Bialystok University of Technology, Faculty of Mechanical Engineering									
Field of study	*Mechatronics*							**Degree level and programme type**	*second-cycle (MSc, Eng) full-time studies*
Specialization/ diploma path	*Common course*							**Study profile**	*academic*
Course name	*Advanced CAx systems*							**Course code**	*IS-FME-00186S*
								Course type	
Forms and number of hours of tuition	**L**	**C**	**LC**	**P**	**SW**	**FW**	**S**	**Semester**	*summer*
	30			*30*				**No. of ECTS credits**	*4*
Entry requirements	-								
Course objectives	*The course objectives are: discussion of parametric CAx systems, getting students acquainted with the possibilities of CAx systems and automation of design work in CAx systems, as well as students' command of advanced tools for modelling parts of mechatronic devices in CAx software.*								
Course content	*Lecture: Discussion of the CAx systems structure. Presentation of development trends and issues related to the implementation of CAx systems. Discussing sketch blocks and their use for analysing motion kinematics of sketch components. Presentation of parts modelling in the context of their further manufacturing. Defining geometric models, taking into account strength conditions. Presenting tools for automating mechatronic devices design. Making students familiar with the possibilities of parametric modelling. Making students familiar with top-to-bottom modelling of parts assemblies and with assembly modelling with the use of intelligent components. Modeling in assembly context and assembly configuration. Project: Creating models of parts, considering their manufacturing. Modelling of parametric parts. Using the tools of sheet metal and welded structures. Top-to-bottom creating of assemblies of parts and modelling assemblies using intelligent components. Modelling in the assembly context and configuring assemblies. Creating sketch blocks and performing motion kinematics analysis of sketch components.*								
Teaching methods	*Information and problem lecture; Project classes*								
Assessment method	*Lecture: two tests; Project: evaluation of: students' projects, their ongoing work progress, participation in discussions and students' activity during classes*								

Symbol of learning outcome	**Learning outcomes Students who successfully complete the course:**	**Reference to the learning outcomes for the field of study**
LO1	*know Cax system structures*	*MK2_W02*
LO2	*know the principles of creating and develop intelligent and flexible CAD models*	*MK2_W02, MK2_U06*
LO3	*know and apply tools used for automation of work related to the design of mechatronic device parts*	*MK2_W02, MK2_U06*
LO4	*use tools for parametrisation of solid models*	*MK2_U06*
LO5	*can create assemblies, using the top-to-bottom method and applying intelligent components in assemblies*	*MK2_U06*
LO6	*can design elements in the context of their manufacturing*	*MK2_U06, MK2_U10, MK2_U11*
LO7	*generate models, taking into account control conditions (strength criterion, rigidity)*	*MK2_U06*

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**

LO1	*Lecture: two tests;*	*L*
LO2	*Lecture: two tests; Project: evaluation of: students' projects, their ongoing work progress, participation in discussions and students' activity during classes;*	*L, P*
LO3	*Lecture: two tests; Project: evaluation of: students' projects, their ongoing work progress, participation in discussions and students' activity during classes;*	*L, P*
LO4	*Project: evaluation of: students' projects, their ongoing work progress, participation in discussions and students' activity during classes;*	*P*
LO5	*Project: evaluation of: students' projects, their ongoing work progress, participation in discussions and students' activity during classes;*	*P*
LO6	*Project: evaluation of: students' projects, their ongoing work progress, participation in discussions and students' activity during classes;*	*P*
LO7	*Project: evaluation of: students' projects, their ongoing work progress, participation in discussions and students' activity during classes;*	*P*

Student workload (in hours)		**No. of hours**
Calculation	*Participation in lectures*	*30*
	Participation in project classes	*30*
	Preparation for passing the lecture	*19*
	Preparation for project assignments	*24*
	Completion of project assignments (including preparation of presentations)	*10*
	Preparation for passing project assignments	*7*
	Participation in consultations	*5*
	TOTAL:	*125*

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	*65*	*2.6*
Student workload – practical activities	*73*	*2.9*

Basic references	*1. Fischer U. [i in.]: Poradnik mechanika, Polish edition by Potrykus J., Wyd. REA, 2014;* *2. Kurmaz L, Kurmaz O.: Podstawy konstruowania węzłów i części maszyn: podręcznik konstruowania, 2011;* *3. Wełyczko A.: CATIA V5. Przykłady efektywnego zastosowania systemu w projektowaniu mechanicznym, Helion, 2005;* *4. Skarka W.: CATIA V5. Podstawy budowy narzędzi autogenerujących, Helion, 2009* *5. Zaawansowane tematy SolidWorks: DS. SolidWorks Corporation, Polish translation: CNS Solutions, 2011*
Supplementary references	*1. Tarnowski W.: Podstawy projektowania technicznego, WNT, Warszawa, 1997;* *2. Lombard M.: 'SolidWorks 2011 Assemblies Bible', Wiley Publishing, 2011;* *3. Lombard M.: 'SolidWorks 2011 Assemblies Bible', Wiley Publishing, 2011;* *4. Trade journals (Design News Polska, Projektowanie i Konstrukcje inżynierskie)* *5. Internet websites, e.g. www.3dcad.pl, www.grabcad.com, www.dps-software.pl*

Organisational unit conducting the course	*Department of Mechanics and Applied Computer Science*	**Date of issuing the programme**
Author of the programme	*Paweł Dzienis, PhD, MSc, Eng*	*24.04.2019*

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar