



### MODULE SPECIFICATION

Module code	
Module title in Polish	<b>Obserwacje i opracowanie pomiarów przemieszczeń i odkształceń wybranych budowli i konstrukcji</b>
Module title in English	<b>Displacements and Deformations of the Selected Buildings and Structures - Observations and Analysis</b>
Module running from the academic year	2016/2017

### A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	<b>Surveying and Cartography</b>
Level of qualification	first cycle (first cycle, second cycle)
Programme type	academic (academic/practical)
Mode of study	full-time (full-time/part-time)
Specialism	Engineering Surveys (graduation path)
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:	<b>Ryszard Florek-Paszkowski, PhD, Eng.</b>

### B. MODULE OVERVIEW

Module type	core module (core/programme-specific/elective HES*)
Module status	optional (compulsory/optional)
Language of module delivery	English
Semester in the programme of study in which the module is taught	semester 7
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	1

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



# Politechnika Świętokrzyska

## WYDZIAŁ INŻYNIERII ŚRODOWISKA, GEOMATYKI I ENERGETYKI

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



### C. LEARNING OUTCOMES AND ASSESSMENT METHODS

<b>Module aims</b>	The aim of the module is to deepen students' knowledge as regards surveys of deformation of structures. Students become familiarised with advanced methods of determining deformation indices as well as the interpretation of the obtained results.
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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 obtains deepened knowledge as regards testing network reliability together with calculation procedures.	I	GiK_W01	T1 A_W01
W_02	A student obtains deepened knowledge on determining structure deformations as well as the interaction concerning the impact of surface and building deformation (together with accident prevention regulations).	I	GiK_W21 GiK_W26	T1 A_W03 T1 A_W06 T1 A_W07
W_03	A student acquires deepened knowledge on the structure and application of measurement apparatus to examine deformations; moreover, a student can design the range and survey methodology for determining deformation indicators.	I	GiK_W20 GiK_W27 GiK_W28 GiK_U20 GiK_U23 GiK_U26	T1 A_W03 T1 A_W06 T1 A_W07 T1 A_W08 T1 A_U11 T1 A_U15 T1 A_U16
W_04	A student obtains deepened knowledge as regards designing networks and survey systems for determining deformations; moreover, a student is able to determine deformation observation results and indicate the methods of protecting a building.	I	GiK_W13 GiK_U14	T1 A_W01 T1 A_W04 T1 A_U08
U_01	A student is able to: design a network to examine deformations, select survey methodology, take measurements, and interpret them.	I	GiK_U14 GiK_U16	T1A_U08, T1A_U13
K_01	A student is able to appropriately determine priorities for the realisation of a given (by himself/herself or other students) task; furthermore, a student understands non-technical aspects and effects of geodetic activity, including its impact on the economy.	I	GiK_K05 GiK_K06	T1A_K02 T1A_K04
K_02	A student is aware of his/her responsibility for the realisation of team tasks; moreover, a student can co-operate and work in a team during the realisation of engineering projects.	I	GiK_K06 GiK_K07	T1A_K03

#### Module content:

##### 1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1.	Analysing the reasons of land surface deformations and objects (natural and anthropogenic). Constructional prevention. Surface deformations in relation to building deformations.	W_01 W_02 K_01
2.	Deformations caused by mining exploitation. The classification of mining areas in terms of their susceptibility to deformations.	W_01 W_02 K_01
3.	Geodetic methods of measuring deformations and displacements concerning land surface.	W_01



	Establishing observation lines and networks. The method of surveying rosettes.	W_02 W_04 U_01 K_01
4.	The accuracy of determining deformation indicators. The distribution of deformations. The reliability of observation networks.	W_01 W_02 W_04 K_01
5.	Monitoring deformations with the use of modern surveying and photogrammetric methods. The application of satellite observations for precise determination of deformation size.	W_03 U_01
6.	Determining deformation indicators of non-typical objects (slender structures, bridges, dams, etc.)	W_03 U_01
7 – 8.	Preparing observation results. The analysis and interpretation of survey results.	W_04 U_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	A test and a discussion during the lectures
W_02	A test and a discussion during the lectures
W_03	A test and a discussion during the lectures
W_04	A test and a discussion during the lectures
U_01	A test and a discussion during the lectures
K_01	A test, a discussion during tutorials and obtaining a credit
K_02	A discussion during tutorials and obtaining a credit



### D. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	Study time/ credits
1	Contact hours: participation in lectures	<b>15</b>
2	Contact hours: participation in classes	-
3	Contact hours: participation in laboratories	-
4	Contact hours: attendance at office hours (2-3 appointments per semester)	<b>5</b>
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	<b>Number of contact hours</b>	<b>20</b> <i>(total)</i>
10	<b>Number of ECTS credits for contact hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>0.8</b>
11	Private study hours: background reading for lectures	
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	
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	<b>5</b>
19		
20	<b>Number of private study hours</b>	<b>5</b> <i>(total)</i>
21	<b>Number of ECTS credits for private study hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>0.2</b>
22	<b>Total study time</b>	<b>25</b>
23	<b>Total ECTS credits for the module</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>1</b>
24	<b>Number of practice-based hours</b> <i>Total practice-based hours</i>	<b>0</b>
25	<b>Number of ECTS credits for practice-based hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>0</b>

### E. READING LIST

References	1. Caspary W.F., <i>Concepts of network and deformation analysis</i> , Monograph 11, School of Surveying, The University of New South Wales, Kensington 1988. Welsch W.M., Heunecke O., <i>Models and terminology for the analysis of geodetic monitoring observations</i> , Official Report of the Ad-Hoc Committee of FIG Working Group 6.1., Findings of the 10 <sup>th</sup> International Symposium on Deformation Measurements, Orange, California, 2001.
Module website	