NAME OF THE COURSE	**Modelling Electromagnetic Phenomena in the Environment**					
Code	PMP26E	Year of study	2			
Course teacher	Žarko Kovač, PhD, Assistant Professor Dragan Poljak, PhD, Full Professor	Credits (ECTS)				
Associate teachers	Anna Šušnjara, mag. ing.	Type of instruction (number of hours)	L	S	E	F
			30	20	10	
Status of the course	Compulsory	Percentage of application of e-learning				

COURSE DESCRIPTION

Course objectives	- to enable students to understand and apply the basic principles of numerical modelling of radiation transmission in the environment - setting and solving simple problems in environmental physics by application of modern numerical methods - permanent acquisition and deepening of knowledge in the field of numerical modelling	
Course enrolment requirements and entry competences required for the course	- Mathematical Methods of Physics 3 - Electrodynamics 1 - Electrodynamics 2 - Ocean Physics 1 - Meteorology 1 - programing	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	- understanding and application of basic principles of numerical modelling of electromagnetic phenomena in environmental physics - setting up and solving simple problems of radiation transmission in environmental physics - acquiring basic knowledge about solar radiation - a mathematical description of the propagation of light through the atmosphere and the sea - knowledge of modelling the greenhouse effect - acquiring introductory knowledge about the interaction of light and the biosphere	
Course content broken down in detail by weekly class schedule (syllabus)	1. Introduction to numerical modelling and classification of numerical methods, and analysis in frequency and time range (2 hours of lectures) 2. Finite difference method (4 hours of lectures and 2 hours of exercises) 3. Finite element method (4 hours of lectures and 2 hours of exercises) 4. Final volume method (4 hours of lectures and 2 hours of exercises) 5. Application of numerical methods to classical electrodynamics and thermodynamics (2 hours of lectures and 4 hours of exercises) 6. Defining the topic of the seminar paper (10 hours of the seminar) 7. Introduction to the theory of radiation transfer (2 hours of lectures) 8. Black body radiation and solar radiation (2 hours of lectures) 9. Atmospheric optics (2 hours of lectures) 10. Ocean optics (2 hours of lectures) 11. Long-wave radiation and the greenhouse effect (2 hours of lectures) 12. Remote sensing (2 hours of lectures) 13. Interaction of light and the biosphere (2 hours of lectures) 14. Presentation of seminar paper (10 hours of seminar)	
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

<table>
<tr><td>Student responsibilities</td><td colspan="6">Attend at least 70% of lectures and 70% of exercises.</td></tr>
<tr><td rowspan="5">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>Class attendance</td><td>1</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Homework</td><td>1</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>2</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the first 7 weeks of classes, students receive 5 homework assignments from the first 6 teaching units. These assignments are handed over at the end of the 8th week of classes. During the next 7 weeks of classes, students receive 5 new homework assignments from the next 5 teaching units. These assignments are handed over at the end of the 15th week of class. Students who submit assignments on time and achieve more than 50% of the possible points are exempted from writing the written part of the exam. Students who do not pass assignments or achieve less than 50% of the possible points must take a written exam. In the first 7 weeks of classes, the teacher gives lectures on possible seminar topics. In the 8th week of classes, students choose the topic of the seminar to be submitted by the end of the semester. Students present the seminar at the end of the semester and submit a written version of the seminar before the exam deadline. The final grade is formed on the basis of homework / exams (1/3 grade), seminars (1/3 grade) and answers to the oral exam (1/3 grade).</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Howard R. Gordon

Physical principles of ocean color remote sensing

International ocean color coordinating group, 2019.</td><td>0</td><td>yes</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">Muhammad Iqbal
An Introduction to solar radiation
Elsevier, 1983.

John T. O. Kirk
Light and photosynthesis in aquatic ecosystems
Cambridge Universiy Press, 2011.

Dragan Poljak
Teorija elektromagnetskih polja s primjenama u inženjerstvu
Skolska knjiga, 2014.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Exam results statistics and student evaluation through an anonymous survey at the end of the course. The survey is conducted according to the regulations of the University of Split.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
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