<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Phytotherapy</td></tr>
<tr><td>Code</td><td>PMB734</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Valerija Dunkić, PhD, Professor
Ana Maravić, PhD, Associate Professor</td><td>Credits (ECTS)</td><td colspan="4">3</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Marija Nazlić, mag.educ.biol. et chem.</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective course</td><td>Percentage of application of e-learning</td><td colspan="4">10</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">The aim of the course is to get acquainted with the wild plants characteristics and their secondary metabolites especially with the essential oils, and their isolation, analysis and chemical composition. Students will also be acquainted to the methods of testing antibacterial and antifungal activity of secondary metabolites for their potential application in pharmaceutical industry.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">After completing the exam, the student will be able to:
• Describe the structure and function of secondary metabolites especially in aromatic plants
• Identify different essential oil chemotypes
• Introduce the development and application of essential oils
• Plan an experiment to determine the antimicrobial activity of plant secondary metabolites
• Perform a series of standard analytical and microbiological laboratory techniques
• Analyze experiment results
• Assess the importance of using natural plant products for human health</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Lectures:
1. Basics and principles of phytotherapy (2 hours)
2. Phytotherapy through history (2 hours)
3. The specific plant metabolites, their distribution and role (2 hours)
4. Methods of isolation and identification of volatile bioactive components (2 hours)
5. Application of natural plant products (2 hours)
6. Laboratory techniques for determination of antimicrobial activity I (disc-diffusion method, microdilution method, bacterial growth kinetics, time-killing assay) (3 hours)
7. Laboratory techniques for determination of antimicrobial activity II (biofilm formation assay, protein expression change by 2D-DIGE) (2 hours)

Practical:
1. Review of aromatic plants, collection, identification and drying of plant material;
2. Isolation of secondary metabolites;
3. Analysis of samples by GC / MS and GC / FID methods;
4. Identification of volatile compounds</td></tr>
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	5. Application of plant volatile components in phytotherapy 6. Antimicrobial activity determination: Disc-diffusion and microdilution method, 7. Antimicrobial activity determination: Bacterial growth kinetics and biofilm formation assay.					
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work		☐ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)			
Student responsibilities	The student must attend 70% of lectures and actively do 100% of laboratory exercises, and pass a written and oral exam					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	0.5	Research		Practical training	0.5
	Experimental work	1	Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam	1	(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	Active participation of students in the classroom is scored as follows: inadequate (1) student does not participate actively in the classes; a sufficient (2) student actively participates in teaching only after the question is asked, a good (3) student occasionally actively participates in the lessons but hardly makes independent conclusions; very good (4) student often actively participates in teaching and often makes independent conclusions; an excellent (5) student almost always actively participates in teaching, critically reflects and independently brings conclusions. A written exam is deemed to be passed if the student achieves at least 60% of the total number of points. Scoring: <60% of students did not satisfy; 60-69% sufficient (2); 70-79% good (3); 80-89% very good (4); 90-100% excellent (5). The final grade is the average grade of attendance in the classroom, practical work, written and oral exam.					
Required literature (available in the library and via other media)	**Title**			**Number of copies in the library**	**Availability via other media**	
	D. Kuštrak. Farmakognozija Fitofarmacija, Golden marketing – Tehnička knjiga, Zagreb, 2005.					
	Adams, R.P. Identification of essential oil components by gas chromatography/ mass spectroscopy. Fourth ed. Allured Publishing Corp.: Carol Stream IL, USA, 2007					
	Relevant scientific articles					
Optional literature (at the time of submission of study programme proposal)						

Quality assurance methods that ensure the acquisition of exit competences	Quality monitoring will be performed at three levels: (1) University (2) Faculty Level by the Commission for improvement the quality of teaching, (3) teacher level.
Other (as the proposer wishes to add)	