

1. COURSE DESCRIPTION – GENERAL INFORMATION			
1.1. Course teacher	Professor Sanda Vladimir-Knežević, PhD	1.6. Year of study	2 nd
1.2. Name of the course	Pharmacognosy 1	1.7. Credit value (ECTS)	7.5
1.3. Associate teachers	Assistant Professor Biljana Blažeković, PhD Maja Bival Štefan, MPharm, Marija Klndl, MPharm	1.8. Type of instruction (number of hours L+E+S+e-learning)	30+45+15
1.4. Study programme (undergraduate, graduate, integrated)	Pharmacy integrated study programme	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
2. COURSE DESCRIPTION			
2.1. Course objectives	Introduction to medicinal compounds and raw materials of natural origin including biosynthesis, chemical structures and qualitative and quantitative analysis. Understanding the role of natural products in research and development of drugs as well as in disease prevention and treatment. Acquisition of basic knowledge and skills in quality control of herbal drugs and products.		
2.2. Enrolment requirements and required entry competences for the course	Enrolment requirements: passed examination in Pharmaceutical Botany Required entry competences: passed examination in Analytical Chemistry 1		
2.3. Learning outcomes at the level of the study programme to which the course contributes	<ul style="list-style-type: none"> • Applying of professional knowledge and skills in counseling on pharmacotherapy. • Informing and counseling patients on the effects and proper application of drugs. • Selection and applying of analytical methods and quality assurance in drug manufacturing. • Demonstration of observational, analytical and critical thinking skills to develop, implement and evaluate solutions that solve drug control and drug manufacturing problems. 		
2.4. Expected learning outcomes at the level of the course (4-10 learning outcomes)	<p>After completing the course, student will be able to:</p> <ol style="list-style-type: none"> 1. Recognize and define medicinal natural compounds according to their chemical structure and biosynthetic pathway; 2. Associate medicinal compounds with their natural sources; 3. Use basic pharmacognostical terminology in Croatian and Latin; 		

	<p>4. Combine quality control of herbal drugs with their effectiveness and safe use;</p> <p>5. Use the European Pharmacopoeia in the area of herbal drug analysis;</p> <p>6. Conduct basic qualitative and quantitative analysis of medicinal compounds in herbal drugs and preparations.</p>
<p>2.5. Course content broken down in detail by weekly class schedule (syllabus)</p>	<p>LECTURES:</p> <ul style="list-style-type: none"> • Introduction to Pharmacognosy; • History of Pharmacognosy; • Fatty oils and waxes; • Carbohydrates in herbal drugs; • Essential oils, resins and balsams; • Terpenes and phenylpropanes; • Iridoids, secoiridoids and pyrethrins; • Sesquiterpene lactones; • Diterpenes; • Triterpenes and sterols: saponins and cardiotonic glycosides; • Phenols and phenolic acids; • Coumarins and furanocoumarins; • Flavonoids, anthocyanins and tannins; • Anthraquinones; • Alkaloids; • Secondary metabolites from microorganisms. <p>SEMINARS:</p> <ul style="list-style-type: none"> • Factors affecting quality of herbal drugs and products; • European pharmacopoeia and monographs of herbal drugs; • Quality control of herbal drugs; • Aspects of purity control of herbal drugs; • Quality control of fatty oils; • Pharmacopoeial methods for quality evaluation of essential oils; • Determination of medicinal compounds in herbal drugs and preparations; • Safety sanitation requirements for herbal drugs and preparations. <p>LABORATORY EXERCISES:</p> <ul style="list-style-type: none"> • Determination of loss on drying, total ash, swelling index and some chemical values; • Qualitative analysis of cyanogenic glycosides, anthracene derivatives, cardiotonic glycosides and tannins in herbal drugs; • Identification of herbal drugs containing flavonoid by thin layer chromatography; • Determination of essential oil in herbal drugs; • Identification of essential oil; • Determination of arbutin i methylarbutin, phenolic acids and alkaloids in herbal drugs;

	<ul style="list-style-type: none"> Analysis of flavonoids using high performance liquid chromatography. 					
2.6. Type of instruction	<u>lectures</u> <u>seminars</u> and workshops <u>exercises</u> online in entirety mixed e-learning field work		independent study multimedia and the internet <u>laboratory</u> work with the mentor (other)		2.7. Comments:	
2.8. Student responsibilities						
2.9. Screening of student's work (specify the proportion of ECTS credits for each activity)	Class attendance	1.5	Research		Practical training	
	Experimental work	1.5	Report			
	Essay		Seminar essay		(Other--describe)	
	Tests	1.5	Oral exam	1.5	(Other—describe)	
	Written exam	1.5	Project		(Other—describe)	
2.10. Grading and evaluation of student work over the course of instruction and at a final exam						
2.11. Required literature (available at the library and via other media)	Title					
	S. Vladimir-Knežević and B. Blažeković. Teaching practicum in Pharmacognosy I, Faculty of Pharmacy and Biochemistry, Zagreb 2008.					
	S. Vladimir-Knežević. Pharmacognosy I: lectures and seminars					
	European Directorate for the Quality of Medicines and Health Care (EDQM). European Pharmacopoeia, Council of Europe: Strasbourg					
2.12. Optional literature	G. Samuelsson. Drugs of natural origin, A textbook of pharmacognosy, Svedish Pharmaceutical Press, Stockholm, 2004. Hansel, O. Sticher: Pharmakognosie – Phytopharmazie, 7. Auflage, Springer-Verlag Berlin Heidelberg New York, 2004.					
2.13. Methods of monitoring quality that ensure acquisition of exit competences	Learning outcomes from 1 to 4 are validated by written and oral exams: Learning outcomes 5 and 6 are validated during practical training in laboratory and by final test.					