<table>
<tr><td>NAME OF THE COURSE</td><td colspan="5">Numerical Programs for Physicists</td></tr>
<tr><td>Code</td><td>PMP072</td><td>Year of study</td><td colspan="3">UGU-3</td></tr>
<tr><td>Course teacher</td><td>Petar Stipanović, PhD, Assistant Professor</td><td>Credits (ECTS)</td><td colspan="3">1,0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Petar Stipanović, PhD, Assistant Professor</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></td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>optional</td><td>Percentage of application of e-learning</td><td colspan="3">50%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Competence in the use of Maxima.
Competence in the use of MatLab/SciLab.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Basic knowledge in physics and mathematics.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">The student will:
1. develop a critical approach towards the input-output data, i.e. the accuracy and applicability of models of physical systems;
and be able:
2. to define basic objects using (functions, lists, matrices) using Maxima (alternatives to the Mathematica) and MatLab/SciLab;
3. to apply these tools in modeling classical and quantum physical systems to assess their dynamic and static properties, e.g., to solve: the equations of motion, the inherent problems from the quantum mechanics, diffusion equation, wave equation ...;
4. modify algorithms for implementation in Maxima and MatLab/SciLab;
5. to display schematically and visualize, i.e., make graphical presentation of the data using gnuplot.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">MAXIMA
(1h) Introduction to Maxima (operators, variables, lists, flow control, functions).
(2h) Matrix calculus. Eigenvalue problems from Quantum Mechanics.
(1h) Equations (algebraic and transcendental examples from General Physics.
(2h) Infinitesimal calculus (limits, derivations, integrals). Examples in Physics.
(2h) Ordinary differential equations. Examples in Physics.
MATLAB/SCILAB
(1h) Introduction to MatLab/SciLab.
(2h) Integrals and solving differential equations of motions.
(2h) Matrix calculus. Eigenvalue problems.
(2h) Solving differential equations (diffusion, wave …).</td></tr>
<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="2">☒ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ homework assignments</td></tr>
<tr><td>Student responsibilities</td><td colspan="5">Active participation on classes and assignments.</td></tr>
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<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 colspan="3"><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>0.5</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></td><td>Essay</td><td></td><td></td><td></td></tr>
<tr><td>Tests</td><td></td><td>Practical training</td><td>0.5</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 colspan="3">During the course, students’ work on the computer is monitored. Maxima (50%) and MatLab/SciLab (50%) exams need to be solved in computer labs during the examination period.
The final grade is formed according to the following list:
[50,60>% = D (2)
[60,75>% = C (3)
[75,90>% = B (4)
[90,100]% = A (5)</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td colspan="3"><table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>[1] Software help documentation that is available in packages Maxima and Scilab.</td><td>0</td><td>yes</td></tr>
<tr><td>[2] Lecture notes (P. Stipanović).</td><td>0</td><td>yes</td></tr>
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<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">[1] Maxima Documentation, URL: http://maxima.sourceforge.net/documentation.html
[2] SciLab Documentation, URL: https://www.scilab.org/resources/documentation
[3] MathWorks: "MATLAB Onramp", Training Sercices, URL: https://www.mathworks.com/learn/tutorials/matlab-onramp.html</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Professors, who teach other similar courses, cooperate and take care of the quality of the course program.
Students using web applications can send anonymous comments regarding lectures.
Statistics of test results.
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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