

1. COURSE DESCRIPTION – GENERAL INFORMATION			
1.1. Course teacher	Professor Jerka Dumić, PhD	1.6. Year of study	4 th
1.2. Name of the course	Immunology	1.7. Credit value (ECTS)	2,5
1.3. Associate teachers	-	1.8. Type of instruction (number of hours L+S+E+e-learning)	30+0+0
1.4. Study programme (undergraduate, graduate, integrated)	Integrated study of Pharmacy	1.9. Expected enrolment in the course	130
1.5. Status of the course	Compulsory	1.10. Level of use of e-learning (1, 2, 3 level), percentage of instruction in the course on line (20% maximum)	2 nd (possibility of e-learning according to the student's personal affinity to use teaching materials and problem based examples for knowledge improvement)
2. COURSE DESCRIPTION			
2.1. Course objectives	To acquire the basic knowledge of the cellular and molecular immunology, mechanisms of the development of the diseases related to immune system (immunodeficiency, hypersensitivity, and autoimmunity), principles and application of immunochemical tests in diagnostics, testing of immune functions and application of immunotherapies.		
2.2. Enrolment requirements and required entry competences for the course	Attended Pharmacology course.		
2.3. Learning outcomes at the level of the study programme to which the course contributes	Application of knowledge in immunology needed to define, analyse and propose actions related to research, development and production and analysis and quality control of medicines.		
2.4. Expected learning outcomes at the level of the course (4-10 learning outcomes)	<p>After successfully completing the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Identify the components of the immune system; 2. Describe the cellular basis of the normal development of innate and acquired immunity and identify outcomes of impaired development and deficiencies; 3. Compare the mechanisms of activation of innate and adaptive immunity and explain how the outcomes of innate immunity activate acquired immunity; 4. Describe how the innate and acquired immunity inhibit bacterial, fungal and viral infections as well as the consequences of inefficiency suppression; 		

	<ol style="list-style-type: none"> 5. Describe mechanisms and outcomes of regulation of the immune system; 6. Identify key mechanisms that lead to the development of immunological disorders (hypersensitivity, autoimmunity, and immunodeficiency) and the principles for therapeutic modulation of the immune system; 7. Describe the basic immunological principles that are the basis of therapeutic approaches including biotherapeutics. 8. Explain the principles of immunochemical tests, and tests of immune function; 9. Identify the advantages and disadvantages of new immunodrugs. 					
2.5. Course content broken down in detail by weekly class schedule (syllabus)	<p>LECTURES:</p> <ul style="list-style-type: none"> • Review of the components and reactions of the immune system. • Immunobiology: The components of the immune system - cells, tissues and organs. • Immunobiology: The components of the immune system - complement and antibodies. • Immunobiology: MHC class molecules, T cell receptors, cytokines and chemokines. • Immunobiology: Innate immunity. • Immunobiology: Acquired immunity. • The regulation of the immune system: central and peripheral tolerance. • The regulation of the immune system: homeostasis of the immune system. • Immunopathology: The immune response against viral, bacterial and fungal infections. • Immunopathology: The immune response against the protozoa and helminths. • Immunopathology: Hypersensitivity and autoimmunity. • Immunopathology: Immunodeficiency; The immune system and cancer. • Immunotherapy: Allogeneic transplantation. • Immunotherapy: Immunomodulation - Advanced immunotherapy; Vaccination. • Immunochemistry and testing of various immune functions. 					
2.6. Type of instruction	<p>lectures seminars and workshops exercises online in entirety mixed e-learning field work</p>	<p>independent study multimedia and the internet laboratory work with the mentor (other)</p>	<p>2.7. Comments: e-learning - is not included in standard hours, but is used in teaching and contains problems with solutions, links to different pages, video and audio materials, etc.</p>			
2.8. Student responsibilities	<p>The students are required to attend classes that take place in the form of lectures and seminars. The students, for the achievement of credits and grades in specified courses, are required to take the written and oral exam and pass them both successfully.</p>					
2.9. Screening of student's work (specify the proportion of ECTS credits for each activity so that the total number of CTS credits is	Class attendance	1	Research		Practical training	
	Experimental work		Report			
	Essay		Seminar essay		(Other--describe)	
	Tests		Oral exam	0.5	(Other—describe)	

equal to the credit value of the course)	Written exam	0.5	Project		(Other—describe)	
2.10. Grading and evaluation of student work over the course of instruction and at a final exam	The students are evaluated according to the performance in the written (40%) and oral examination (60%), which can be accessed only after the attended lectures. On the final exam students are required to demonstrate knowledge of all areas covered by the program of the course, at the level of skilled information management and synthesis of materials.					
2.11. Required literature (available at the library and via other media)	Title					
	J. Dumić Imunologija Powerpoint presentations (within the e-learning)					
	Andreis I, Batinić D, Čulo F, Grčević D, Marušić M, Taradi M, Višnjić D. Imunologija (7. izdanje), Medicinska naklada, Zagreb, 2010					
	Male D., Brostoff J., Roth D.B., Roitt I. Immunology (7th ed.), 2006					
2.12. Optional literature	Abbas, AK, Lichtman, AH, Pillai, S. Cellular and Molecular Immunology (7th ed.), 2011 Andreis I, Batinić D, Čulo F, Grčević D, Marušić M, Taradi M, Višnjić D. Imunologija (6. izdanje), Medicinska naklada, Zagreb, 2004					
2.13. Methods of monitoring quality that ensure acquisition of exit competences	Outcomes 1-7 are checked by written and oral exam.					