1.1. Course description

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="6">Computer intelligence with applications</td></tr>
<tr><td>Code</td><td>PMII55</td><td>Year of study</td><td colspan="4">GU-1
GU-2</td></tr>
<tr><td>Course teacher</td><td>Hrvoje Kalinić, PhD, Assistant Professor</td><td>Credits (ECTS)</td><td colspan="4">5,0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></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>20</td><td>20</td><td>20</td><td></td></tr>
<tr><td>Status of the course</td><td>elective</td><td>Percentage of application of e-learning</td><td colspan="4">15</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Become familiar with the trends in the field of computational intelligence, possibilities and problems that brings.
Understand basic concepts, become familiar with popular libraries, and apply some algorithms for learning and reasoning from data.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Familiarity with basic mathematical concepts frequently used in machine learning.
2. Familiarity with popular cmouting intelligence algorithms.
3. Application of ML algorithms using libraries such as scikit-learn, TensorFlow, Keras...
4. Analyse and evaluate the applied algorithm.
5. Ability to use advance programming techniques in Python such as lambda calculus.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1. Principal component analysis and applications (4)
2. Distribution, expectation and variance in information theory (4)
3. Numerical Computation: convergence, overflow, numerical errors (4)
4. Applications and challenges in computing intelligence (4)
5. Applications and challenges in computing intelligence (4)
Seminar
1. Applications in physics (geophysics, civil engineering, ocean sciences...) (4)
2. Applications in modeling complex systems (stock market, traffic, social graphs...)
(4)
3. Image processing applications (4)
4. Various other applications (scientific papers or other relevant sources) (4)
5. Presentation and discussion(4)
Exercises
1. Scikit-learn basics (2)
2. TensorFlow basics (2)
3. Neuron and associative memory (2)
4. Perceptron (2)
5. Multi-layer perceptron (2)
6. Support vector machines (2)
7. Recursive neural net (4)
8. Convolutional neural net (4)</td></tr>
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<tr><td>Format of instruction</td><td colspan="2">☒ lectures
☒ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="4">☐ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ homework assignments</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Active participation in teaching activities. Making homework. Exam.</td></tr>
<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="6"><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>1</td><td>Research</td><td></td><td>Experimental work</td><td>1</td></tr>
<tr><td>Oral exam</td><td>1</td><td>Report</td><td></td><td>Homework assignments</td><td></td></tr>
<tr><td>Seminar essay</td><td>1</td><td>Essay</td><td></td><td></td><td></td></tr>
<tr><td>Tests</td><td></td><td>Practical training</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td>1</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Student activities in class (30%)
Exercises (20%)
Project (30%)
Exam (40%)</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td colspan="6"><table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>Lecture notes in computational intelliceng & applications, Hrvoje Kalinić</td><td>0</td><td>yes</td></tr>
<tr><td>Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville</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="6">Lecture notes available on the Internet including solved problems and additional links including selected papers</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Students feedback, students results and self-evaluation</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
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