MODULE DESCRIPTION

Module code	**Z-ZIP-441z**
Module name	**Komputerowe wspomaganie prac inżynierskich**
Module name in English	**Computer-Aided Engineering**
Valid from academic year	**2016/2017**

A. MODULE PLACEMENT IN THE SYLLABUS

Field of study	**Management and Production Engineering**
Level of education	**1st degree** *(1st degree / 2nd degree)*
Studies profile	**General** *(general / practical)*
Form and method of conducting classes	**Full-time** *(full-time / part-time)*
Specialisation	**All**
Unit conducting the module	**The Department of Automotive Vehicles and Transportation**
Module co-ordinator	**Zbigniew Skrobacki, PhD**
Approved by:	

B. MODULE OVERVIEW

Type of subject/group of subjects	**Major** *(basic / major / specialist subject / conjoint / other HES)*
Module status	**Compulsory** *(compulsory / non-compulsory)*
Language of conducting classes	**English**
Module placement in the syllabus - semester	**6th semester**
Subject realisation in the academic year	**Summer semester** *(winter / summer)*
Initial requirements	**Engineering Graphics** *(module codes / module names)*
Examination	**No** *(yes / no)*
Number of ECTS credit points	**3**

Method of conducting classes	Lecture	Classes	Laboratory	Project	Other
Per semester	**15**		**15**		

C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Module target	The aim of the module is to familiarise students with basic 3D modelling techniques using AutoCAD graphical editor as well as with the method of model parameterization in the SolidWorks system. Learning 3D modelling concerns the selected technological objects illustrated in solid and surface representations.

Effect symbol	Teaching results	Teaching methods *(l/c/lab/p/other)*	Reference to subject effects	Reference to effects of a field of study
W_01	A student has basic knowledge of the possibilities as regards various systems of computer-aided designing. It refers to both classical vector systems (e.g. AutoCAD) and fully-parametric systems (e.g. SolidWorks). A student also knows basic notions and menu structure in both systems.	l/lab	K_W04 K_W06	T1A_W03 T1A_W04 S1A_W06
W_02	A student has basic knowledge as regards modelling objects with complex shapes both in the form of solids and surface objects using the AutoCAD system.	l/lab	K_W04 K_W06	T1A_W03 T1A_W04 S1A_W06
W_03	A student understands the essence of parametrisation, the possibilities of creating construction complexities and geometric bonds between the selected spatial objects.	l	K_W04 K_W06	T1A_W03 T1A_W04 S1A_W06
U_01	A student can utilise basic theoretical knowledge as regards spatial modelling to create his/her own model with varied geometric complexity.	lab	K_U01 K_U02 K_U03 K_U04 K_U06	TA1_U01 TA1_U02 TA1_U03 TA1_U04 TA1_U05
U_02	A student utilises the acquired knowledge for designing works for other subjects and in future professional work.	lab	K_U01 K_U02 K_U03 K_U04 K_U06	TA1_U01 TA1_U02 TA1_U03 TA1_U04 TA1_U05
K_01	A student knows and understands the necessity of lifetime education in order to raise his/her professional qualifications in various project tasks.	l/lab	K_K04 K_K06	T1A_K03 T1A_K04 T1A_K07
K_02	A student is able to co-operate, work in a group, communicate effectively and act ethically as regards the assigned project tasks.	l/lab	K_K04 K_K06	T1A_K03 T1A_K04 T1A_K07

Teaching contents:

1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	**Spatial modelling – introduction** Global and local coordinate system. The level and height of objects. Isometric projection and the methods of observing objects in space. Generating simple objects through “drag”.	W_01
2	**Modelling solids** Generating solids in given directions parallel to the OZ axis and axisymmetrical solids. Shape modifications with Boolean algebra operations. An example of utilising sequence of orders in the AutoCAD program to	W_01 W_02

	generate a “hydraulic T-pipe” solid model.	
3	**Editing solid models** Utilising predefined solids to generate complex shapes. The operations of cutting solids and making cross-sections. Creating regions. Examples of generating “stamped” solids along a curve in space.	W_01 W_02
4	**Surface modelling** Predefined surface objects to generate complex shapes. Creating objects with the following commands: area, 3D surface, edge, and 3D mesh.	W_01 W_02
5	**Generating and editing three-dimensional polygonal mesh** Cylindrical surface models. Ruled surface models. Coonse patch model. Sample applications.	W_01 W_02
6	**Generating simple solids in SolidWorks** The description of the Sketch menu. Generating planes for sketching in space. Generating simple solids with holes. Presenting parameterization of external dimensions. Editing solids.	W_01 W_02 W_03
7	**Creating compounds** The principles of work in *.sldprt files. Creating a compound in *.sldasm files. Controlling relations. Sample compounds.	W_01 W_02 W_03

2. Teaching contents as regards classes

Class number	Teaching contents	Reference to teaching results for a module

3. Teaching contents as regards laboratory classes

Laboratory class number	Teaching contents	Reference to teaching results for a module
1	**Introduction to 3D modelling** Views and the selected option of a local coordinate system. Creating a student’s own model of coordinate system composed of sections and cones. Sketching exercises on various planes – “level” command. Generating “wall” objects with the “thickness” option.	W_01 W_02
2	**Generating simple solids** Creating a “bearing casing” model: utilizing the modification of “sum and difference” of solids.	W_01 W_02 U_01 K_01
3	**Modification of solids, generating solids along a curve and by rotation** Modifying a “bearing casing” model – bevelling, rounding, and creating holes at different angles. A new model with a hole bored at different angles.	W_01 W_02 U_01 K_01 K_02
4	**A solid model of “hydraulic T-pipe”** Generating solids by “drawing along a curve” and by a “rotation”. Copying operations of solids using, among other things, a circular array. Cutting and cross-section.	W_01 W_02 U_01 K_01

		K_02
5	A test	W_01 W_02 U_01 K_01
6	**Generating and editing three-dimensional multi-angular lattices** The “hook” model with a Coons patch. The “prism” model with a 3D mesh (_3dmesh).	W_01 W_02 U_01 K_01 K_02
7	**The model of a thread using a ruled surface (_rulesurf)**	W_01 W_02 U_01 K_01 K_02
8	A test and obtaining a credit.	W_01 W_02 W_03 U_01 K_01

4. The characteristics of project assignments

The methods of assessing teaching results

Effect symbol	Methods of assessing teaching results *(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)*
W_01	In the first test, a student utilises his/her knowledge to design a given spherical object independently (with a specific shape, dimensions, and in a specific place in space) being familiar with 3D modelling methods and menu structure in the AutoCAD program.
W_02	In the second test, a student utilises his/her knowledge to design a given spherical object independently (with a specific shape, dimensions, and in a specific place in space) being familiar with 3D modelling methods and menu structure in the AutoCAD program.
W_03	**Observing a student’s involvement during the classes** In order to gain a B mark, a student should understand the essence of parametrisation and the possibility of creating construction complexities.
U_01	Time management and quality of the completed assignment (within time limit) during the first and second tests are a criterion of the level concerning the required knowledge and practical skills of planning action sequence in a computer system.
U_02	**Further checking as regards the acquired knowledge and skills will take place during the continued educational process.**
K_01	**Observing a student’s involvement during the classes; a discussion during the classes** In order to gain a B mark, a student should understand the necessity of continuous improvement of his/her knowledge.
K_02	**Teamwork facilitates improving student’s individual knowledge and skills** In order to gain a B mark, a student should co-operate well, work in a team, and actively participate in realizing the assigned 3D projects. In order to gain an A mark, a student should additionally undertake initiative during teamwork as well as be able to prepare and lead project works in an effective manner.

D. STUDENT'S INPUT

ECTS credit points		
	Type of student's activity	**Student's workload**
1	Participation in lectures	**15**
2	Participation in classes	
3	Participation in laboratories	**15**
4	Participation in tutorials (2-3 times per semester)	**4**
5	Participation in project classes	
6	Project tutorials	
7	Participation in an examination	
8		
9	**Number of hours requiring a lecturer's assistance**	**34** *(sum)*
10	**Number of ECTS credit points which are allocated for assisted work** *(1 ECTS point=25-30 hours)*	**1.4**
11	Unassisted study of lecture subjects	**10**
12	Unassisted preparation for classes	**10**
13	Unassisted preparation for tests	**15**
14	Unassisted preparation for laboratories	
15	Preparing reports	**7**
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	
18	Preparing for an examination	
19		
20	**Number of hours of a student's unassisted work**	**42** *(sum)*
21	**Number of ECTS credit points which a student receives for unassisted work** *(1 ECTS point=25-30 hours)*	**1.6**
22	**Total number of hours of a student's work**	**76**
23	**ECTS points per module** *1 ECTS point=25-30 hours*	**3**
24	**Work input connected with practical classes** *Total number of hours connected with practical classes*	**51**
25	**Number of ECTS credit points which a student receives for practical classes** (1 ECTS point=25-30 hours)	**2**

E. LITERATURE

Literature list	1. Pikoń A., *AutoCAD 2010 PL. Pierwsze kroki*. Wyd. HELION, 2010. 2. Autor zb., *Podstawy SolidWorks. Podręcznik szkoleniowy*, CNS Solution 2007.
Module website	