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<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">General Physics I</td></tr>
<tr><td>Code</td><td>PMP001</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 mechanics.</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 knowledge of mechanics of point mass, mechanics of rigid body and fluid mechanics, especially:
• to understand and describe qualitatively and quantitatively different types of motion of point mass and rigid body by the application of Newton's laws,
• to understand and describe qualitatively and quantitatively the motion of systems of bodies by the application of Newton's laws and the laws of conservation of energy and momentum,
• to understand and describe qualitatively and quantitatively periodic motion of point mass and rigid body by the application of Newton's laws,
• to understand and describe qualitatively and quantitatively fluid kinetics and dynamics by the application of Newton's laws.</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>
• Basic concepts of space and time; mathematical reminder of vectors and vector calculus. (2 hours)
• Kinematics:
  ○ linear and motion in two and three dimensions (2 hours)
  ○ circular motion (2 hours)
• Aristotle's description of the body motion (1 hour)
• Newton’s laws (3 hours)
• Diagram of forces to free body (free fall and the vertical shot, horizontal and motion on the slope). The dynamics of system of the bodies. (2 hours)
• Dynamics of circular motion. (2 hours)
• Descriptions of the selected forces in nature:
  ○ Gravitational force (3 hours)
  ○ Elastic force (2 hours)
  ○ Friction (2 hours)
• Inertial and non-inertial systems (2 hours)
• Rotating non-inertial systems (2 hours)
• Work and kinetic energy. Elastic and gravitationa potential energy. (2 hours)
• Conservative and non-conservative forces. Conservation laws in isolated systems. (3 hours)
• Collisions:
  ○ Central elastic collision in laboratory and centre-of-mass systems (2 hours)
  ○ Non-central elastic collision in laboratory and centre-of-mass systems (2 hours)
  ○ Non-elastic central collision in laboratory and centre-of-mass systems (1 hour)
• Statics of the rigid body. (2 hours)
• Steiner theorem. Main axis of the rigid body. (2 hours)
• Euler’s equations (1 hour)</td></tr>
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Rotation of the axial symmetric free body. (2 hours)
Top motion. Angular momentum conservation law. (2 hours)
Periodic motion without and with dampening (3 hours)
Forced pendulum (3 hours)
Fluid statics (1 hour)
Fluid dynamics:

Euler, continuity and Bernoulli’s equation (2 hours)
Laminar fluid flow. Navier–Stokes’ equation (2 hours)
Aerodynamics (1 hour)

Kepler’s laws (3 hours)
Historical development of Solar system models and the cosmology (1 hour)

<u>Exercises:</u>

Vectors (2 hours)
Linear motion (2 hours)
Complex motions (2 hours)
Force. Newton’s laws. (6 hours)
Reference systems (2 hours)
Work and energy (2 hours)
Momentum and energy conservation laws (4 hours)
Rigid body mechanics (4 hours)
Periodic motion (2 hours)
Fluid mechanics (2 hours)
Mechanics of the solar system (2 hours)

<u>Seminars:</u>

Vectors (1 hour)
Linear motion (1 hour)
Complex motions (1 hour)
Force. Newton’s laws. (3 hours)
Reference systems (1 hour)
Work and energy (1 hour)
Momentum and energy conservation laws (2 hours)
Rigid body mechanics (2 hours)
Periodic motion (1 hour)
Fluid mechanics (1 hour)
Mechanics of the solar system (1 hour)

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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 (homework)</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 (homework)</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 evaluating student</td><td colspan="6">Twice during the semester, students take a written pre-exam (first part: kinematics, dynamics, systems of the body, the second part: energy, conservation laws, rigid</td></tr>
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<tr><td>work in class and at the final exam</td><td colspan="3">body, oscillations, fluids). 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 material to the systems of the body, 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="9">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>Antonije Dulčić: Mehanika, Prirodoslovno-matematički fakultet u Zagrebu, (in Croatian)</td><td>0</td><td>yes (free access)</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>P. Kulišić, L.Bistričić, D. Horvat, Z. Narančić, T. Petrović i D. Pevec. Riješeni zadaci iz mehanike i topline. Školska knjiga, Zagreb, 2002., in Croatian</td><td>5</td><td>no</td></tr>
<tr><td>Ante Bilušić, additional materials (Fluid statics and dynamics, Kepler’s laws, mathematical addendums), 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 and M.A. Ruderman. Mechanics, Berkeley Course, First part,
R. P. Feynman, R. B. Leighton, M. Sands, The Feynman Lectures on Physics, vol. I, 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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