



### MODULE SPECIFICATION

Module code	
Module title in Polish	Geodezyjny monitoring budowli
Module title in English	Structure's Geometry Monitoring
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. Bogdan Wolski, PhD hab., Eng.
Approved by:	Ryszard Florek-Paszkowski, PhD, Eng.

### B. MODULE OVERVIEW

Module type	core module (core/programme-specific/elective HES*)
Module status	compulsory module (compulsory/optional)
Language of module delivery	
Semester in the programme of study in which the module is taught	semester 6
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	3

\* 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		30		



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### C. LEARNING OUTCOMES AND ASSESSMENT METHODS

<b>Module aims</b>	The aim of the module is to deepen students' knowledge on designing and realisation of deformation measurements as regards building structures. Students become familiarised with the indicators of deformation (as well as the methods of determining them). Furthermore, students detailed knowledge on examining the stability of points (together with the ability of interpreting 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 comprehensive knowledge as regards examining the stability of points (together with the calculation procedures).	I	GiK_W01	T1 A_W01
W_02	A student obtains comprehensive knowledge on determining the displacement of points in networks as well as the interpretation of the obtained results.	I	GiK_W21 GiK_W26	T1 A_W03 T1 A_W06 T1 A_W07
W_03	A student acquires comprehensive knowledge on the construction and application of measuring instruments to examine deformations.	I	GiK_W20 GiK_W27 GiK_W28	T1 A_W03 T1 A_W06 T1 A_W07 T1 A_W08
W_04	A student obtains comprehensive knowledge on designing networks and measurement system for determining deformations.	I	GiK_W13	T1 A_W01 T1 A_W04
U_01	A student can design a network or a measurement system in a comprehensive manner to determine deformations.	I	GiK_U14 GiK_U15	T1 A_U08 T1 A_U09
U_02	A student is able to complete a whole range of topographic measurements to determine deformation indices; a student can also select appropriate measurement apparatus and observation method with his/her deepened knowledge.	I	GiK_U20 GiK_U23 GiK_U26	T1 A_U11 T1 A_U15 T1 A_U16
U_03	A student can interpret the results of deformation observation in a deepened manner.	I	GiK_U14	T1 A_U08
K_01	A student can appropriately determine priorities serving the realisation of a determined task by himself/herself or other students; a student also understands non-technical aspects of geodetic activity (including its impact on economy).	II	GiK_K05 GiK_K06	T1A_K02 T1A_K04
K_02	A student is aware of the responsibility for the realisation of team assignments; a student can also co-operate and work in a team during the realisation of engineering projects.	II	GiK_K06 GiK_K07	T1A_K03

#### Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1-2	The aims and range of surveying monitoring. The causes of object deformations (natural and anthropogenic factors). Construction prevention.	W_01 W_02 K_01
3-6	Monitoring systems. Measurement apparatus. Observation techniques.	W_03 W_04 K_01
7-8	The issue of the reference system. The analysis of measurement result. Determining the	W_03



	indices of a building structure on the basis of monitoring results.	K_02
9-10	The issue of reliability as regards the network of surveying points.	U_01 U_02 K_01
11-15	The examples of monitoring. The monitoring of industrial facilities, large structure, ground objects, and the objects in deep excavation zones.	W_02 W_03 K_02

### 2. Topics to be covered in the laboratories

No.	Topics	Module outcome code
1 – 2	The issue of the reference system in the object monitoring task. A practical measurement and the analysis of results.	U_02 U_03 K_01
3 - 7	Measuring the deformations of object shape (field practice). Preparing an observation project as well as measurement results. Determining the indicators of structure deformations.	U_02 U_03 K_01
8 -11	The application of measurement and control apparatus in the monitoring of engineering objects and soil background. Preparing the results of observations made with the use of inclinometers.	U_02 U_03 K_01
12 - 13	Monitoring an object in the influence zone as regards deep excavations. The analysis of measurement results. The visualization of results.	U_03 K_02
14 - 15	Calculating the reliability of the selected network of surveying points.	U_01 U_02 K_01

### 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, assessing reports on laboratory classes
W_02	A test, assessing reports on laboratory classes
W_03	A test, assessing reports on laboratory classes
W_04	A test, assessing reports on laboratory classes
U_01	A test, assessing reports on laboratory classes
U_02	A test, assessing reports on laboratory classes
U_03	A test, assessing reports on laboratory classes
K_01	A test and a discussion during tutorials and obtaining a credit
K_02	Assessing reports on laboratory classes, 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	15
2	Contact hours: participation in classes	
3	Contact hours: participation in laboratories	30
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	<b>Number of contact hours</b>	<b>48</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>1.92</b>
11	Private study hours: background reading for lectures	6
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	
14	Private study hours: preparation for laboratories	6
15	Private study hours: writing reports	10
16	Private study hours: preparation for a final test in laboratories	5
17	Private study hours: preparation of a project/a design specification	
18	Private study hours: preparation for an examination	
19		
20	<b>Number of private study hours</b>	<b>27</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>1.08</b>
22	<b>Total study time</b>	<b>75</b>
23	<b>Total ECTS credits for the module</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>3</b>
24	<b>Number of practice-based hours</b> <i>Total practice-based hours</i>	<b>40</b>
25	<b>Number of ECTS credits for practice-based hours</b> <i>(1 ECTS credit = 25-30 hours of study time)</i>	<b>1.6</b>

### E. READING LIST

References	<ol style="list-style-type: none"> <li>1. W. Schofield, Engineering Surveying. Theory and Examination Problems for Students eBook ISBN: 9781483105130. Published by Butterworth-Heinemann, 1985</li> <li>2. N. Dann, D. Worthing, D. Marshall. The Construction of Houses Roger Heath 2013 Publisher Taylor &amp; Francis Ltd.</li> <li>3. Russell C. Brinker The Surveying Handbook, Technology &amp; Engineering 2013</li> <li>4. Journal of Surveying Engineering, ISSN (print): 0733-9453 ISSN , Frequency: Quarterly</li> <li>5. Reports on Geodesy. Warsaw University of Technology.</li> <li>6. Geomatics and Environmental Engineering. AGH University of Science and Technology</li> </ol>
Module website	<a href="http://www.spar3d.com">http://www.spar3d.com</a> . Jan van Sickle The Engineering Surveying Manual, 2015



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