



<b>Study program:</b> Integrated Academic Studies in Pharmacy
<b>Course title:</b> Basics of Industrial Pharmacy
<b>Teacher:</b> Veljko S. Krstonošić, Dejan M. Ćirin
<b>Course status:</b> compulsory
<b>ECTS Credits:</b> 3
<b>Condition:</b> Pharmaceutical Technology II
<p><b>Course aim</b></p> <p>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.</p>
<p><b>Expected outcome of the course:</b></p> <p>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 the theoretical knowledge in practice. The use of different sources of information. Performing at the laboratory level.</p>
<p><b>Course description</b></p> <p><i>Theoretical education</i></p> <ol style="list-style-type: none"> <li>1. Introduction to the basis in industrial pharmacy. Definition. Scientific field to which it is based the formulation of pharmaceutical preparations.</li> <li>2. Colloidal basics: Classification system and classification of colloids.</li> <li>3. Viscosity and rheological behaviour of colloidal systems.</li> <li>4. Surface phenomena in colloidal systems. Cleaning processes.</li> <li>5. Micellar systems and their role in pharmaceutical preparations. Solubilization.</li> <li>6. Structure, function and role of macromolecular compounds in the pharmaceutical compositions.</li> <li>7. Emulsions, suspensions, foams and aerosols. Microheterogenous disperse systems. Basic concepts and classification. Formation of disperse systems.</li> <li>8. The determination of size and particle size distribution.</li> <li>9. Pharmaceutical unit operations in the pharmaceutical and cosmetic industry. Size reduction, sifting, mixing, drying, filtration, compression, dispersion, fluid mechanics, and heat transfer.</li> <li>10. Legislation in pharmacy.</li> <li>11. Standardization in pharmacy.</li> </ol> <p><i>Practical education</i></p> <ol style="list-style-type: none"> <li>1. Pharmaceutical unit operations. Practical work. Size reduction, mixing, dispersing, formation of foams and aerosols, determination of types of disperse system.</li> <li>2. The tasks of unit operations.</li> <li>3. Industrial scale equipment and laboratory scale equipment. Introduction to the organization of work in factories and pharmaceutical laboratories. Scale up equipment.</li> <li>4. Good manufacturing practice. Introduction to the principles of good manufacturing practice.</li> <li>5. Sources of information. The development of optimal formulation and technological processes. Solving certain requirements for formulations (specific example).</li> <li>6. Emulsions and suspensions. Production and testing of products.</li> <li>7. Characterization of dispersion properties of the emulsion.</li> <li>8. Determination of the critical micellar concentration of surfactants.</li> <li>9. Foams. Foaming of surfactants.</li> <li>10. The viscosity of solutions of macromolecules.</li> </ol>
<p><b>Literature</b></p> <p><i>Compulsory</i></p>

1. Hickey AJ, Ganderton D. Pharmaceutical Process Engineering. New York: Marcel Dekker, Inc. 2001.
2. Ganderton D. Unit Processes in Pharmacy. London: William Heinmann Medical Books; 2014.
3. Smith BT. Remington Education: Physical Pharmacy. London: Royal Pharmaceutical Society; 2016

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1. Tadros TF. Formulation Science and Technology, Volume 3: Pharmaceutical, Cosmetic and Personal Care Formulations. Berlin: Walter de Gruyter GmbH; 2018.

<b>Number of active classes</b>	<b>Theoretical classes: 30</b>	<b>Practical classes: 30</b>	
<b>Teaching methods</b>			
Theoretical classes. Practical classes.			
<b>Student activity assessment</b> (maximally 100 points)			
<b>Pre-exam activities</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
Lectures	5	Written	55
Practices		Oral	
Colloquium	40	.....	
Essay			