SYLLABUS OF A MODULE

Polish name of a module	**KINEMATYKA, DRGANIA I STATECZNOŚĆ UKŁADÓW MECHANICZNYCH**
English name of a module	**Kinematics, Vibrations and Stability of Mechanical Systems**
ISCED classification - Code	0715
ISCED classification - Field of study	*Mechanics and metal trades*
Languages of instruction	*English*
Level of qualification:	*1 – BSc (EQF 6)*
Number of ECTS credit points	*5*
Examination:	*A - assignment*
Available in semester:	*A – autumn only*

Number of hours per semester:

Lecture	Tutorials	Laboratory	Seminar	E-learning	Project
30	0	30	0	0	0

MODULE DESCRIPTION

MODULE OBJECTIVES

O1. Acquiring basic skills in modeling and simulation of machine movement and mechanisms.

O2. Acquiring practical skills in using Catia software.

O3. To familiarize students with mechanical vibrations of damped or undamped systems with a finite number of degrees of freedom and continuous systems.

O4. To familiarize students with the criteria for loss of stability

O5. Acquisition by students of skills in determining critical load and the frequency and form of vibrations of vibrating systems.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge in mathematics and physics.
2. Individual and group work skills.
3. Skills of correct interpretation and presentation of own activities.

LEARNING OUTCOMES

LO1. has knowledge of kinematics, mechanical vibrations and stability of mechanical systems

LO2. can develop models of mechanical systems

LO3. can determine the parameters of mechanical systems

MODULE CONTENT

Type of classes – lecture	**Number of hours**
Lec1-3 - Work in the Part Design module.	**3**
Lec 4-6 - Work in the Assembly Design module.	**3**
Lec 7-13 - Introduction to the Kinematics DMU module. 7	**7**
Lec 14-15 - Introduction to the Drafting module.	**2**
Lec 16 - Basic concepts of mechanical vibrations.	**1**
Lec 17 - Equations of motion of individual mechanical systems with one degree of freedom.	**1**
Lec 18,19 - System with one degree of freedom (natural vibrations, stimulated vibrations, resonance transitions).	**2**
Lec 20,21 - Vibrations of a damped oscillator (natural vibrations, stimulated vibrations).	**2**
Lec 22,23 - Vibrations of the system with two degrees of freedom (two pendulums connected by a spring).	**2**
Lec 24 - Vibrations of a double mathematical pendulum.	**1**
Lec 25,26 - Beam vibrations as a continuous system (Hamilton principle, boundary conditions, natural frequency).	**2**
Lec 27 - Beam vibration modes.	**1**
Lec 28,29 - Impact of compressive force on free vibrations of the column (kinetic stability criterion).	**2**
Lec 30 - Vibrations of the non-conservative system (Beck column).	**1**
Sum	**30**
Type of classes– laboratory	**Number of hours**
Lab1-6 - Part Design - part modeling	**6**
Lab7-10 - Basics of mechanisms creation - assemblies.	**4**
Lab11-14 - Simulation and analysis of motion - a block on an inclined plane	**4**
Lab15-18 - Simulation and analysis of motion - Maltese mechanism.	**4**
Lab19-22 - Simulation and analysis of motion - collision detection.	**4**
Lab23-26 - Simulation and analysis of motion - planetary gear	**4**
Lab27-30 - Creating technical documentation for the Drafting module	**4**
Sum	**30**

TEACHING TOOLS

1. - lecture using multimedia presentations
2. - computer hardware and computer software - CATIA
3. - examples of laboratory exercises

WAYS OF ASSESSMENT (F – FORMATIVE, S – SUMMATIVE)

F1. - assessment of preparation for laboratory exercises
F2. - assessment of the ability to apply the acquired knowledge while doing the exercises
F3. - evaluation of reports on the implementation of exercises covered by the curriculum
F4. - assessment of activity during classes
S1. - assessment of the ability to solve the problems posed and the manner of presentation obtained results - pass mark *

*) in order to receive a credit for the module, the student is obliged to attain a passing grade in all laboratory classes as well as in achievement tests.

STUDENT'S WORKLOAD

No.	Forms of activity	Average number of hours required for realization of activity
1.	**Contact hours with teacher**	
1.1	Lectures	30
1.2	Tutorials	
1.3	Laboratory	30
1.4	Seminar	
1.5	Project	
1.6	Examination	
	Total number of contact hours with teacher:	60
2.	**Student's individual work**	
2.1	Preparation for tutorials and tests	10
2.2	Preparation for laboratory exercises, writing reports on laboratories	35
2.3	Preparation of project	
2.4	Preparation for final lecture assessment	
2.5	Preparation for examination	
2.6	Individual study of literature	20
	Total number of hours of student's individual work:	65
	Overall student's workload:	125
Overall number of ECTS credits for the module		5 ECTS
Number of ECTS points that student receives in classes requiring teacher's supervision:		2.4 ECTS
Number of **ECTS** credits acquired during practical classes including laboratory exercises and projects:		2.6 ECTS

BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. Nader Zamani CATIA V5 FEA Tutorials,2008
2. Jaecheol Koh CATIA V5 Design Fundamentals: A Step by Step Guide, 2010
3. L. Meirovitch: Fundamentals of Vibrations, McGraw-Hill Higher Education, 2001

MODULE COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)

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