<table>
<tr><td>Name of the course</td><td colspan="5">SEMINAR ON TEACHING PHYSICS</td></tr>
<tr><td>Code</td><td>PMP152</td><td>Year of study</td><td colspan="3">2nd year of Masters</td></tr>
<tr><td>Course lecturer</td><td>Assoc. Prof. Ivica Aviani, PhD</td><td>Credits (ECTS)</td><td colspan="3">4</td></tr>
<tr><td rowspan="2">Associate Lecturer</td><td rowspan="2">Lucija Krce</td><td rowspan="2">Type of subject teaching (number of hours)</td><td>L</td><td>S</td><td>LE</td></tr>
<tr><td>0</td><td>60</td><td>0</td></tr>
<tr><td>Course status</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="3">20</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">• To take account on pupil’s preconceptions and misconceptions within a lecture plan.
• To develop abilities for the evaluation of conceptual knowledge.
• To gain an overview of influence of educational research on the development of efficient teaching methods.
• To capacitate students for independent production of seminar papers and essays.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">• Teaching methods in physics II</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">• To interpret ideas connected with certain phenomena.
• To qualitatively interpret certain physical phenomena.
• To assess the level of pupil’s conceptual understanding.
• To link knowledge through contextual problems.
• To use acquired knowledge in new contexts.
• To be able to use and analyze a papers from an educational physics journal.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule</td><td colspan="5">Seminar (60 hours)

1. Pupil’s preconceptions in mechanics and difficulties in application of Newton’s laws.
2. Pupil’s difficulties in constructing and interpreting diagrams of forces.
3. Pupil’s difficulties in understanding of non-inertial reference frames.
4. Concept of energy and difficulties in conceptual understanding.
5. Conservation of momentum and difficulties in conceptual understanding.
6. Difficulties in conceptual understanding of kinetic molecular theory of gases and structure of matter.
7. Fluid mechanics and difficulties in conceptual understanding.
8. Electrostatics and difficulties in conceptual understanding.
9. Pupil’s difficulties in interpreting concepts of electric circuits.
10. Electromagnetism and difficulties in conceptual understanding.
11. Wave optics and difficulties in conceptual understanding.
12. Pupil’s difficulties in interpreting concepts of quantum mechanics.
13. Teaching and learning with analogies.
14. Misconceptions through history of physics.
15. Development of pupil’s procedural and metacognitive knowledge.</td></tr>
<tr><td>Teaching methods</td><td colspan="2">☐ lectures
☒ seminars and workshops
☐ exercises</td><td colspan="3">☐ independent assignments
☒ multimedia
☐ laboratory</td></tr>
</table>

	☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ work with mentor ☐ (other)
Student responsibilities	Attendance of at least 80% of seminar classes. At least two seminar essays written and presented.	

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	Research		Practical work	0
	Experimental work		Report		Homework	0
	Essay		Seminar essay	2	(Other)	
	Colloquia		Oral exam	0,5	(Other)	
	Written exam	0.5	Project		(Other)	

Grading and evaluating student work in class and at the final exam

Student's achievements and activities are graded as follows:

- Two written seminar essays - up to 30 points
- Two given lecture on seminar essay topics – up to 20 points
- Analysis and self-analysis of the given lectures – up to 5 points
- Attendance and class activity – up to 15 points
- Exam – up to 30 points

Final grade is given as follows:

- 89 - 100 points: excellent
- 76 - 88 points: very good
- 63 - 75 points: good
- 50 - 62 points: enough

Required literature (available in the library and via other media)

Title	**Number of copies in the library**	**Availability via other media**
E. Mazur, *Peer Instruction: A User's Manual*, Prentice Hall, 1997		
The physics classroom, http://www.physicsclassroom.com/		
Paper from journals: Am. J. Phys, Phys. Teach, Phys. Educ, Int. J. of Sci. Educ.		
Approved high and elementary school textbooks		

Optional literature

- B. Arons, *Teaching Introductory Physics*, John Wiley & Sons Inc. 1996.
- E. F. Redish, *Teaching Physics with the Physics Suite*, John Wiley & Sons Inc. 2003.

Quality assurance methods that ensure the acquisition of exit competences

- Evaluation of student achievements in accordance with expected outcomes
- Lecturer's self-evaluation
- Student feedback through questionnaires
- In-institution and out-institution review

Other (as the proposer wishes to add)