KLAIPĖDA STATE UNIVERSITY OF APPLIED SCIENCES

Faculty of Technologies

STUDY PROGRAMME: **GEODESY**
NAME OF THE SUBJECT: **CARTOGRAPHY**
CODE OF THE SUBJECT: **TF-G-2-022**

Group of the subject*	Type of the subject**	Form of studies	Structure***				Total number of hours	Number of credits
			T	P	C	I		
SF	P	Full-time studies (FT)	18	66	6	70	160	6
		Part-time studies (PT)	10	26	54	70		

*Group of the subject: GS ─ general study subjects; SF ─ subjects of the study field.

**Type of the subject: C ─ compulsory subject; A ─ optional subject (alternative), FE ─ freely elective subject.

***Structure: T ─ theory; P ─ seminars, workshops, laboratory works; C ─ consultations; I ─ individual work.

Annotation

The subject provides theoretical knowledge about the mapping science, mathematical basis for map making, cartographic design, map design, compilation and publishing. Students will master technological peculiarities and construction methods, related to the creation of digital maps. They will also develop skills, related to the creation, analysis and editing of digital maps by using specialised software.

The connection of results of the study programme with results of the study subject and study methods, as well as evaluation methods of the learning achievements

Results of the study programme	Results of the study subject	Study methods	Evaluation methods of the learning achievements
A2. A student will demonstrate knowledge and understanding about the measuring, design and construction methods and ways, technical measures used to take such actions, as well as their management methods and principles of quality assurance	A2.1. A student will be able to analyse and select data models of maps; to create dotted, linear and spatial layers of digital maps by using "ArcGIS" software.	Demonstration, individual tasks and implementation of work skills by using software.	Assessment of practical work. Verbal interview
A3. A student demonstrates knowledge and understanding about the traditional and innovative technologies of measurement engineering and their application methods that are significant in the field of research, design and development of technological sciences, as well as has a holistic approach by making engineering decisions, coordinating the costs, benefit, safety, quality, reliability and environmental impact by applying principles of sustainable development	A3.1. A student will be able to create a fragment of a digital map by showing geographical views and cartographic views.	Presentation of theoretical material, demonstration, individual tasks and implementation of work skills by using software, analysis of scientific-methodological material.	Presentation and defence of practical work.
B1. A student is able to apply the acquired	B1.1. A student will be able to read and	Presentation of theoretical material,	Presentation of practical work. Verbal interview

knowledge to implement the latest technologies and to solve the tasks, related to geodesy, cartography and cadastre and register of real estate, as well as territorial planning; a student is also able to select measurement methods to obtain the necessary data	understand a cartographic view of maps in various scales, to draw elements of map content by using various conventional signs and their combinations; a student will recognise spatial objects of digital maps in various scales, be able to conclude, edit and update spatial objects of the maps. B1.2. A student will be able to analyse the primary and secondary data sources of digital maps.	demonstration, individual tasks, analysis, implementation of software and analysis of scientific-methodological material.	
C1. A student uses methods of mathematical-statistical processing of measurement data, measurement reliability and determination of indeterminacy by collecting, structuring and analysis information obtained during measurements.	C1.1. A student will be able to analyse spatial data models: cartometric, geodetic and photogrammetric. A student will be able to analyse measurement accuracy of spatial data by using various geodetic devices	Presentation of theoretical material, demonstration, group work and analysis.	Interview in writing
C2. A student is able to apply measurement information for scientific research and to solve other applicable tasks, to design various types of maps, measurement databases of information systems, and to apply legislation in the professional activities	C2.1. A student will be able to apply measurement data of the spatial data for creation of spatial data sets, as well as to present such data as cartographic views and to analyse them C2.2. A student will be able to logically distribute the view of a real world to geographical objects; to describe characteristics of geographical objects – attributes; a student will also be able to apply "InGIS" specification, used in the Republic of Lithuania, by using "ArcGIS" software, and to define and code the spatial objects of a digital map.	Presentation of theoretical material, individual tasks, demonstration, analysis and implementation of work skills by using software.	Assessment of practical work. A test
C4. A student is able to use basic software, to apply and use numerical computed methods, used to solve specific engineering problems, to use computers to obtain and process problem solving data, to manage processes, automated design and	C4.1. A student will be able to understand the principles used to conclude cartographic projections and their applicability, know how to analyse representation principles of cartographic projections; will be able to analyse LKS – 94, UTM	Presentation of theoretical material, demonstration, group work, analysis and implementation of software.	Presentation of an individual work Verbal interview

computer graphics	(WGS) coordinate systems, created in 1942, as well as methods of their transformation		

Contents and scope of the subject

Topic name and content description	Number of the contact hours, FT form			Number of the contact hours, PT form			I	Total number of hours
	T	P	C	T	P	C		
1. A concept and tasks of cartography An individual work No 1. To analyse shape of the globe, ellipsoid parameters and to be able to distinguish them.	2	-	-	-	-	2	6	8
2. Mathematical cartography: systems of geodetic coordinates and cartographic projections. Practical work No 1. Distortion of cartographic view in the maps. Objectives: to analyse the display principles of cartographic projections, to be able to calculate the size of distortion of cartographic view in the maps of different scales, to determine what kind of impact does the map projection make to the distances in the map and the shape of the map object.	2	6	-	2	2	4	2	10
3. Methods of mapping. Differences of cartographic representation in "GIS" and "CAD" systems. Practical work No 2. Methods of cartographic representation by using "ArcGIS" and "QGIS" software. Objectives: to be able to read and understand cartographic view of digital maps in various scales, to draw content elements of digital map by "ArcGIS" and "GeoMAP" software, using various signs and their combination.	-	12	-	-	4	8	6	18
4. Test No 1 Objective: to draw content elements of a map by using various signs and their combinations	-	-	2	-	-	2	4	6
5. Generalisation of cartographic view by the means of "GIS". Practical work No 3. Generalisation of the digital maps in different scales. Objective: To be able to perform simple generalisation of some content elements of a map by using "ArcGIS" software	2	6	-	2	2	4	4	12
6. Test No 2 Objective: to prepare for the examination.	-	-	2	-	-	2	4	6
7. The history and development of "GIS". Digital mapping. Practical work No 4. Creation of a fragment of thematic digital map by using "ArcGIS" software. Objective: To create a fragment of a cartographic map in "ArcMAP" environment, corresponding to requirements, set out for a map.	2	8	-	2	2	6	4	14
8. Paper maps and "GIS" maps. Advantages of "GIS" maps. An individual work No 2. Advantages and disadvantages of "GIS" maps. Objectives: to process and present information about "GIS" map based on the chosen topic. To determine advantages of "GIS" map in order to solve the specific tasks.	2	-	-	2	-	-	10	12
9. The principles of design of "GIS" and layer management. Practical work No 5. Layer management of signs in "ArcGIS" software Objective: To create new layers of a map by using "ArcGIS" software and to prepare the given analogue or	2	10	-	2	4	6	6	18

raster map for vectorisation.								
10. Land information system in Lithuania. Practical work No 6. Thematic digital maps and creation of their fragment. Objective: to analyse information about the land fund of the Republic of Lithuania, content of agricultural land, quantitative and qualitative properties of land, terms of land use and other characteristics, having impact on the land use, by using spatial data about land, which is collected in separate thematic spatial data sets and connected in one system on www.zis.lt.	2	12	-	-	6	8	10	24
11. Cartographic design. Practical work No 9. Cartographic design Objective: To create a model of a digital map in "ArcMAP" environment (Map view of the project) and to add elements to the map, which are necessary for the final model (area of a map of object, name, legend, map scale, nested view, information about authors, grid of geographic or rectangular coordinates, borders and frames, North arrow.	2	12	-	-	4	10	4	18
12. Spatial data sets of Lithuanian spatial information infrastructure. An individual work No 3. Spatial data sets of Lithuanian spatial information infrastructure. Objective: to learn using georeference data on website www.geoportal.lt and to perform analysis of this data.	2	-	-	-	2	-	4	6
Preparation for the examination	-	-	2	-	-	2	6	8
Total number of hours	**18**	**66**	**6**	**10**	**26**	**54**	**70**	**160**

Assessment system of results of the subject studies

Result number of the study subject	**Assessment criteria of results of the study subject**
A2.1.	Selection of a method for the creation of digital map and creation of layers by "ArcGIS" software.
A3.1.	Accuracy of representation of geographic objects as cartographic views by applying "ArcGIS" software.
B1.1.	Understanding of map contents in various scales and recognition of map elements and spatial objects.
B1.2.	Recognition of primary and secondary data in the digital maps.
C1.1.	Assessment of measurement accuracy of spatial data by selecting model of the spatial data.
C2.1.	Amount of information by creating thematic spatial data set (SDS)
C2.2.	Knowledge of "InGIS" specification and use by encoding layers of SDS
C4.1.	Understanding of principles of display and creation of cartographic projections

Procedure of evaluation

A ten-point criterial grading scale and system of an individual cumulated grading are applied.

$$\mathbf{IKV}=\sum_{i=1}^{n} \mathbf{X_i} \times \mathbf{k_i}$$

n –number of interim assessments (evaluation of 2 tests, evaluation of 3 individual works and evaluation of 3 practical works).

Xi – evaluations for interim assessments and examination (evaluation of tests – 30%, evaluation of an individual work – 20% and evaluation of practical works – 50%).

ki – weighted coefficients of interim assessments and examination (all interim works will be evaluated on a 10-point criterial grading system from 5 to 10 points, the weighted coefficients of all interim assessments is equal to 1).

Recommended literature and other information sources

Primary literature and information sources			
No	**Literature and information sources**	**Number of copies**	
		At the library of the Faculty of Technologies	**At other libraries of Klaipeda State University of**

			Applied Sciences
1.	Kuklienė L. (2011). *Kartografija: Mokomosios priemonės aukštosioms mokykloms.* Kaunas: Vitae Litera	10	-
2.	Aleknavičius A. (2008). *Kartografija: mokomoji knyga*. LŽŪU Leidybos centras.	11	
3.	Bagdžiūnaitė R. (2008). *Kartografija*. Vilnius: Technika.	20	-
4.	Urbanavičius V., Rožokienė A., Sližienė G. (2008). *Kartografija*. Kaišiadorys: UAB „AJS.	E-books of Klaipėda State University of Applied Sciences	-
5.	Kumetaitienė A., Stanionis A. (2010). *Skaitmeninių žemėlapių sudarymas ir duomenų apdorojimas: mokomoji knyga.* Vilnius: Technika.	www.ebooks.vgtu.lt	-

Additional literature and information sources	
No	**Literature and information sources**
1.	Burrough, P. A. (2011). *Principles of geographical information systems*. Oxford: Oxford University Press
2.	Krygier, J. (2011). *Making maps: a visual guide to map design for GIS.* New York, [N.Y.]: The Guilford press
3.	Zakarevičius A. (1996). *Lietuvos geodezinių tinklų koordinačių sistemos ir jų ryšiai*. V.: Technika.
4.	Stankevičius Ž. (2002). *Skaitmeniniai žemėlapiai: mokomoji knyga*. V.: Technika.
5.	Wade T. (2006). *A to Z GIS: an illustrated dictionary of geographic information systems*. Redlands (Calif.): ESRI Press.

Description of the subject was prepared by:

Lecturer		Lina Kuklienė
(Position)	*(Signature)*	*(Academic degree, name and surname)*