NAME OF THE COURSE	Proteomics					
Code	PMB703	Year of study	1			
Course teacher	Stjepan Orhanović, Ph.D. Associate Professor	Credits (ECTS)	3			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			15		30	
Status of the course	mandatory	Percentage of application of e-learning				

COURSE DESCRIPTION	
Course objectives	The objective of this course is providing an introduction to basic techniques used to study proteome and to cover basic proteomic applications in biochemistry, biology and related sciences.
Course enrolment requirements and entry competences required for the course	Course requires competences acquired upon completion Biochemistry 1 and 2 courses, firm knowledge of protein structure and regulation of protein expression and activity is required.
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After successfully completing this course, student will be able to: - describe the most important techniques used to separate peptides and proteins and to study proteome - determine amino acid sequence using mass spectrometry - use bioinformatic tools to identify protein - describe specific applications of proteomic research such as quantitative proteomics, proteomic study of posttranslational modifications and interaction proteomics - describe application of proteomic research in biology and biomedicine
Course content broken down in detail by weekly class schedule (syllabus)	Lectures are being held for fifteen weeks, one hour per week, eight- and fifteenth-week partial exam instead of lecture is taking place. 1. Introduction to proteomics, overall proteomics experimental workflows 2. Separation techniques for proteins and peptides (electrophoresis, capillary electrophoresis, liquid chromatography) 3. Introduction to mass spectrometry I (ionization techniques, analyzers, mass detectors) 4. Introduction to mass spectrometry II (instrument configuration, MALDI TOF, LC MS QTOF) 5. Introduction to mass spectrometry III (instrument configuration, QQQ, Orbitrap) 6. Introduction to mass spectrometry IV (Data acquisition, Data dependent acquisition) 7. Introduction to mass spectrometry V (Data independent acquisition, Targeted acquisition) 8. Partial exam I 9. Mass spectrometry of peptides and proteins I (M_r of intact protein, peptide mass fingerprinting) 10. Mass spectrometry of peptides and proteins II (peptide fragmentation in mass spectrometer) 11. Mass spectrometry of peptides and proteins III (de novo peptide sequencing)

	12. Mass spectrometry of peptides and proteins IVI (protein identification using bioinformatic tools) 13. Posttranslational modification and mass spectrometry 14. Selected examples of proteome research application 15. Partial exam II Laboratory exercises: thirty hours terms, some terms will last six hours depending on experiment length Manual determination of peptide sequence using provided spectra Extracting proteins from biological sample and sample preparation Determination of mass of an intact protein Targeted determination of protein in the sample - MRM HR analysis Data independent analysis of tryptic digest – SWATH analysis Protein identification using bioinformatics tools
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	Attending classes, missing 30% of lectures is acceptable, all practical exercises should be completed

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	1.5	Research		Practical training	
	Experimental work		Report		Preparation for the tests	1
	Essay		Seminar essay		(Other)	
	Tests	0.3	Oral exam	0.1	(Other)	
	Written exam	0.1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	It is possible to complete written part of the exam through passing two partial exams during semester. Passing grade on the written exams is set at 50 % of total points. Written part of the exam comprises 40 % of overall grade (passing written part is condition for accession on the oral exam), oral exam comprises another 40 % while final test taken upon completion of laboratory exercises comprise 20% to the overall grade.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Mass spectrometry for the novice, John Greaves, John Roboz, CRC press 2014	1	

Optional literature (at the time of submission of study programme proposal)	Selected scientific articles
Quality assurance methods that ensure the	Personal consultations, completing partial exams, students survey for the evaluation of the subject and teacher, evidence of the presence on the classes, analysis of the success rate on the partial and final tests.

acquisition of exit competences	
Other (as the proposer wishes to add)	