

MODULE DESCRIPTION

Module code	Z-ZIP-113z
Module name	Projektowanie inżynierskie
Module name in English	Engineering Design
Valid from academic year	2016/2017

A. MODULE PLACEMENT IN THE SYLLABUS

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

B. MODULE OVERVIEW

Type of subject/group of subjects	Major <i>(basic / major / specialist subject / conjoint / other HES)</i>
Module status	Compulsory <i>(compulsory / non-compulsory)</i>
Language of conducting classes	English
Module placement in the syllabus - semester	5th semester
Subject realisation in the academic year	Winter semester <i>(winter / summer)</i>
Initial requirements	No requirements <i>(module codes / module names)</i>
Examination	No <i>(yes / no)</i>
Number of ECTS credit points	4

Method of conducting classes	Lecture	Classes	Laboratory	Project	Other
Per semester	30			15	

C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Module target	The aim of the module is to acquaint students with: the knowledge concerning engineering design, the principles of constructing devices with a given functionality and strength using modern construction materials as well as designing techniques based on CAD/CAE (drawing particular attention to system issues in designing, optimisation methods, and product innovativeness).
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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 knowledge of general principles of engineering design, basic calculation procedures, materials selection, determining boundary conditions for the designed device, and modelling constructions according to the binding norms and possible optimisation and innovative solutions.	l	K_W06 K_W07	T1A_W04 T1A_W06 InzA_W01 InzA_W02 InzA_W05
W_02	A student has knowledge concerning the principles of work as regards computer support of an engineer's designing work (with reference to CAD/CAE), taking simulation as well as optimisation possibilities of the modelled construction into consideration.	l	K_W04	T1A_W03 S1A_W06 InzA_W01
U_01	A student can make a functionality analysis of the designed simple construction, prepare a calculation process using basic materials strength analyses, conduct a simulation concerning the condition of the construction in CAD/CAE support packages (as regards an engineer's work).	p	K_U14 K_U17	TA1_U07 TA1_U08 TA1_U09 TA1_U16 InzA_U01 InzA_U02 InzA_U08
U_02	A student can prepare technological documentation of an engineering project, provide documentation for it with appropriate reference to the literature on the subject and formulate final conclusion concerning the functioning of the designed device in the production process and during later exploitation.	p	K_U01 K_U03	T1A_U01 T1A_U03
K_01	A student understands the necessity of continuous improvement of his/her knowledge and skills as regards engineering design, drawing particular attention to learning CAD/CAE computer packages supporting an engineer's work; a student is also aware of his/her impact on the environment of the designed devices and the responsibility for their functioning.	l/p	K_K01 K_K02	TA1_K01 T1A_K02 InzA_K01

Teaching contents:

1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	Systems conditioning of the construction process. General principles concerning constructing mechanical devices; a constructor's tasks.	W_01 U_01 K_01
2	Basic calculation procedures as regards static and fatigue loads.	W_01 U_01
3	Materials applied in machine construction. Determining the features of	W_01

	essential materials in terms of designing. New materials in mechanical constructions.	
4	The characteristics of key, pin, and knuckle joints. Calculation methods.	W_01
5	The characteristics of riveted and welded joints. Calculation methods.	W_01
6	Construction elements of a shaft. Calculating shaft strength.	W_01
7	The types of bearings (their construction, features, and advantages). The methods of selecting rolling and slide bearings.	W_01
8	Toothed gears.	W-01
9	Belt transmissions.	W_01
10	The types of clutches; the methods of selecting clutches.	W_01
11	The issues of reliability, energy consumption, and effectiveness of mechanical devices.	W_01
12	The evolution of mechanical devices for mechatronical solutions.	W_01
13	An analysis of the selected mechanical devices and original patents – a case study.	W_01 K_01
14	Computer support in engineering works- CAD/CAM/CAE applications.	W_02 U_01
15	A final test – a test on the acquired knowledge and selecting a construction solution for a given application.	

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

4. The characteristics of project assignments

A student completes two projects. The first one includes designing a simple screw mechanism system in various applications. The aim of the project is to complete basic elements of the designing process starting with initial analysis, determining basic functionalities, making simple calculations, construction modelling, preparing documentation, and a final analysis. A substantial part of the report includes an analysis of the impact of the construction on the environment together with determining critical states of the designed construction. Finally, the project covers making an analysis of simulation concerning construction behaviour in CAD/CAE support packages concerning an engineer's work and formulating appropriate conclusions.

The second project covers selecting a construction element, e.g. a clutch or a motored reducer, for the initially defined applications of the already produced and ready construction elements present on the market. In this case, the analysis refers to the selection process (including other possible variants) as regards technical and non-technical parameters, together with providing a justification.

The methods of assessing teaching results

Obtaining a credit for the lecture: on the basis of a written test (in its first part concerning the acquired knowledge and, in its second part, selecting an appropriate construction solution for a given application).

Obtaining a credit for the project: on the basis of two projects.

Effect symbol	Methods of assessing teaching results <i>(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)</i>
W_01	A test conducted at the end of the lectures.
W_02	A test conducted at the end of the lectures.
U_01	Assessing the correctness of the construction process realised in the first project.
U_02	Assessing the use of CAD/CAE computer tools in the first project.
K_01	Comments during the lectures and a discussion during project classes.

D. STUDENT'S INPUT

ECTS credit points		
	Type of student's activity	Student's workload
1	Participation in lectures	30
2	Participation in classes	
3	Participation in laboratories	
4	Participation in tutorials (2-3 times per semester)	5
5	Participation in project classes	15
6	Project tutorials	
7	Participation in an examination	
8		
9	Number of hours requiring a lecturer's assistance	50 <i>(sum)</i>
10	Number of ECTS credit points which are allocated for assisted work <i>(1 ECTS point=25-30 hours)</i>	2
11	Unassisted study of lecture subjects	10
12	Unassisted preparation for classes	
13	Unassisted preparation for tests	10
14	Unassisted preparation for laboratories	
15	Preparing reports	
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	30
18	Preparing for an examination	
19		
20	Number of hours of a student's unassisted work	50 <i>(sum)</i>
21	Number of ECTS credit points which a student receives for unassisted work <i>(1 ECTS point=25-30 hours)</i>	2
22	Total number of hours of a student's work	100
23	ECTS points per module <i>1 ECTS point=25-30 hours</i>	4
24	Work input connected with practical classes <i>Total number of hours connected with practical classes</i>	50
25	Number of ECTS credit points which a student receives for practical classes <i>(1 ECTS point=25-30 hours)</i>	2

E. LITERATURE

Literature list	<ol style="list-style-type: none"> 1. Kurmaz L. W., Kurmaz O.L., <i>Podstawy konstruowania węzłów i części maszyn, podręcznik konstruowania</i>, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2011. 2. Gąsiorek E., <i>Podstawy projektowania inżynierskiego</i>, Wyd. AE, Wrocław 2006. 3. Tarnowski W., <i>Podstawy projektowania technicznego</i>, WNT, Warszawa 1997. 4. Osiński Z., <i>Podstawy Konstrukcji Maszyn</i>, PWN, Warszawa 2002. 5. Mazanek E., <i>Przykłady obliczeń z podstaw konstrukcji maszyn</i>, Wydawnictwa Naukowo-Techniczne, Warszawa 2005. 6. Chlebus E., <i>Techniki komputerowe CAx</i>, Wydawnictwa Naukowo-Techniczne, Warszawa 2000.
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Module website	
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