

KLAIPEDA STATE UNIVERSITY OF APPLIED SCIENCES

Faculty of Technologies

STUDY PROGRAMME: GEODESY
STUDY SUBJECT: GEODESICAL DEVICES AND AUTOMATION OF MEASUREMENTS

Subject group*	Subject type**	Form of studies	Structure***				Hours, total	Credits
			T	P	K	S		
SK	P	Full-time (NL)	16	26	3	35	80	3
		Part-time (I)	10	8	27	35		

*Subject group: BS—general study subjects; SK—subjects of the study field.

**Subject type: P—compulsory subject; A—optional subject (alternative), LP—elective.

***Structure T—theory; P—seminars, placements, laboratory works; K—consulting; S—self-studying.

Annotation

To form the student's competence in the area of geodetic device selection, analysis, metrological provision. The subject analyses optical parts of devices, reading systems, axes of geodetic devices, levels, compensators. Cases of geodetic device maintenance, inspection and repairs are provided. The structure and criteria of measurement automation software, the probability of measurement automation errors. The importance of the global positioning system and its use in measurement automation is presented.

Links between the learning outcomes of the programme and the outcomes of the study subject as well as the study methods and the student performance assessment methods

Learning outcomes of the programme	Learning outcomes of the study subject	Study methods	Student performance assessment methods
B2. Able to use modern measuring instruments and to optimally organise and perform measurements, process and analyse measurement results, apply real estate administration, formation and assessment methods in compliance with Lithuanian and EU standards and regulations	B2.1. Performs optimal measurements and processes measurement results by applying valid legislation.	Lecture, demonstration, individual tasks,	Individual task report Written survey.
C1. Uses methods of mathematical statistical processing of measurement data, methods of determining measurement reliability and uncertainty, and is able to accumulate, systematise and analyse information obtained from measurements.	C1.1. Knows the principles of operation of measuring instruments and methods for processing measurement data and determining their reliability. C1.2. Understands the importance of measurement reliability and analyses measurement information	Lecture, demonstration, comparative analysis, individual tasks, mastering of measuring equipment, independent work.	Presentation of a comparative report
C2. Able to apply measurement information for engineering research and solving other applied tasks, designing various maps and IS measurement databases, and applying legal acts in professional	C2.1. Applies measurement information to engineering research	Lecture, demonstration, individual tasks involving software	Individual task report Verification of data synthesis diagram

Subject content and scope

Topic name and content description	Number of contact hours, full-time			Number of contact hours, part-time			S	Hours, total
	T	P	K	T	P	K		

<p>1. Requirements for geodetic instruments, metrological provision. Independent work No. 1. Requirements for geodetic devices (electronic tachometer, GPNS receiver, drone and 3D scanner). Aim: to assimilate the principles of utilisation, maintenance and construction of geodetic instruments.</p>	2	-	-	-	-	2	4	6
<p>2. The essence of wave and geometric optics. Optical parts of devices (electronic tachometer, GPNS receiver, drone and 3D scanner). Practical work No. 1. Optical parts of devices (electronic tachometer, GPNS receiver, drone and 3D scanner). Aim: to assimilate the principles of operation of optical parts of geodetic devices and their systems as well as their deficiencies and removal thereof.</p>	2	2	-	2	2	-	4	8
<p>3. The theory of operation of geodetic devices (electronic tachometer, GPNS receiver, drone and 3D scanner), their structure and applications. Practical work No. 2. Structures of geodetic devices (electronic tachometer, GPNS receiver, drone and 3D scanner) and their applications. Aim: to assimilate structures and applications of geodetic devices, be able to perform experimental measurements. Compare applications of geodetic devices and their accuracy in different geodetic works.</p>	4	6	-	2	2	6	5	15
<p>4. The use of the global positioning system in measurement automation. Practical work No. 3. The use of the global positioning system. Aims: to assimilate GPIS measuring methods and be able to perform experimental measurements.</p>	2	8	-	2	2	6	6	16
<p>5. Test (topics 1, 2, 3, and 4). Aim: to prepare for the test.</p>	-	-	1	-	-	1	3	4
<p>6. Maintenance and repairs of geodetic devices (electronic tachometer, GPNS receiver, drone and 3D scanner). Independent work No. 2. Maintenance of geodetic devices (electronic tachometer, GPNS receiver, drone and 3D scanner). Aim: to analyse factors influencing the longevity of geodetic devices as well as peculiarities of their maintenance.</p>	2	-	-	2	-	-	4	6
<p>7. Classification of measurement errors. Independent work No. 3. Classification of measurement errors. Aim: to describe errors occurring during geodetic measurements and to classify them.</p>	2	2	-	2	-	2	4	8
<p>8. Processing of geodetic measurements by using software (GeoMAP, ArcGIS and BENTLEY). Practical work No. 4. Processing of geodetic measurements by using GeoMAP, ArcGIS and BENTLEY software. Aim: to process experimental measurements performed by using various geodetic devices.</p>	2	8	-	-	2	8	4	14
Preparation for examination.	-	-	2	-	-	2	1	3
Total number of hours	16	26	3	10	8	27	35	80

Evaluation system for subject learning outcomes

Subject learning outcome No.	Subject learning outcome evaluation criteria
B2.1.	Processing of measurements and their results in accordance with valid legislation
C1.1.	Assimilation of the key principles of creating topographic maps of measurements.
C1.2.	Understanding the importance of measurement reliability and

	analysis of measurement information.
C2.1.	Application of measurement information to engineering research

<p>Assessment procedure</p> <p>A ten-point criterion scale and a cumulative assessment system are applied.</p> $IKV = \sum_{i=1}^n X_i \times k_i$ <p>n—number of intermediate assignments (assessment of 1 test, assessment of 1 independent work, assessment of 2 practical works). Xi—assessment of intermediate assignments and the examination (assessment of tests—20 %, assessment of an independent work—20%, assessment of practical works—60%). ki—weighted coefficients of intermediate assignments and the examination (all intermediate works are assessed on a ten-point criterion scale from 5 to 10 points; the weighted coefficient of all intermediate assignments is 1).</p>

Recommended literature and other sources of information

Key literature and sources of information			
No.	Literature and sources of information	Number of copies	
		At the library of the Faculty of Technologies	At other libraries of the University
1.	Skeivalas J. (2010) <i>Elektroniniai geodeziniai prietaisai, Mokomoji knyga</i> , Vilnius Technika	5	-
2.	Skeivalas J. (2004) <i>Elektroniniai geodeziniai prietaisai, Mokomoji knyga</i> , Vilnius Technika	15	-
3.	Steponavičienė J. Tumelienė E. Zigmantienė E. (2005) <i>Geodezijos mokomoji praktika, Metodikos nurodymai</i> , Vilnius Technika	37	-
4.	Paršeliūnas E.(2001) <i>Geoinformacinės sistemos: technologija</i> . Vilnius. Technika	3	-
5.	Tamutis Z. et al. (1996) <i>Geodezija 2d</i> . Vilnius. Mokslo ir enciklopedijų leidykla	55	-

Additional literature and sources of information	
No.	Literature and sources of information
5.	Fialovszky (Editor) (1991) <i>Surveying Instruments and their Operational principles</i> , Elsevier
6.	<i>Topografinio M 1:10 000 Žemėlapis turinys, kodai, sutartiniai ženklai</i> .(2009) National Land Service under the Ministry of Agriculture,
7.	Journals “ <i>Geodezija ir kartografija</i> ”. 1996-2011

Subject description drawn up by:

<p>Lecturer</p> <p>_____</p> <p>(position)</p>	<p>_____</p> <p>(signature)</p>	<p>Dainora Jankauskienė</p> <p>(degree, name, surname)</p>
<p>Assistant</p> <p>_____</p> <p>(position)</p>	<p>_____</p> <p>(signature)</p>	<p>Rasida Vrubliauskienė</p> <p>(degree, name, surname)</p>