<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Robotics in education</td></tr>
<tr><td>Code</td><td>PMT276</td><td>Year of study</td><td colspan="4">2. year graduate study (3. Semester)</td></tr>
<tr><td>Course teacher</td><td>Doc.dr.sc. Vladimir Pleština</td><td>Credits (ECTS)</td><td colspan="4">2,5</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>15</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective course</td><td>Percentage of application of e-learning</td><td colspan="4">30%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">To qualify a student for independent application of simple robotic systems in education.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Course enrolment requirements: none.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After this course, students will be able to:
- Compile educational robotic assembly
- Create a program using graphical programming tool
- Construct a robotic assembly
- Start Arduino, Raspberry Pi. mbot
- Write a program in Python to control Raspberry PI GPIO
- Write a program in the Arduino IDE interface and run it on the Arduino development board
- Create a program using mBlock tool</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Week 1
An introductory lecture. Introducing students to the rules of the class, the rules of attendance. General definition of robotics. Introduction to robotics. Introducing students to robotic systems for education: FischerTechnik, Lego Mindstorms, MBlock, Raspberry Pi and Arduino.

Week 2
Raspberry Pi - historical overview. The hardware components of Raspberry Pi. Device connections. Consumption and power sources. GPIO ports. Raspberry Pi accessories.
exercises:
Working with test board. Connecting basic electronic elements.

Week 3
Raspberry Pi - Software. Choosing operating system. Preparing SD card and OS installation. Boot up OS and install necessary software. Python on Raspberry Pi. Managing GPIO connections with Python.
exercises:
Connecting and managing LED using the Raspberry Pi's

Week 4
Raspberry Pi - advanced use. Control DC motor. Motor Driver, H-bridge. Sensors on GPIO port.
exercises:
DC motor on a test board and control with Raspberry Pi's

Week 5
Arduino platform. General about Arduino. Detailed description of the hardware platform. Installation and use of Arduino IDE. Simple program in the Arduino IDE
exercises:
Connecting and managing LED using Arduino UNO.</td></tr>
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	Week 6 Arduino platform. Development of more complex projects. Using sensors and control based on input data. exercises: Sensors and control using Arduino UNO. Week 7 Raspberry Pi and Arduino device on same project. Raspberry Pi and Arduino shield. Mutual sensors and connections of Raspberry Pi and Arduino. exercises: Raspberry Pi and Arduino on same project. Week 8 1st colloquium Week 9 MakeBlock platform. MBot educational robot. MakeBlock sensors and equipment. exercises: MakeBlock device. Week 10 mBlock. Programming with mBlock tool. exercises: MakeBlock devices and mbot robot programming. Week 11 Lego Mindstorms. Basic forms. Assembling Lego Mindstorms robot. exercises: Assembling Lego Mindstorms robot Week 12 Lego Mindstorms NXT. Programming with block tool. exercises: Development of a simple program for Lego Mindstorms Week 13 Construction of educational robots and applications of robotics in education Micro:bit exercises: Construction of a simple robotic assembly Week 14 The application and use of robotic models Construction of robotic systems and applications in education with micro:bit. exercises: Construction of a simple robotic assembly Week 15 2nd colloquium.	
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☐ multimedia ☐ laboratory ☒ work with mentor ☒ Robot demonstration (other)
Student responsibilities	Class attendance Independent planning and presentation of student paper Active participation in the teaching process Exam.	

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)*	Class attendance	0,5	Research		Practical training	0,5
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	1	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Total scoring (100%): Exam or 2 colloquiums - 90%, exercises 10% 1. Colloquium 1: 45% (or exam) 2. Colloquium 2: 45% (or exam) 3. Exercises: 10% (obligatory) Rating by percentage: 50% to 62% - sufficient (2) 63% to 75% - good (3) 76% to 88% - very good (4) 89% to 100% - excellent (5)

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	Robotika u nastavi - internal script.		
	Paolo Zanzerović, Arduino kroz jednostavne primjere		

Optional literature (at the time of submission of study programme proposal)	1. Michael Margolis, Arduino CookBook 2. Simon Monk, Raspberry Pi CookBook 3. Guan Xuefeng Team, Scratch, The adventures of Mike 4. Laurens Valk, The LEGO MINDSTORMS EV3 Discovery Book (Full Color): A Beginner's Guide to Building and Programming Robots
Quality assurance methods that ensure the acquisition of exit competences	Conversation with the students. Students opinions about the quality of teaching through anonymous polls. The success of students at exam. Self-evaluation.
Other (as the proposer wishes to add)	