MODULE DESCRIPTION

Module code	**Z-ZIP2-523z**
Module name	**Fizyka inżynierska**
Module name in English	**Engineering Physics**
Valid from academic year	**2012/2013**

A. MODULE PLACEMENT IN THE SYLLABUS

Field of study	**Management and Production Engineering**
Level of education	**2nd degee** *(1st degree / 2nd degree)*
Studies profile	**General** *(general / practical)*
Form and method of conducting classes	**Full-time** *(full-time / part-time)*
Specialisation	**All**
Unit conducting the module	**The Department of Mathematics and Physics**
Module co-ordinator	**Robert Rynio, PhD**
Approved by:	

B. MODULE OVERVIEW

Type of subject/group of subjects	**Basic** *(basic / major / specialist subject / conjoint / other HES)*
Module status	**Compulsory** *(compulsory / non-compulsory)*
Language of conducting classes	**English**
Module placement in the syllabus - semester	**2nd semester**
Subject realisation in the academic year	**Winter semester** *(winter semester/ summer)*
Initial requirements	**No requirements** *(module codes / module names)*
Examination	**No** *(yes / no)*
Number of ECTS credit points	**2**

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 module is to acquaint students with foundations and applications of quantum mechanics. Another aim is to develop skills concerning measurement of basic physical quantities as well as analysis of the measurement data.

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 in the field of mechanics, thermodynamics, optics, electricity, and magnetism.	l/lab	K_W01	T2A_W01 T2A_W02
W_02	A student has knowledge of analysis of measurement data and estimate of measurement errors.	lab	K_W02	T2A_W01
U_01	A student is able to extract information from literature, data bases and other sources, can combine the obtained informations, draw conclusions, ad can express and justify his/her opinions.	l/lab	K_U01	T2A_U01
U_02	A student, working in a team, is able to carry out simple measurements of physical quantities.	lab	K_U02	T2A_U02 T2A_U06
U_03	A student, on the basis of his/her experimental work, is able to write a report.	lab	K_U01 K_U04	T2A_U01 T2A_U03 T2A_U08
K_01	A student appeciates importance of the continuous learning process and acquiring knowledge and skills as a basis of creative and entrepreneurial thinking.	l/lab	K_K01	T2A_K01 T2A_K06
K_02	A student understands importance of impacts of the engineering activity and is conscious of its non-technical aspects.	l/lab	K_K02	T2A_K02

Teaching contents:

1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	Thermal radiation. A quantum of energy.	W_01 U_01 K_01
2	Quantum nature of light. Photoelectric effect. Photocells.	W_01 U_01 K_01
3	The old quantum theory of Niels Bohr. Emission and absorption of radiation. Lasers.	W_01 U_01 K_01
4	Foundations of quantum mechanics. Schrődinger equation.	W_01 U_01 K_01
5	Example: one-dimensional potential well.	W_01 U_01 K_01
6	Quantum theory of the hydrogen atom. Many-electron atoms.	W_01 U_01 K_01

7	Quantum theory of a nucleus. Nuclear fission and nuclear fusion. Nuclear power.	W_01 U_01 K_02
8	Assessment of the lecture.	K_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	Getting acquainted with Occupational Health and Safety, regulations of the physical laboratory, and the schedule.	K_01 K_02
2	Uniformly variable motion. Measurement of the acceleration of gravity using Kater's pendulum. Determination of Young's modulus. The Hook's law. Harmonic oscillations. Kinematic viscosity.	W_01 W_02 U_01 U_02 U_03
3	Determination of adiabatic index. Determination of heat capacity and heat of fusion. Measurement of the speed of sound.	W_01 W_02 U_01 U_02 U_03
4	Investigation of spectra. Determination of refractive index. Determination of a diffraction grating constant.	W_01 W_02 U_01 U_02 U_03
5	Investigation of a polarized light. Determination of the focal length. Measurement of a numerical aperture of a waveguide. Photometric law of distance.	W_01 W_02 U_01 U_02 U_03
6	Investigation of a hysteresis loop. The Hall voltage. Determination of the electrochemical equivalent of copper.	W_01 W_02 U_01 U_02 U_03
7	Investigation of the resonance in an RLC circuit. Characteristics of a bipolar transistor.	W_01 W_02 U_01 U_02 U_03
8	Assessment of the physical laboratory.	K_01

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	Oral test, testing preparation to laboratory activities. Assessment of the report on laboratory activities.
W_02	Assessment of the report on the laboratory exercise.
U_01	Assessment of the report on the completed laboratory exercise. Assessment of the unassisted written essay on a selected problem related to a lecture.
U_02	Assessment of student's work during laboratory activities. Assessment of the report on the completed laboratory exercise.
U_03	Assessment of the report on the completed laboratory exercise.
K_01	Observation of student's activity at lectures, discussions in the lab.
K_02	Observation of student's activity at lectures, discussions in the lab.

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)	**2**
5	Participation in project classes	
6	Project tutorials	
7	Participation in an examination	
8		
9	**Number of hours requiring a lecturer's assistance**	**32** *(sum)*
10	**Number of ECTS credit points which are allocated for assisted work** *(1 ECTS point=25-30 hours)*	**1.1**
11	Unassisted study of lecture subjects	**5**
12	Unassisted preparation for classes	
13	Unassisted preparation for tests	**6**
14	Unassisted preparation for laboratories	**3**
15	Preparing reports	**14**
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	
18	Preparing for an examination	
19		
20	**Number of hours of a student's unassisted work**	**28** *(sum)*
21	**Number of ECTS credit points which a student receives for unassisted work** *(1 ECTS point=25-30 hours)*	**0.9**
22	**Total number of hours of a student's work**	**60**
23	**ECTS points per module** *1 ECTS point=25-30 hours*	**2**
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)	**1.3**

E. LITERATURE

Literature list	1. Resnick R., Halliday D., Walker J., *Fundamentals of Physics Extended*, 10th edition, John Wiley and Sons, Inc., 2011. 2. Halliday D., Resnic, R., Walker J. (2002). *Fundamentals of Physics*, Probeware Lab Manual/Student Version. 3. Fundamentals of Physics, Probeware Lab Manual/Student Version, by David Halliday, Robert Resnick, Jearl Walker, Wiley-VCH, 2002.
Module website	www.tu.kielce.pl/~fizyka (istructions for laboratory exercises)