MODULE SPECIFICATION

Module code	
Module title in Polish	**Fizyka I**
Module title in English	**Physics 1**
Module running from the academic year	2016/2017

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	**Surveying and Cartography**
Level of qualification	first cycle (first cycle, second cycle)
Programme type	academic (academic/practical)
Mode of study	full-time (full-time/part-time)
Specialism	**All**
Organisational unit responsible for module delivery	**The Department of Physics**
Module co-ordinator	**Medard Makrenek, PhD**
Approved by:	**Prof. Andrzej Okniński, PhD hab.**

B. MODULE OVERVIEW

Module type	core module (core/programme-specific/elective HES*)
Module status	compulsory module (compulsory/optional)
Language of module delivery	
Semester in the programme of study in which the module is taught	semester 1
Semester in the academic year in which the module is taught	**Winter semester** (winter semester/summer semester)
Pre-requisites	None (module code/module title, where appropriate)
Examination required	**No** (Yes/No)
ECTS credits	**4**

* elective HES – elective modules in the Humanities and Economic and Social Sciences

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	30	15			

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C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the modules includes the following: presenting the principles of modelling physical reality on the basis on Newton's classical mechanics; familiarising students with the description of motion, the causes of motion and with the principles of modelling motion; students are also acquainted with basic information on vector, differential, and integral calculus.

Module outcome code	Module learning outcomes	Mode of instruction *(l/c/lab/p/ others)*	Corresponding programme outcome code	Corresponding discipline-specific outcome code
W_01	A student has knowledge on the description of motion as regards a material particle in the coordinate system. A student also knows Galilean and Lorentz transformations.	l/c	GiK_W01 GiK_W15	T1 A_W01 T1 A_W03
W_02	A student is familiar with Newtonian laws of a material particle (as well as the concept of work, power, and energy).	l/c	GiK_W01	T1 A_W01
W_03	A student has knowledge on the description of harmonic motion.	l/c	GiK_W01	T1 A_W01
W_04	A student understands the principles of conservation of the *n* system of material particles.	l/c	GiK_W01	T1 A_W01
U_01	A student can solve simple problems concerning kinematics and dynamics of a material particle with the use of a differential calculus.	l/c	GiK _U01 GiK _U03 GiK _U18 GiK _U21	T1A_U01 T1A_U05 T1A_U09 T1A_U13 T1A_U15
U_02	A student is able to explain and apply the principles of conservation of momentum and energy.	l/c	GiK _U01 GiK _U03 GiK _U18 GiK _U21	T1A_U01 T1A_U05 T1A_U09 T1A_U13 T1A_U15
U_03	A student has the ability of analysing harmonic motion.	l/c	GiK _U01 GiK _U03 GiK _U18 GiK _U21	T1A_U01 T1A_U05 T1A_U09 T1A_U13 T1A_U15
K_01	A student understands the necessity and knows the possibility of continuous education and raising his/her professional, personal, and social competences.	l/c	GiK _K01 GiK _K02	T1A_K01 T1A_K02 T1A_K05 T1A_K07
K_02	A student is aware of the importance and understands non-technical aspects and effects engineering activity.	l/c	GiK _K03 GiK _K05	T1A_K02

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	A short outline of the development of civilisation (drawing particular attention to the period since 1600). Basic branches of physics. The structure of science.	W_01 U_01
2	The description of motion – the kinematics of material particle. System of	W_01 U_01

	coordinates and vectors. Function derivative.	
3	Newton's laws of the dynamics of a material particle. Interactions and forces.	W_02 U_01 K_01
4	Motion relativity. Galilean transformation.	W_01 U_01
5	Lorentz transformation.	W_01 U_01
6	Motion planning. Integrating the equations of motion – samples.	W_01 U_01
7	Work, power, and energy.	W_02 U_01 U_02
8	Potential and non-potential forces.	W_02 U_01 U_02
9	The principles of conservation of momentum and energy.	W_03 U_03
10	Harmonic motion as an example of modelling vibrating motion.	W_03 U_03
11	Analysing a harmonic oscillator with silencing and external excitation force.	W_03 U_03
12	Examples and application of harmonic motion.	W_03 U_03
13	The dynamics of *n* material particles system.	W_03 U_02
14	The principles of conservation of *n* material particles.	W_04 U_02
15	Analysing the dynamics of the solar system.	W_04 U_02 K_02

2. Topics to be covered in the classes

No.	Topics	Module outcome code
1	Vectors: the concept of a vector, the notion of a scalar, operations on vectors – adding, subtracting, multiplying a vector by a number, a scalar and vector product, vectors in relations the laws of physics.	W_01 U_01
2	Uniformly accelerated motion: position vector, displacement vector, motion track, and mean velocity. Uniformly accelerated motion: spot speed, mean and spot acceleration.	W_01 U_01
3	Uniformly accelerated motion, cont.: free fall, a vertical throw upwards and downwards.	W_01 U_01 K_01
4	Diagonal throw: deriving formulas for the range of throw, maximum height and total time of particle flight.	W_02 U_02
5	The dynamics of a material point: first, second, and third Newton's law.	W_02 U_02
6	Kinetic and potential energy, and work. The law of conservation of mass.	W_02 U_02
7	Harmonic oscillator.	W_03 U_03
8	Systems of particles: centre of gravity as regards a system of particles, the momentum of a system of particles.	W_04 U_02 K_02

Assessment methods

Module outcome code	**Assessment methods** *(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)*

W_01	A mid-semester test, a final test, and oral presentations.
W_02	A mid-semester test, a final test, and oral presentations.
W_03	A mid-semester test, a final test, and oral presentations.
U_01	A mid-semester test, a final test, and oral presentations.
U_02	A mid-semester test, a final test, and oral presentations.
U_03	A mid-semester test, a final test, and oral presentations.
K_01	Observing a student's involvement during the classes, a discussion during the classes.
K_02	Observing a student's involvement during the classes, a discussion during the classes.

D. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	**Study time/ credits**
1	Contact hours: participation in lectures	**30**
2	Contact hours: participation in classes	**15**
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	**5**
5	Contact hours: participation in project-based classes	
6	Contact hours: meetings with a project module leader	
7	Contact hours: attendance at an examination	
8		
9	**Number of contact hours**	**50** *(total)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**2,0**
11	Private study hours: background reading for lectures	**20**
12	Private study hours: preparation for classes	**20**
13	Private study hours: preparation for tests	**10**
14	Private study hours: preparation for laboratories	
15	Private study hours: writing reports	
16	Private study hours: preparation for a final test in laboratories	
17	Private study hours: preparation of a project/a design specification	
18	Private study hours: preparation for an examination	
19		
20	**Number of private study hours**	***50***
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**2,0**
22	**Total study time**	**100**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**4**
24	**Number of practice-based hours** *Total practice-based hours*	
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	

E. READING LIST

References	
Module website	