University: University of Žilina	
Faculty: Faculty of Mechanical Engineering	
Course ID: 2Y020	**Course name:** Industry 4.0 (I4_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: 1 classes Lab.exercises: 1 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: 5	
Study workload: 130 hours in total; of which 52 hours are direct teaching, 72 hours are independent study of the student and his/her individual creative work.	
Recommended semester/term of study: winter	
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:

- knows the stages of industrial production development / industrial revolutions,
- knows the methodology of computer support of engineering works,
- knows how to apply information technology in engineering,
- can apply Industry 4.0 methods - artificial intelligence, expert systems, Internet of Things (IoT).

Course scheme:

Lectures:

- The concept of Industry 4.0 (Industry 4.0) in the automation of engineering production,
- Stages of industrial production development / industrial revolutions - transition from computer integrated manufacturing (CIM) to Industry 4.0,
- Information technologies in engineering,
- Communication systems and buses,
- Digital transformation of businesses,
- Risks associated with the digital transformation of businesses,
- Internet of Things (IoT), Internet of Services (IoS),
- Digital twin (Digital Twin) and virtual commissioning (Virtual Commissioning),
- Artificial intelligence,
- Expert systems,
- Augmented reality, Virtual reality,
- Cyber security of technical systems.

Lab.exercises:

- Digital transformation of the automated production / assembly system in the spirit of the Industry 4.0 concept..

Literature:

KURIC, I. – GROZAV, S. – ČUBOŇOVÁ, N. – KUMIČÁKOVÁ, D. – CÍSAR, M. – BULEJ, V. – et al.: Mechanization and automation equipment for processing. - Cluj-Napoca: Publishing House Alma Mater, 2015. - ISBN 978-606-504-188-2. - p. 482. (book)

GROOVER,M.P: Automation,Production Systems and Computer –Integrated Manufacturing. Učebnica, Second edition, Prentice Hall,USA, January 2000, ISBN 0-13-088978-4,832 p.

NÁVRAT, P.: Artificial Intelligence (in Slovak), STU Bratislava 2015, ISBN: 978-80-227-4344-0

SOLANKI, A. – HINCHEY, M.: Industry 4.0: Managing Digital Transformation Using Disurptive Technologies, Academic Press 2021, ISBN-13: 9780323884853

PASCUAL, G. D., DAPONTE, P., KUMAR, U.: Handbook of Industry 4.0 and SMART Systems, CRC Press, 2019, ISBN: 978-1138316294

COTETIU, R. – KURIC, I. – MARCINCIN, J. – UNGUREANU, N.: New Trend in Mechanical Design and Technologies. ISBN 973-751-084-4, 2005, RISOPRINT Cluj Napoca Publisher, 210p., (book)

KURIC, I.- KOŠTURIAK, J. – JANÁČ, A. – PETERKA, J. – MARCINČIN, J.: Computer Aided Systems in Mechanical Engineering (in Slovak). - Žilina : Žilinská univerzita, 2002. - 351 s. - ISBN 80-7100-948-2 (book)

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.

Instruction language: english

Notes:

Course evaluation:

Total number of evaluated students: 0

A	B	C	D	E	FX
00.00 %	00.00 %	0.00 %	0.00 %	0.00 %	0.00 %

Course teachers:

Lecture: prof. Ing. Ivan Kuric, Dr.

Lab.exercises: prof. Ing. Ivan Kuric, Dr.

Lab.exercises: Assoc.-prof. Ing. Ivan Zajačko, PhD.

Lab.exercises: Ing. Tomáš Dodok, PhD.

Last updated:

Approved by: prof. Ing. Nadežda Čuboňová, PhD.