić, D. Ćirin: "Basic industrial pharmacy – practicum", Faculty of Medicine, Novi Sad, 2015. (translated selected chapters from Serbian) 4. P. Dokić: "Emulsions, foams, aerosols", WUS-Austria, 2005. (translated selected chapters from Serbian) <i>Additional</i> <ol style="list-style-type: none"> 5. G. Vuleta: "Pharmaceutical technology with biopharmacy. Practicum for practical education", Nauka, Beograd, 2003. (translated selected chapters from Serbian) 			
Number of active classes			Other:
Lectures: 30	Practice: 30	Other types of teaching:	
Research related activities:			
Teaching methods Theoretical classes. Practical classes.			
Student activity assessment (maximally 100 points)			
Pre-exam activities	points	Final exam	points
Lectures	10	Written	
Practices		Oral	50
Colloquium	40	
Essay			