Kielce University of Technology

FACULTY OF MECHATRONICS AND MECHANICAL ENGINEERING

Annex 9
to the Rector's Ordinance No. 35/19
of 12 June 2019

COURSE SPECIFICATION

Course code	**M#1-S1-MiBM-210b**
Course title in Polish	**Podstawy inżynierii odwrotnej**
Course title in English	**Fundamentals of Reverse Engineering**
Valid from (academic year)	**2019/2020**

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**first-cycle**
Type of education	**academic**
Mode of study	**full-time**
Specialism	**all**
Department responsible	**Department of Manufacturing Engineering and Metrology**
Course leader	**dr hab. inż. Jerzy Bochnia, Prof. PŚk**
Approved by	

COURSE OVERVIEW

Course type	**programme-specific**
Course status	**elective**
Language of instruction	English
Semester of delivery	**semester 2**
Pre-requisites	**None**
Examination required (YES/NO)	NO
ECTS value	**2**

Mode of instruction	**lecture**	**class**	**laboratory**	**project**	**seminar**
No. of hours per semester	**15**		**15**		

LEARNING OUTCOMES

Category of outcome	Out-come code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	Has ordered knowledge of computer science and graphics engineering and modern information technologies supporting the solution of various types of engineering problems related to mechanics and machine construction.	MiBM1_W05
	W02	Has detailed knowledge of the manufacturing techniques od machine parts, including subtractive and non-waste techniques, methods of bonding materials, taking into account additive and laser technologies, issues of rapid prototyping and reverse engineering, also has basic knowledge about the construction of various types of systems for processing and shaping materials.	MiBM_W10
Skills	U01	Can use analytical, numerical and simulative methods to formulate and solve engineering tasks in the field of mechanics and machine construction, can properly interpret and use the result.	MiBM1_U12
	U02	Can work individually and in a team; knows how to estimate the time needed to complete the commissioned task; is able to establish a work schedule that ensures meeting deadlines	MiBM1_U20
	U03	Has the ability to self-educate in order to solve and implement new tasks and improve professional competences.	MiBM1_U21
Competence	K01	Is aware of the responsibility for their own work, understands the necessity to submit to the rules of teamwork and taking responsibility for jointly performed tasks.	MiBM1_K04
	K02	Is aware of the social role of a technical university graduate and understands the need to provide the public with comprehensible information on the achievements related to the field of study mechanics and machine construction	MiBM1_K06

COURSE CONTENT

Type of instruction*	Topics covered
lecture	Theoretical foundations of reverse engineering. Contact and non-contact methods of coordinate measurement technique in reverse engineering. 3D scanning as a reverse engineering tool. Digitization methods used in reverse engineering. Triangulation point clouds. Methods of analysis and processing of the obtained measurement results. Methods of creating digital models of objects with complex shapes. Converting of the surface model to the solid model. Data preparation for manufacturing of products. Methods of making models with additive technologies.
laboratory	Laboratory regulations, rules for carrying out and completing exercises. Introduction to the Laboratory of Reverse Engineering. Performing the following laboratory exercises: 1. Construction and operation of an optical 3D scanner. Preparing the scanner for work. 2. Scanning of selected elements with the use of an optical 3D scanner. 3. Processing the obtained point cloud, polygonization of the point cloud. 4. Postprocessing the surface model. Performing a dimensional inspection. 5. Convert to CAD program. Development of a 3D document based on spatial scanning.

*) Please delete rows in the table above that are not applicable.

ASSESSMENT METHODS

Outcome code	Methods of assessment *(Mark with an X where applicable)*					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X			
W02			X			
U01			X		X	
U02					X	
U03					X	
K01					X	X
K02						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction*	Assessment type	Assessment criteria
lecture	examination assessment	Obtaining 50% of the points of the final test
laboratory	examination assessment	Attendance. Obtaining at least 50% of the marks in the final test. Obtaining positive ratings from all reports.

*) Please delete rows in the table above that are not applicable.

OVERALL STUDENT WORKLOAD

ECTS weighting								
	Activity type	Student workload					Unit
1.	Scheduled contact hours	L	C	Lab	P	S	h
		15		15			
2.	Other contact hours (office hours, examination)	2		2			h
3.	**Total number of contact hours**	**34**					h
4.	**Number of ECTS credits for contact hours**	**1,4**					ECTS
5.	**Number of independent study hours**	**16**					h
6.	**Number of ECTS credits for independent study hours**	**0,6**					ECTS
7.	**Number of practical hours**	**25**					h
8.	**Number of ECTS credits for practical hours**	**1**					ECTS
9.	**Total study time**	**50**					h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**2**					ECTS

READING LIST

1. Wyleżoł M.: CATIA. Podstawy modelowania powierzchniowego i hybrydowego. Helion 2003.
2. Skarka W, Mazurek A.: CATIA. Podstawy modelowania i zapisu konstrukcji. Helion 2005.
3. Wełyczko A.: CATIA V5. Sztuka modelowania powierzchniowego. Helion 2009.
4. Babiuch M.: SolidWorks 2006 w praktyce. Helion 2007.

5. Karbowski K.: Podstawy rekonstrukcji elementów maszyn i innych obiektów w procesach wytwarzania. Politechnika Krakowska, monografia 367, 2008.
6. Adamczak St., Błasiak S., Bochnia J., Pomiary wielkości geometrycznych modeli kształtowanych przyrostowo z zastosowaniem skanera 3D, Mechanik, Tom: 87, Zeszyt: 8-9, (2014), pp. 17-25.
7. Bochnia J.: Zastosowanie skanowania 3D w inżynierii odwrotnej, Mechanik, 3/2019.