NAME OF THE COURSE	Physics of DNA, Chromatin and Viruses					
Code	PMP244	Year of study	GU-2			
Course teacher	Larisa Zoranić, PhD, Associate Professor	Credits (ECTS)	5,0			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			20		20	
Status of the course	Elective	Percentage of application of e-learning	40%			

COURSE DESCRIPTION		
Course objectives	Basic understanding of microscopic structure of DNA, based on x-ray and laser scattering in DNA solutions, modern aspects of polymer and polyelectrolyte physics in relations with DNA, microscopic structure of DNA condensate and chromatin, and packing of DNA in bacteriophage viruses.	
Course enrolment requirements and entry competences required for the course	Basic knowledge of statistical mechanics, electrostatic interactions and soft matter physics.	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	On completion of this course a student should be able to: 1. Recognise and articulate the foundational assumptions and main ideas of the DNA structuring. 2. Describe the main experimental methods used in measuring DNA structure. 3. Describe the main interactions governing DNA structure. 4. Describe DNA condensation and structuring in chromatin and bacteriophage viruses.	
Course content broken down in detail by weekly class schedule (syllabus)	1. X-ray scattering and DNA double helices 2. Watson and Crick DNA structure 3. The theory behind the paring of the DNA bases and Peyrard-Bishop-Dauxois model 4. Solvation of DNA and PCR reaction 5. Elasticity of DNA 6. Atomic-force microscopy of DNA 7. Statistical mechanics of DNA 8. Kratky-Porod model and persistent length 9. Light scattering in DNA solutions and analysis of the intensity - Peterlinov model 10. Mesophase of DNA in high-density solutions 11. Electrostatic interactions 12. Poisson-Boltzmann theory and Fuoss, Katchalski and Lifson solutions 13. Counter-ion condensation 14. DNA condensation and organisation in chromatin and bacteriophage viruses	
Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ on line in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☐ multimedia ☐ laboratory ☒ work with mentor ☐ homework assignments
Student responsibilities	Active participation in classes and assignments. Solving given physics problems, writing and presenting seminars.	

<table>
<tr><td>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)</td><td>
<table>
<tr><th>Name</th><th>Ects</th><th>Name</th><th>Ects</th><th>Name</th><th>Ects</th></tr>
<tr><td>Class attendance</td><td>1</td><td>Research</td><td></td><td>Experimental work</td><td></td></tr>
<tr><td>Oral exam</td><td></td><td>Report</td><td></td><td>Homework assignments</td><td></td></tr>
<tr><td>Seminar essay</td><td>3</td><td>Essay</td><td></td><td></td><td></td></tr>
<tr><td>Tests</td><td></td><td>Practical training</td><td>1</td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
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<tr><td>Grading and evaluating student work in class and at the final exam</td><td>Based on the oral presentation of seminars and practical assignments.</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td>
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>[1] R. Podgornik, Physics of DNA (2015), skripta.</td><td>0</td><td></td></tr>
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</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>[1] A. Vologodskii, Biophysics of DNA (2015).</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Students’ evaluation via anonymous questionnaires at the end of the course. The survey is conducted according to the rules of the University of Split.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td></td></tr>
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