



**UNIVERSITY OF PRIZREN  
FACULTY OF COMPUTER SCIENCE**

PROGRAM: Computer Science and Communication Technology

| <b>Curriculum -- SYLLABUS</b> |   |                              |                              |                      |                 |                     |   |
|-------------------------------|---|------------------------------|------------------------------|----------------------|-----------------|---------------------|---|
| <i>Level of studies</i>       | Master  | <i>Program</i>               |                              | <i>Academic year</i> | 2017/2018       |                     |   |
| <i>SUBJECT</i>                | Selected Topics from Artificial Intelligence and Machine Learning |                              |                              |                      |                 |                     |   |
| <i>Year</i>                   | 2 <sup>nd</sup>   | <i>Status Of the subject</i> | Obligatory                   | <i>Code</i>          |                 | <i>ECTS credits</i> | 6 |
| <i>Semester</i>               | III   |                              |                              |                      |                 |                     |   |
| <i>Teaching weeks</i>         | 15  |                              | <i>Hours teaching</i>        | 60                   | <i>Lectures</i> | <i>Exercises</i>    |   |
|                               |   |                              |                              |                      | 2               | 2                   |   |
| <i>Teaching Methodology</i>   | Lectures, exercises, seminar papers, consultations, etc.          |                              |                              |                      |                 |                     |   |
| <i>Consultation</i>           | 1 hr / week   |                              |                              |                      |                 |                     |   |
| <i>The teacher</i>            | Prof. Ass. Dr.Arsim Susuri  | <i>E-mail:</i>               | arsim.susuri@uni-prizren.com |                      |                 |                     |   |
|                               |   | <i>Tel.:</i>                 | 044 254 183                  |                      |                 |                     |   |
| <i>Assistant</i>              |   | <i>E-mail:</i>               |                              |                      |                 |                     |   |
|                               |   | <i>Tel.:</i>                 |                              |                      |                 |                     |   |

| <b>Study goal and table of content</b>  | <b>Benefits of student</b>   |
|---|--|
| <p>The purpose of Artificial Intelligence (AI) and Machine Learning (MM) is to design agents that can be rationally brought to the real world by sensing their environment, planning their goals, and acting optimally to achieve these goals. This course offers an advanced study on techniques and applications of modern AI and MM. The course will cover a wide range of conceptual approaches, from combinatorial research to probabilistic reasoning and machine learning, as well as to a wide range of applications, from the natural language concept to computer vision. Lectures will emphasize not only the technical concepts, but also the history of the ideas behind them.</p> | <p>After completing this course the student will be able to:</p> <ul style="list-style-type: none"> <li>• Understand the advanced concepts of IA and MM</li> <li>• Identify and describe different patterns in IA and MM</li> <li>• Recognized with the technologies and key standards in the field of IA and MM</li> <li>• Describe the social impact of IA and MM</li> <li>• Implement and practice learning through project forms and / or case studies.</li> </ul> |

| <b>Methodology for the implementation of educational topics:</b>  |                       |                    |    |
|---|-----------------------|--------------------|----|
| The course is a combination of lectures, discussions, discussions, numerical and laboratory exercises, the tasks are presented by the subject professor and assistant in the lab. |                       |                    |    |
| <b>Conditions for realization of educational topics:</b>  |                       |                    |    |
| <ul style="list-style-type: none"> <li>• Adequate literature, tables, computers, projectors and other IT tools for learning and exercises.</li> </ul>                             |                       |                    |    |
| <b>Ways of assessing the student (in %) :</b>   | <b>Evaluation in%</b> | <b>Final grade</b> |    |
|   |                       | 51-60% - grade     | 6  |
|   |                       | 61-70              | 7  |
|   |                       | 71-80              | 8  |
|   |                       | 81-90              | 9  |
| <b>Total</b>  | <b>100.00 %</b>       | 91-100             | 10 |
| <b>Obligations of student:</b>  |                       |                    |    |
| <b>Lectures</b>   |                       | <b>Exercises</b>   |    |

The student should be regular in lectures and especially in exercises, make use of all learning opportunities, use compulsory and broader literature, be active and respect the rules on high school ethics in courtesy and cooperation.

The student should be active in the exercises and reflect the readiness and knowledge of initiatives, ideas and demonstrations of the knowledge acquired in the lectures.

| <b>Activities</b>   |   |  |      | <b>Hour/ weeks</b>  | <b>Days/Weeks</b>  | <b>Total</b> |
|---|---|--|------|---|--------------------|--------------|
| Lectures  |   |  |      | 2   | 15                 | 30           |
| Laboratory exercises  |   |  |      | 2   | 15                 | 30           |
| Contacts with teachers / consultations  |   |  |      | 1   | 5                  | 5            |
| Practical work  |   |  |      | 1   | 2                  | 2            |
| Projects, presentations, etc.   |   |  |      | 1   | 2                  | 2            |
| Own study time  |   |  |      | 3   | 15                 | 45           |
| Preparation for final exam  |   |  |      | 5   | 6                  | 30           |
| Time spent in the assessment (tests, final exam, etc.)  |   |  |      | 2   | 3                  | 6            |
| <b>Notice: 1 ECTS credits= 25 hour commitment, e.g. if the subject has 6 ECTS credits student must have 150 hours during the semester commitment.</b> |   |  |      |   | <b>Total load:</b> | <b>150</b>   |
| Week  | Lectures  |  | Hour | Exercises   |                    |              |
|   | Topic   |  |      | Topic   |                    |              |
| 1   | <ul style="list-style-type: none"> <li>• <b>Presentation of the syllabus</b></li> <li>• <b>Introduction</b> <ul style="list-style-type: none"> <li>• AI and MM</li> </ul> </li> </ul> |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 13 (literature 1)</b></li> <li>• <b>Laboratory exercises from chap. 1 (literature 2)</b></li> </ul>  |                    | 2            |
| 2   | <ul style="list-style-type: none"> <li>• <b>Probability (chap. 13)</b></li> </ul>   |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 13 (literature 1)</b></li> <li>• <b>Laboratory exercises from chap. 1 (literature 2)</b></li> </ul>  |                    | 2            |
| 3   | <ul style="list-style-type: none"> <li>• <b>Bayesian Conclusion (chap. 13)</b></li> </ul>   |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 13 (literature 1)</b></li> <li>• <b>Laboratory exercises from chap. 8 (literature 2)</b></li> </ul>  |                    | 2            |
| 4   | <ul style="list-style-type: none"> <li>• <b>Bayes Networks (chap. 14)</b></li> </ul>  |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 14 (literature 1)</b></li> <li>• <b>Laboratory exercises from chap. 8 (literature 2)</b></li> </ul>  |                    | 2            |
| 5   | <ul style="list-style-type: none"> <li>• <b>Bayes Networks Conclusion (chap. 20)</b></li> </ul>   |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 20 (literature 1)</b></li> <li>• <b>Laboratory exercises from chap. 8 (literature 2)</b></li> </ul>  |                    | 2            |
| 6   | <ul style="list-style-type: none"> <li>• <b>Machine Learning (chap. 18)</b></li> </ul>  |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 18 (literature 1)</b></li> <li>• <b>Laboratory exercises from chap. 7 (literature 2)</b></li> </ul>  |                    | 2            |
| 7   | <ul style="list-style-type: none"> <li>• <b>SVM (Support Vector Machines) (chap. 18.6, 18.9)</b></li> </ul>   |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 18 (literature 1)</b></li> <li>• <b>Laboratory exercises from chap. 10 (literature 2)</b></li> </ul> |                    | 2            |
| 8   | <ul style="list-style-type: none"> <li>• <b>Testi 1</b></li> </ul>  |  | 2    | <ul style="list-style-type: none"> <li>• <b>Reinforcement exercises for test 1</b></li> </ul>   |                    | 2            |
| 9   | <ul style="list-style-type: none"> <li>• <b>Neural Networks (chap. 18.7)</b></li> </ul>   |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 18 (literature 1)</b></li> <li>• <b>Laboratory exercises from chap. 7 (literature 2)</b></li> </ul>  |                    | 2            |
| 10  | <ul style="list-style-type: none"> <li>• <b>Deep Learning</b></li> </ul>  |  | 2    | <ul style="list-style-type: none"> <li>• <b>Questions from chap. 19</b></li> </ul>  |                    | 2            |

|    |  |   |  |   |
|----|--|---|--|---|
|    |  |   | (literature 1)<br>• Laboratory exercises from chap. 7 (literature 2)                           |   |
| 11 | •<br><b>Markov Decision Processes (chap. 17)</b> | 2 | • Questions from chap. 17 (literature 1)<br>• Laboratory exercises from chap. 1 (literatura 2) | 2 |
| 12 | •<br><b>Reinforcement Learning (chap. 21)</b>    | 2 | • Questions from chap. 21 (literature 1)<br>• Laboratory exercises from chap. 9 (literatura 2) | 2 |
| 13 | •<br><b>Deep Learning with reinforcementt</b>    | 2 | • Questions from chap. 21 (literature 1)<br>• Laboratory exercises from chap. 7 (literatura 2) | 2 |
| 14 | •<br><b>Social Impacts of AI (chap 26)</b>       | 2 | • Questions from chap. 26 (literature 1)<br>• Laboratory exercises from chap. 7 (literatura 2) |   |
| 15 | • <b>Testi 2</b>                                 | 2 | • <b>Reinforcement exercises for test 2</b>  |   |

|  |  |
|--|--|
| <b>LITERATURE:</b>   |  |
| <b>Main Literature:</b>  |  |
| <ol style="list-style-type: none"> <li>1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 3<sup>rd</sup> edition, Prentice Hall, 2010.</li> <li>2. Mark Watson: Practical Artificial Intelligence Programming With Java, 3<sup>rd</sup> edition 2008.</li> </ol>  |  |
| <b>Additional literature:</b>  |  |
| <ol style="list-style-type: none"> <li>1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2<sup>nd</sup> edition, Prentice Hall, 2003.</li> <li>2. David L. Poole and Alan K. Mackworth, Python code for Artificial Intelligence: Foundations of Computational Agents, 2018.</li> </ol>   |  |
| <b>NOTICE:</b>   |  |
| <p>In general, lecture presentations will be made through the PowerPoint system, the table, the use of materials and software and the Internet.</p> <ul style="list-style-type: none"> <li>• Also additional resources (scientific papers, publications, national bulletins, and recent discoveries and research) will be provided by the professor.</li> <li>• In the absence of the opportunity for practical work to be organized weekly, in cooperation with the University's management, this activity will be organized on certain days in: organizations, companies, ltd, farms, manufacturing units.</li> <li>• During each session, dialogue and co-participation will be organized with the students.</li> </ul> |  |
| <b>Notice for the student:</b>   |  |
| <p>Students are required to be regular in the lectures and exercises section.</p> <p>The contribution of students in the form of conversation and cooperation with students will be evaluated.</p> <p>Timely arrival in lectures and exercises is mandatory.</p>   |  |