

Study program: Information Technology			
Course title: PROGRAMMING INDUSTRIAL ROBOTS			
Teacher(s): Ivan R. Milićević, Danijela G. Milošević			
Course status: elective			
Number of ECTS credits: 6			
Prerequisite courses: none			
Course objectives			
The aim of this course is to familiarize students with the fundamental concepts, current state, and significance of using robots in industrial applications. Additionally, the course will cover the principles of programming industrial robots.			
Learning outcomes			
After completing the course, students should be able to: recognize the importance of industrial robot applications and their impact on productivity, flexibility, productivity, and product quality; program an industrial robot to perform specific manufacturing tasks in a real-world industrial environment.			
Content of the course			
<i>Theoretical classes</i>			
Development of industrial robots. Basic concepts, importance, and application of robots in industry. Classification of industrial robots according to their purpose. Basic components of an industrial robot. Fundamental characteristics of industrial robots. The impact of industrial robots on the production process and industrial productivity. Principles of robot programming. Robot controller. Definition of input and output signals. Programming and control of a robot using <i>FlexPendant</i> (manual programming). Offline programming and simulation of industrial robot movements using <i>RobotStudio</i> software.			
<i>Practical teaching</i>			
During the practical exercises, students will solve examples from the topics covered in lectures, receive instructions, and have their independent projects reviewed. Laboratory exercises will be conducted on a real industrial robot with six degrees of freedom, the ABB IRB 120.			
Lliterature			
[1] B. Borovac, G. Djordjevic, M. Rakovic, M. Rasic: <i>Industrijska robotika</i> , FTN Novi Sad, 2017.			
[2] Jovanović, K., Knežević, N.: <i>Robotika – Zbirka rešenih zadataka</i> , Akademska misao, Univerzitet u Beogradu, Elektrotehnički fakultet, Beograd, 2021.			
[3] I. Milićević, V. Vujičić: <i>OFF-Line programiranje industrijskih robota – ABB Robot Studio</i> , praktikum, Fakultet tehničkih nauka u Čačku, 2021. https://eucenje.ftn.kg.ac.rs/			
[4] J. Podobnik, S. Šlajpah, J. Rejc, R. Kamnik: <i>Osnove robotike - laboratorijski praktikum</i> , Laboratorij za robotiko, Ljubljana, 2018.			
[5] <i>RobotStudio Operating Manual</i> , ABB Robotics, 2022. https://eucenje.ftn.kg.ac.rs/			
[6] <i>RobotStudio 6.08 Training Courses</i> , ABB Robotics, 2017. https://eucenje.ftn.kg.ac.rs/			
[7] <i>Technical reference manual - RAPID overview</i> , ABB Robotics, 2007. https://eucenje.ftn.kg.ac.rs/			
[8] <i>Application manual - Engineering tools: RobotWare 5.0</i> , ABB Robotics, 2007. https://eucenje.ftn.kg.ac.rs/			
[9] <i>Operating manual: IRC5 with FlexPendant</i> , ABB Robotics, 2009. https://eucenje.ftn.kg.ac.rs/			
Number of active teaching classes: 4		Theoretical teaching: 2	Practical teaching: 2
Teaching methods			
The course will be implemented using the interactive teaching model, which includes a combination of traditional classroom lectures, computer-assisted instruction, demonstrations, laboratory exercises in a real industrial environment, and mentorship. Students will also have the opportunity to receive individual consultations during the project assignments.			
Evaluation of knowledge (maximum number of points 100)			
Pre-exam obligations	Points	Final exam	Points
Activities during teaching process	/	Final exam (practical):	30
Practical teaching	10	Final exam (oral):	20
Project work	40		