MODULE SPECIFICATION

Module code	
Module title in Polish	**Fizyka stosowana w geomatyce**
Module title in English	**Applied Physics in Geomatics**
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	**English**
Semester in the programme of study in which the module is taught	**semester 3**
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	**2**

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

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

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C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to acquaint students with basic physical phenomena and processes in nature which are based on mechanical and electrical resonance (together with the presentations of techniques utilising the phenomena and laws of the physics of wave optics applied in geomatics.

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 knows (and is able to utilise physical laws and phenomena in solving simple technical issues).	l/c	GiK_W01	T1 A_W01
W_02	A student is knowledgeable about the principles of forming and propagating acoustic and electromagnetic waves.	l/c	GiK_W01	T1 A_W01
W_03	A student is knowledgeable about the propagation of electromagnetic waves, wave optics, and the fundamentals of satellite communication.	l/c	GiK_W01 GiK _W07	T1 A_W01
U_01	A student knows the methods of searching information included in various bibliographical and the Internet sources; a student can also asses this information (and utilise it in practice).	l/c	GiK _U01	T1A_U01
U_02	A student is able to independently prepare for tests and examinations.	l/c	GiK _U03	T1A_U01, T1A_U05
K_01	A student is aware of the necessity of self-education and acting responsibly as well as professionally.	l/c	GiK _K02	T1A_K01, T1A_K07

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	The law of conservation of energy in harmonic vibrations. Mechanical and electrical resonance.	GiK_W01
2	The elements of acoustics and utilising sound propagation to measure distance. The Doppler effect.	GiK_W01
3	The fundamentals of wave and geometrical optics. Sound formation in optical devices.	GiK_W01
4	The diffraction and interference of electromagnetic waves. Utilising electromagnetic waves for measurements.	GiK_W01
5,6	The structure of hydrogen atom according to Bohr. Einstein's absorption theory and light emission. Induced light emission in statistical systems. Induced emission. Generating monochromatic light (optical lasers).	GiK_W01
7	Generators of electrical vibrations. Electronic time meters.	GiK_W01 GiK_W07

2. Topics to be covered in the classes

No.	Topics	Module outcome code
1	The kinematics of electromagnetic wave propagation.	GiK_W01
2	Natural frequency of mechanical and electrical systems containing C and L elements.	GiK_W01 GiK _U01

3	The periods of vibrations and the frequency of vibrations in mechanical systems.	GiK_W01 GiK _U01
4	The frequency and velocity of signal source in the interpretation of the Doppler effect.	GiK_W01 GiK _U01
5	Induced emission. Frequency values, the energy of electrical and magnetic waves in atomic systems.	GiK_W01 GiK _U01
6	The construction of the optical laser. The construction of the frequency or time meter.	GiK_W07 GiK _U01
7	A final test.	GiK _U03 GiK _K02

Assessment methods

Module outcome code	**Assessment methods** *(Method of assessment; for module skills − reference to specific project, laboratory and similar tasks)*
W_01	A test and oral presentations
W_02	A test and oral presentations
W_03	A test and oral presentations
U_01	A test and oral presentations
U_02	A test and oral presentations
K_01	A test, oral presentations, observing a student's involvement, and a discussion during the classes

D. 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	**0**
4	Contact hours: attendance at office hours (2-3 appointments per semester)	**Lecture-1 Classes -1**
5	Contact hours: participation in project-based classes	**0**
6	Contact hours: meetings with a project module leader	**0**
7	Contact hours: attendance at an examination	**0**
8		
9	**Number of contact hours**	**32** *(total)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**1.28**
11	Private study hours: background reading for lectures	**6**
12	Private study hours: preparation for classes	**6**
13	Private study hours: preparation for tests	**6**
14	Private study hours: preparation for laboratories	**0**
15	Private study hours: writing reports	**0**
16	Private study hours: preparation for a final test in laboratories	**0**
17	Private study hours: preparation of a project/a design specification	**0**
18	Private study hours: preparation for an examination	**0**
19		
20	**Number of private study hours**	**18** *(sum)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**0.72**
22	**Total study time**	**50**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**2**
24	**Number of practice-based hours** *Total practice-based hours*	**0**
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	**0**

E. READING LIST

References	
Module website	