MODULE SPECIFICATION

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

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	**Civil Engineering**
Level of qualification	**First cycle** *(first cycle, second cycle)*
Studies profile	**Academic** (*academic/practical)*
Mode of study	**Full-time** *(full-time / part-time)*
Specialism	
Organisational unit responsible for module delivery	The Department of Physics
Module co-ordinator	Prof. **Andrzej Okniński, PhD hab.**
Approved by	**Marek Iwański, Professor**

B. MODULE OVERVIEW

Module type	**Core module** (*core/programme-specific/elective HES*)*
Module status	**Compulsory module** *(compulsory / non-compulsory)*
Language of module delivery	**English**
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 / summer)*
Pre-requisites	**None** (*module code/module title, where appropriate)*
Examination required	**No** *(yes / no)*
ECTS credits	**3**

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

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

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	B_W01	T1A_W01 T1A_W02
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	B_W01	T1A_W01 T1A_W02
W_03	A student has knowledge on the description of harmonic motion.	l/c	B_W01	T1A_W01 T1A_W02
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	B_U01	T1A_U08 T1A_U09
U_02	A student can plan and conduct laboratory tests (and present their results).	l	B_U16	T1A_U08
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	B_K03	T1A_K01 T1A_K05 T1A_K06
K_02	A student can work in a group by accepting various roles in it and understanding specific priorities to complete a task.	l	B_K01	T1A_K03 T1A_K04 T1A_K01

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 coordinates and vectors. Function derivative.	W_01 U_01
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. Motion planning. Integrating the equations of motion – samples.	W_01 U_01
5	Work, power, and energy. Potential and non-potential forces. The principles of conservation.	W_02 U_01 K_01
6	Harmonic motion as an example of modelling vibrating motion. Examples and applications.	W_02 U_01
7	The dynamics of material particles systems. The principle of conservation. The analysis of the solar system dynamics.	W_03 U_01

8	Lorentz transform.	W_01 U_01 K_01

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
4	Diagonal throw: deriving formulas for the range of throw, maximum height and total time of particle flight.	W_01 U_01 K_01
5	The dynamics of a material point: first, second, and third Newton's law.	W_02 U_01
6	Kinetic and potential energy, and work. The law of conservation of mass.	W_02 U_01
7	Systems of particles: centre of gravity as regards a system of particles, the momentum of a system of particles.	W_03 U_01
8	The momentum of a system of particles, centre of gravity as regards a rigid solid.	W_03 U_01 K_01

3. Topics to be covered in the laboratories

No.	Topics	Module outcome code
1	Introduction to the calculus of errors.	U_02
2, 3	Mechanical Laboratory (two laboratory exercises to choose from): M1 – Examining uniformly variable motion with the Atwood machine M2 – Determining Young's modulus M3 – Determining the Cp/Cv ratio with the Clement-Desormes method M4 – Determining specific heat of solid bodies, determining ice fusion heat M6 – Hooke's law. Harmonic oscillations. M7 – Determining gravitational acceleration with Kater's pendulum M8 - Determining the coefficient of fluid viscosity with the Hoppler viscometer	U_02 K_02
4, 5	Electrical Laboratory (two laboratory exercises to choose from): E1 – Examining magnetic hysteresis loop of ferromagnetic substances with an oscilloscope E3 – Determining static characteristics of a bipolar transistor in the common emitter system E5 – Examining resonance in the RLC circuit E6 – Determining copper electrochemical equivalent and Faraday constant E7 – Examining a single-phase transformer	U_02 K_02
6, 7	Optical Laboratory (two laboratory exercises to choose from): O1 – Determining angle of polarisation plane and torsion of a typical sugar solution	U_02 K_02

	O3 – Examining optical spectra O4 – Determining the refractive index with a microscope O5 – Determining constant diffraction grating and the length of light waves O6 – Examining polarised light O7 - Determining focal distance of a lens O8 – Measuring numerical aperture of optic fibre O9 – Photometric law of distance	

4. Topics to be covered in the projects

Assessment methods

Module outcome code	**Assessment methods** *(Method of assessment; for module skills − reference to specific project, laboratory and similar tasks)*
W_01	An examination, a mid-term test, a final test, and oral presentations
W_02	An examination, a mid-term test, a final test, and oral presentations
W_03	An examination, a mid-term test, a final test, and oral presentations
U_01	An examination, a mid-term test, a final test, and oral presentations
U_02	Observing a student's involvement, a test on six classes, reports on the classes
K_01	Observing a student's involvement during the classes and a discussion during the classes
K_02	Observing a student's involvement during laboratory classes

C. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	**Study time/ credits**
1	Contact hours: participation in lectures	**15**
2	Contact hours: participation in classes	**15**
3	Contact hours: participation in laboratories	**15**
4	Contact hours: attendance at office hours (2-3 appointments per semester)	**3**
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**	**48** *(total)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**1.9**
11	Private study hours: background reading for lectures	**7**
12	Private study hours: preparation for classes	**7**
13	Private study hours: preparation for tests	**5**
14	Private study hours: preparation for laboratories	**3**
15	Private study hours: writing reports	**6**
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**	**28** *(total)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**1.1**
22	**Total study time**	**76**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**3**
24	**Number of practice-based hours** *Total practice-based hours*	**21**
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	**0.8**