

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Control Systems		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Introduction to Robotics		
Lecturer (for lectures)		Nikolić N. Milutin		
Lecturer/associate (for exercises)		Todorović Z. Darko		
Lecturer/associate (for OFE)				
Number of ECTS	5	Course status (obligatory/elective)	Obligatory	
Prerequisites				
Course objectives		Introduction to elementary topics in contemporary industrial robotics and application of industrial robots.		
Course outcomes		Robotisation concept and problems. Mathematical fundamentals in robotics. Fundamental components of a robot. The organization of robot as a system. Robot control. Programming and application of robots.		
Course outline				
Theoretical teaching		The geometry of robot. Kinematic model of robot. Differential kinematics. Robot drive systems. Electric, hydraulic and pneumatic drive. Systems for transmission of driving torque. Robot dynamics. Model of the robot dynamics. Analysis of modeled and non-modeled effects. Simulation of the robot. Trajectory planning. Synthesis of trajectories in the internal and external coordinates. Sensors in robotics. Executive bodies of the robot. Control in the internal coordinates. Control in the external coordinates. Inverse kinematic and dynamic control. Position and power control. Intelligent management. Planning activities. Functional architecture of the control system. The application of robots. The introduction of robots in manufacturing. Service robots. Automatic guided vehicles. Robots in service, medical and cosmic applications.		
Practical teaching (exercises, OFE, study and research)		Solving specific examples and problems during exercises will help students to master methodical units which will be covered through theoretical lectures.		
Textbooks/references				
1	Lecture notes and slides (to be posted on the web page of the Faculty)			
2	B. Borovac, G.S. Đorđević, M. Rašić, Marko Raković, Industry robotics (in Serbian), FTN publishing, Novi Sad, 2017.			
3	B. Borovac, G.S. Đorđević, M. Rašić, D. Andrić, Robotics Workbook (in Serbian), Novi Sad, Niš, 2002, internet edition.			
4	Thomas R. Kurfess, Robotics and Automation Handbook, CRC Press, 2004, ISBN: 0849318041			
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	2	0	0	0
Teaching methods		Lecture notes and slides. Auditory lectures, demonstrational and computational exercises.		
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures		10	Written exam	20
Exercises		0	Oral exam	30
Colloquia		20		
Projects		20		