MODULE DESCRIPTION

Module code	**Z-ZIP-412z**
Module name	**Modelowanie w inżynierii produkcji**
Module name in English	**Modelling in Production 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	**Production and Innovation Management**
Unit conducting the module	**The Department of Production Engineering**
Module co-ordinator	**Wacław Gierulski, PhD, Eng., Professor of the University**
Approved by:	

B. MODULE OVERVIEW

Type of subject/group of subjects	**Specialist subject** *(basic / major / specialist subject / conjoint / other HES)*
Module status	**Compulsory** *(compulsory / non-compulsory)*
Language of conducting classes	**English**
Module placement in the syllabus - semester	**5th semester**
Subject realisation in the academic year	**Winter semester** *(winter semester/ summer)*
Initial requirements	**Differential equations** *(module codes / module names)*
Examination	**Yes** *(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 subject is to indicate the possibilities of mathematical modelling or computer simulation in describing such complex phenomena as analytical tools supporting the decision-making process.

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 as regards model structure and utilising mathematical methods to describe real phenomena and processes.	l/lab	K_W01	T1A_W01 T1A_W07
W_02	A student has knowledge as regards economic phenomena, particularly those connected with production engineering.	l/lab	K_W10	S1A_W05 S1A_W06
U_01	A student is able to apply mathematical tools, including differential equations to describe processes, which facilitates the decision-making process.	l/lab	K_U14 K_U19	TA1_U07 TA1_U08 TA1_U09
K_01	A student is aware of the necessity of acting professionally in the analysed phenomena as well as processes.	l/lab	K_K03	T1A_K05

Teaching contents:

1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	The notion of modelling, methods as well as tools – connection with production engineering.	W_01 W_02
2	Mathematical models, the significance of differential equations, and computer simulation.	W_01 K_01
3	The examples of models – differential models in natural sciences.	W_01 W_02
4	The examples of models – differential models in economy and management.	W_01 W_02
5	The examples of models – differential models in mechanical systems.	W_01 W_02
6	The examples of models – differential models in electric systems.	W_01 W_02
7	Structure and process modelling in an enterprise.	W_01 W_02
8	The summary of issues, the notion of chaos in mathematical models.	K_01 W_01

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	Mathcad as a tool of solving differential equations and simulations.	W_01 U_01
2	The structure and analysis of differential models applied in natural sciences.	U_01
3	The structure and analysis of differential models applied in economy and management.	U_01
4	The structure and analysis of differential models applied in mechanical systems.	U_01
5	The structure and analysis of differential models applied in electric systems.	U_01
6	Test 1 with the use of the Mathcad program – the analysis of differential models.	U_01
7	Structure and process modelling in an enterprise using the ADONIS program.	U_01 W_02
8	Test 2 using the ADONIS program – process modelling.	U_01 W_02

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	An examination, test 1.
W_02	An examination, test 2.
U_01	Test 1, test 2.
K_01	Completing laboratory assignment as regards the structure and analysis of mathematical models.

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)	**3**
5	Participation in project classes	
6	Project tutorials	
7	Participation in an examination	**3**
8		
9	**Number of hours requiring a lecturer's assistance**	**36** *(sum)*
10	**Number of ECTS credit points which are allocated for assisted work** *(1 ECTS point=25-30 hours)*	**1.5**
11	Unassisted study of lecture subjects	**10**
12	Unassisted preparation for classes	
13	Unassisted preparation for tests	
14	Unassisted preparation for laboratories	**20**
15	Preparing reports	
16	Preparing for a final laboratory test	
17	Preparing a project or documentation	
18	Preparing for an examination	**15**
19		
20	**Number of hours of a student's unassisted work**	**45** *(sum)*
21	**Number of ECTS credit points which a student receives for unassisted work** *(1 ECTS point=25-30 hours)*	**1.5**
22	**Total number of hours of a student's work**	**81**
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*	**38**
25	**Number of ECTS credit points which a student receives for practical classes** (1 ECTS point=25-30 hours)	**1.5**

E. LITERATURE

Literature list	1. Cannon R.H., *Dynamika układów fizycznych*, WNT, Warszawa 1973. 2. Chiang A.C., *Podstawy ekonomii matematycznej*, PWE, 1994. 3. Palczewski A., Równania różniczkowe zwyczajne, WNT, 2004. 4. Kucharski T., *Drgania mechaniczne – rozwiązywanie zagadnień z Mathcadem,* WNT, 2004. 5. *Materiały informacyjne programu ADONIS* – WWW.boc-group.com
Module website	