



MODULE SPECIFICATION

Module code	
Module title in Polish	Techniki pomiarowe w geodezji
Module title in English	Measurement Techniques in Surveying
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 Geotechnical Engineering, Geomatics and Waste Management
Module co-ordinator	Prof. Jacek Szewczyk, PhD hab., Eng.
Approved by:	Ryszard Florek-Paszowski, PhD, Eng.

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 2
Semester in the academic year in which the module is taught	summer 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	15		15		



semester					
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C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to acquaint students with basic knowledge on the construction, geometrical conditions (and their control) as well as handling optoelectronic surveying devices.
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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 indispensable knowledge on the principles of operation as regards main electronic modules, surveying devices (laser diodes), and photoconductors.	II	GiK_W07 GiK_W24	T1A_W02 T1A_W04 T1A_W05 T1A_W06 T1A_W07
W-02	A student knows the construction and principle of operation of optoelectronic surveying devices.	I	GiK_W07	T1A_W02 T1A_W04 T1A_W06
W_03	A student knows the methods of preparing surveying observations which are necessary to determine the coordinated of the measured points.	II	GiK_W03	T1A_W01, T1A_W04, T1A_W07
U_01	A student can handle and take measurements with electronic surveying devices.	II	GiK_U14	T1A_U08
U_02	A student is able to independently prepare for laboratory classes.	II	GiK_U03	T1A_U01 T1A_U05
U_03	A student is capable of independently prepare for field works (measurements with the method of benchmark levelling, mesh levelling, dispersed points, traverse, polar, test, and examinations).	I	GiK_U03	T1A_U01, T1A_U05,
K_01	A student understands and knows the possibilities of continuous education (and raising his/her professional qualifications), which results from changes in regulations and technologies applied during land survey and height measurement.	II	GiK_K01	T1A_K01
K_02	A student is aware of acting in a professional and responsible manner with the utilisation of devices during the classes.	II	GiK_K02 GiK_K06	T1A_K01, T1A_K02, T1A_K05, T1A_K07 T1A_K03
K_03	A student can co-operate and work in a team during while conducting surveys.	I	GiK_K07	T1A_K03

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1 - 2	The classification of electronic surveying measurement devices. Basic construction elements of surveying devices. The construction and parameters of a telescope. Electrooptic devices and their basic modules. Basic parameters of electromagnetic waves (velocity, phase, length, and frequency).	W_01



3	The classification and principles of operation as regards electromagnetic rangefinders. Impulse and phase rangefinders. The impact of air temperature and pressure on distance measurement with rangefinders. The comparison of electromagnetic rangefinders.	W_02 U_01
4	Electronic angle measurement systems. Code and impulse systems (the principles of measuring directions).	W_02 U_01 K_01
5	Digital (code) levelling instruments; the principles of reading from levelling staff. Laser samples in surveying engineering (the classification of laser functions in surveying engineering). The applications of laser devices.	W_02 U_01 K_01
6	Electronic tacheometers (their construction and basic handling principles). Surveying software of tacheometers (the principles of starting and utilising them in land survey and height measurements).	W_02, U_01 K_01
7	GNSS techniques in surveys. The construction and principle of determining position in satellite systems (the navigation and differential, RTK, methods). Polish positioning systems (ASG EUPOS). RTN measurements in the ASG EUPOS system.	W_02 U_01, K_01
8	Other electronic measurement systems (echo sounders electromagnetic detectors of underground devices). Obtaining a credit for the lectures.	W_02 U_01, K_01

2. Topics to be covered in the laboratories

No.	Topics	Module outcome code
1 - 2	Handling and measuring vertical and horizontal angles with electronic theodolites.	W_02 U_01 U_02 K-01 K_02
3	Handling levelling instruments and measuring height differences with digital levelling instruments.	W_02 U_01 U_02 K-01 K_02
4-5	Handling tacheometer and measuring angles and lengths with electronic tacheometers. Measurements with the use of specialist programs. Determining constants of the tacheometer-mirror set.	W_02 U_01 U_02 K-01 K_02
6	Measurements with laser devices (of height differences as well as distance – setting out with rotational and hand laser levelling instruments).	W_02 U_01 U_02 K-01 K_02
7	Determining coordinates and height with the RTN method with the use of GPS receivers.	W_02 U_01 U_02 K-01 K_02
8	Practical and individual check of students' ability to handle and utilise electronic surveying devices in surveys.	W_02 U_01 U_02 K-01 K_02

Assessment methods



Module outcome code	Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i>
W_01, W_02, W_03	A final test on the construction and handling of electronic measuring instruments.
U_01, U_02, U_03	Completing measurement and computational tasks. Preparing measurement results during the classes. Individual and team preparation of technical reports on the results of field measurements.
U_01 U_02	A test on the principles of measuring and preparing measurement results (computational tasks).
U_01, U_02, U_03, K_01, K_02,	Observing a student's involvement during field measurement and computational works. A report and consulting projects.

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	
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	2
8		
9	Number of contact hours	35 <i>(sum)</i>
10	Number of ECTS credits for contact hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	1.4
11	Private study hours: background reading for lectures	2
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	
14	Private study hours: preparation for laboratories	2
15	Private study hours: writing reports	7
16	Private study hours: preparation for a final test in laboratories	2
17	Private study hours: preparation of a project/a design specification	
18	Private study hours: preparation for an examination	2
19		
20	Number of private study hours	15 <i>(sum)</i>
21	Number of ECTS credits for private study hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	0.6
22	Total study time	53
23	Total ECTS credits for the module <i>(1 ECTS credit = 25-30 hours of study time)</i>	2
24	Number of practice-based hours	29



	<i>Total practice-based hours</i>	
25	Number of ECTS credits for practice-based hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	1.1

E. READING LIST

References	
Module website	