

University: University of Žilina		
Faculty: Faculty of Mechanical Engineering		
Course ID: 2Y008	Course name: Robots and Manipulators (RM_E)	
Povinnosť predmetu: Electorial; Ukončenie: Exam		
Profile course: - Core course: -		
Form, extent and method of teaching activities:		
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 2 classes Seminars: 0 classes Lab.exercises: 2 classes	
Methods by which the educational activity is delivered	Present form of education	
Applied educational activities and methods suitable for achieving learning outcomes	Lectures: problem-based lectures, interactive lectures with discussion, lectures supported by multimedia and audiovisual means Examination: presentation and defence of the project, oral examination	
Number of credits: 4		
Study workload: 120 hours in total; of which 52 hours are direct teaching, 30 hours are project development and consultation with the supervisor on project preparation, 38 hours are independent study of the student.		
Recommended semester/term of study: summer		
Study degree: 4		
Required subsidiary courses:		
Prerequisites: -		
Co-requisites: -		
Course requirements:		
Continuous assessment / evaluation: - active participation in exercises, project presentation		
Final assessment /evaluation: - Written and oral exam		
The resulting classification of the subject:		
A: 93 – 100 points		
B: 85 – 92 points		
C: 77 – 84 points		
D: 69 – 76 points		
E: 61 – 68 points		
FX: Less than 61 points		
Minimálny počet bodov pre prihlásenie na skúšku nie je zadaný		
Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
student portfolio (1 x semester project)	50%	practical skills, application of expertise, activities and correctness of solving tasks during the semester, working with various information sources, self-study
Exam (test / oral)	50%	Theoretical knowledge
Course outcomes:		
After completing the course the student:		
<ul style="list-style-type: none"> • knows and can characterize industrial robots and manipulators, • knows and can characterize automated workplaces equipped with industrial robots and manipulators, • knows basic concepts, key system elements of robotic workplaces, cells and production/assembly lines, • knows the basic methodology of the system approach to designing robotic workplaces, 		

- knows online and offline methods for robot programming,
- can apply appropriate assembly technologies, universal robotics, or purpose-designed assembly equipment,
- can apply simulation software Fanuc Roboguide to design and simulate robotic workcells,
- can select suitable end-effector for handling or technology,
- can analyse and evaluate the outputs of simulation and optimisation approaches,
- can analyze and evaluate simulation outputs and perform steps / modifications of the robotic workplace leading to the achievement of the desired workplace activity.

Course scheme:

Lectures:

- Robotics - basic concepts and definitions; classification of robots and robotic devices.
- Kinematic structures of industrial and robots. Modular design of robots and robotic devices.
- End effectors of robots - types, properties, principles of choosing suitable effector for application.
- Applications of industrial robots and robotic devices (automated handling of objects, assembly, finishing machining methods, arc welding).
- Robotized workplaces - basic types of workplace layout.
- Online / Offline Programming of industrial robots - basic principles and methods
- Off-line program Fanuc Roboguide - working with the system - basic steps, principles of creating a control program. Trends in the development of robotics – service robots, assistant robots, bio-inspired robots.

Lab.exercises:

- Online programming in the robotics laboratory with the Fanuc LR Mate 200iC robot.
- Off-line programming in the Fanuc Roboguide system - working with the system, environment, basic steps, setting up the control system, principles of creating a control program, more advanced methods of creating a program.

Literature:

ČUBOŇOVÁ, N. – BULEJ, V. – NÁPRSTKOVÁ, N. – DODOK, T. - TLACH, V. Automation of Mechanical Production (in Slovak). 1st ed. – EDIS Žilina : University of Žilina, 2021. – p. 259, - ISBN 978-80-554-1836-0.

Internal study materials on selected topics of lectures in electronic form - available in the Education - Moodle system.

LYNCH K.-M., PARK F.-C. 2017. Modern Robotics - Mechanics, Planning, and Control. Availability: an eBook version which is distributed on our behalf by a third party. Cambridge University Press. ISBN: 9781108515658

URÍČEK, J. – BULEJ, V.: Automation Elements in Mechanical Engineering (in Slovak). Vyd. 1. - V Žiline : Žilinská univerzita, Strojnícka fakulta, 2015. - 145 s., ilustr. - ISBN 978-80-554-1123-1. (skriptá)

BOCK, T. - LINNER, T.: Robot-oriented design: design and management tools for the deployment of automation and robotics in construction. - Cambridge : Cambridge University Press, 2015. - xxiv, 283 s., ilustr. - ISBN 978-1-107-07638-9.

MATHIA, K.: Robotics for electronics manufacturing [e-kniha]: principles and applications in cleanroom automation. - Cambridge : Cambridge University Press, 2010. - online. - ISBN 9780511712173 (SUD) - Spôsob prístupu: <http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511712173>

PALKO, A., SMRČEK, J., SKAŘUPA, J., TULEJA, P.: Robotics - Technical equipment for automation of production processes (in Czech). 1st ed. Edition of scientific and professional literature. Publishinghouse of Michala Vasek, Prešov. 2010. 386 pp. ISBN 978-80-7165-807-8

KOLÍBAL, Z. a kol.: Robots and Robotic Production Technologies (in Czech),1. vydanie, Tiskárny Havlíčkov Brod, VUT Brno, 2016, 787 s., ISBN 978-80-214-4828-5

KUMIČÁKOVÁ, D. – JAKUBČÍK, M.: Programovanie robota Fanuc LR Mate 200iC. Učebné texty a príručka k programovaniu robotov. Žilinská univerzita, Strojnícka fakulta, KAVS, 2013, Žilina, 65s.

PALKO., A. – SMRČEK, J.: Robotika. Koncové efekty pre priemyselné a servisné roboty. Navrhovanie – konštrukcia – riešenia. 1. vydanie, Edícia vedeckej a odbornej literatúry TU v Košiciach, Strojnícka fakulta, 2004, 274 s., ISBN 80-8073-218-3

Instruction language: english

Notes:

Course evaluation:

Total number of evaluated students: 0

A	B	C	D	E	FX
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00.00 %	00.00 %	0.00 %	0.00 %	0.00 %	0.00 %
Course teachers: Lecture: Assoc.-prof. Ing. Vladimír Bulej, PhD. Lab.exercises: Assoc.-prof. Ing. Vladimír Bulej, PhD.					
Last updated:					
Approved by: prof. Ing. Ivan Kuric, Dr.					