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<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">General Physics II</td></tr>
<tr><td>Code</td><td>PMP003</td><td>Year of study</td><td colspan="4">1st</td></tr>
<tr><td>Course teacher</td><td>Ante Bilušić</td><td>Credits (ECTS)</td><td colspan="4">9.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Ivana Weber</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>60</td><td>15</td><td>30</td><td></td></tr>
<tr><td>Status of the course</td><td>Obligatory course</td><td>Percentage of application of e-learning</td><td colspan="4">20%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Understanding the basics of electrodynamics.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Prior knowledge of elementary mathematics which was confirmed at the state graduation exam in mathematics, A-level.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">By the end of the course, students are expected to apply laws of electrodynamics and the special theory of relativity, especially:
to understand Maxwell equations in integral and differential form,
using the Maxwell equations, to describe phenomena related to electromagnetism,
using the Maxwell equations, to analyze numerical problems that deal with basics of electromagnetism,
to understand the special theory of relativity, and relativistic origin of the magnetic field.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6"><u>Lectures with demonstration experiments:</u>
Electric charge and field (2 hours)
Electric dipole (2 hours)
Electric fields of the charged line, ring, disc and plane (3 hours)
Gauss law (2 hours)
Scalar and vector fields. Gauss and Stokes theorems (2 hours)
Electric potential
Definition. Connection between the electric field and potential (2 hours)
Electric potential of different charge distributions: electric dipole, line segment, line, ring, and disc (3 hours)
Electric capacity:
Definition. Capacities of plate, cylindrical, and spherical capacitors (2 hours)
Series and parallel capacitors. Electric field energy. (2 hours)
Dielectric in the electric field. Capacity of the capacitor filled with dielectric (2 hours)
Circuits. Series and parallel resistors. (2 hours)
RC-circuit (2 hours)
Magnetic field: introduction, motion of the charge in magnetic field. Applications: Hall effect, cyclotron, synchrotron, electromagnetic lenses (2 hours)
Conductor and current loop in magnetic field (2 hours)
Biot-Savart’s law. Force between conductors with the electrical current flow. Magnetic dipole moment of the current loop. (3 hours)
Amperé’s law and its application in cases of line conductor, solenoid and toroidal solenoid. (2 hours)
Magnetic field of the real solenoid derived from the Biot-Savart’s law (1 hour)
Faraday’s law of induction. Eddy currents. (2 hours)
Self-induction. RL-circuit. (2 hours)
Magnetic field energy. Mutual induction. (2 hours)
Maxwell’s contribution to the 4th Maxwell equation. Maxwell’s equations in integral and differential forms. (2 hours)</td></tr>
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Magnetic properties of dia-, para-, and ferro-magnets (2 hours)
RL- i RLC-circuits. Alternative current (AC). AC RLC-circuit (3 hours)
Transformer (1 hour)
Electromagnetic waves (2 hours)
Special theory of relativity:

Michelson-Morley’s experiment. Lorentz’s transformations (2 hours)
Transformation of velocity and acceleration (2 hours)
Relativistic dynamics (2 hours)
Transformation of electric field. Electric field of the moving charge (2 hours)

<u>Excercises:</u>

Electric charge. Coulomb’s law (2 hours)
Electric field (2 hours)
Gauss’ law (2 hours)
Electric potential (2 hours)
Electric capacity (2 hours)
Electric current and circuits (4 hours)
Magnetic fields (2 hours)
Magnetic fields caused by the electric currents (2 hours)
Faraday’s law o induction (4 hours)
Alternative currents (2 hours)
Electromagnetic oscillations (2 hours)
Revision (4 hours)

<u>Seminars:</u>

Electric charge. Coulomb’s law (1 hour)
Electric field (1 hour)
Gauss’ law (1 hour)
Electric potential (1 hour)
Electric capacity (1 hour)
Electric current and circuits (2 hours)
Magnetic fields (1 hour)
Magnetic fields caused by the electric currents (1 hour)
Faraday’s law o induction (2 hours)
Alternative currents (1 hour)
Electromagnetic oscillations (1 hour)
Revision (2 hours)

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<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☒ problems (homeworks)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Solving homework during the semester. Attendance.</td></tr>
<tr><td rowspan="6">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>2.5</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>Problems (homeworks)</td><td>1.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>3.0</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>2.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
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<tr><td>Grading and</td><td colspan="6">Twice during the semester, students take a written pre-exam (first part: till magnetic</td></tr>
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<tr><td>evaluating student work in class and at the final exam</td><td colspan="3">fields). Students that reach more than 50% of possible points were acquitted of taking the written exam and can access the oral exam directly. Furthermore, those students that in the first written pre-exam achieve 50% points or more, can take the oral exam in two parts (first part, that includes till the magnetic fields, must be taken immediately after the first written pre-exam). The final grade is based on written (pre-)exam (1/2 of the score) and the oral exam (1/2 of the score).</td></tr>
<tr><td rowspan="10">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Halliday, Resnick, Walker: Fundamentals of Physics, John Wiley & Sons, 2003.</td><td>25</td><td>yes</td></tr>
<tr><td>E. Babić, R. Krsnik i M. Očko: Zbirka riješenih zadataka iz fizike, Školska knjiga, Zagreb 2004., in Croatian</td><td>10</td><td>no</td></tr>
<tr><td>Ante Bilušić, additional materials (Scalar and vector fields. Gauss’ and Stokes’ theorem; Magnetic properties of materials; Electromagnetic waves; Transformation of the electric field. Electrical field of the moving charge), in Croatian</td><td>0</td><td>yes (free access)</td></tr>
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<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">• C. Kittel, W.P. Knight i M.A. Ruderman. Electricity and magnetism, Berkeley course, 2nd part,
• R. P. Feynman, R. B. Leighton, M. Sands, The Feynman Lectures on Physics, vol. II, Addison-Wesley, 1978.
• I. E. Irodov: Problems in General Physics, Mir Publishers, Moscow</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Statistics of students’ results and 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 colspan="3"></td></tr>
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