



SURVEYING AND CARTOGRAPHY FIELD-OF-STUDY LEARNING OUTCOMES

field-of-study: Surveying and Cartography education level: first-cycle programme education profile: general academic		
Field-of-study (GiK) learning outcomes symbol	FIELD-OD-STUDY LEARNING OUTCOMES – EXPLANATION On completion of the first-cycle programme in SURVEYING AND CARTOGRAPHY field-of-study – the graduate:	Related learning outcomes symbols for engineering sciences
KNOWLEDGE		
GiK_W01	has the knowledge of mathematics, physics, environmental engineering and other scientific areas, which is essential for formulating and solving basic tasks related to surveying and cartography	T1A_W01
GiK_W02	has basic knowledge of the geometric reconstruction of space on the basis of photogrammetric images	T1A_W01 T1A_W03
GiK_W03	knows the principles of statistical analysis of data, has the knowledge of error calculus and knows statistical foundations of observation processing (including advanced methods)	T1A_W01 T1A_W04 T1A_W07
GiK_W04	has well-organized knowledge of general and geodetic computer science, including the knowledge of computer software and hardware and computer programming in selected languages, data protection and archiving and programme licenses	T1A_W01 T1A_W05 T1A_W07 T1A_W10
GiK_W05	has the basic knowledge of civil and administrative law, tasks and competencies of the state and self-government administration bodies	T1A_W02 T1A_W03
GiK_W06	knows the basic principles of digital cartographic generalization of the databases of topographic objects and NTM (Numerical Model of Terrain), knows the principles of the edition of general geographic and thematic maps and the methods of their geovisualization	T1A_W02 T1A_W03



GiK_W07	knows the principles of electronic surveying instruments operation and data acquisition in the surveying process	T1A_W02 T1A_W04 T1A_W06
GiK_W08	knows the fundamental principles of real estate valuation	T1A_W02 T1A_W08
GiK_W09	has the knowledge of surveying and cartography-related law and technology, including the geodetic and cartographic law with the accompanying regulations as well as the scope of technical norms and standards in force in surveying and cartography	T1A_W03
GiK_W10	has basic knowledge of spherical geometry, knows time systems and scales, knows the spatial reference systems, coordinate systems, cartographic projections and appropriate systems of coordinates used in official documents in Poland	T1A_W03
GiK_W11	knows the methodology of SIT and spatial data analysis, knows functional models, knows principles of planning, creating, updating and harmonizing the official reference bases of spatial data (public registers)	T1A_W03
GiK_W12	demonstrates the knowledge of surveys used in general structure and transport infrastructure engineering	T1A_W03
GiK_W13	has detailed knowledge of geodetic control establishing, measuring and calculating as well as mapping/topographic surveys, knows the principles of designing and establishing integrated controls with the application of a network of stations ASG-EUPOS (Active Geodetic Network-EUPOS)	T1A_W03 T1A_W04
GiK_W14	is familiar with the basic implementation guidelines of the European Union directives on the spatial information infrastructure and the types of spatial analyses available in GIS, knows the principles of constructing and operating geoportals within spatial information infrastructure	T1A_W03, T1A_W04, T1A_W05
GiK_W15	knows the theory of defining and implementing the astronomical, geodetic and cartographic systems of coordinates, demonstrates the regularized knowledge of higher geodesy, geodetic astronomy and the principles of operation of Global Navigation Satellite Systems – GNSS	T1A_W03 T1A_W04 T1A_W05 TA1_W07
GiK_W16	has the fundamental theoretical knowledge of computer graphics	T1A_W03 T1A_W04 T1A_W05 TA1_W07
GiK_W17	knows the automation principles of geodetic and cartographic production process, starting with acquiring information about the area in the field and finishing with its graphical presentation	T1A_W03 T1A_W04 T1A_W07



GiK_W18	knows the principles, methods and purpose of conducting real estate cadastre and real estate management tasks	T1A_W03 T1A_W04 T1A_W08
GiK_W19	has a knowledge of the applications of aerial and satellite photogrammetry including the knowledge of the use of photogrammetric and remote sensing methods and technologies in spatial data acquisition for the purpose of constructing topographic and thematic databases and for documentation purposes	T1A_W03 T1A_W05 T1A_W07
GiK_W20	is familiar with surveying instruments and the principles of their checking and adjusting	T1A_W03 T1A_W06
GiK_W21	knows the methods of conducting construction-stage surveys, inventory surveys, as well as displacement and deformation surveys	T1A_W03 T1A_W07
GiK_W22	knows the principles of land register keeping and relation with real estate cadastre	T1A_W03, T1A_W08
GiK_W23	knows the basics of one computer programming language and database design principles, including standards for the exchange of information between databases	T1A_W05 T1A_W07
GiK_W24	is familiar with development trends in the field of direct and remote surveying methods of land data acquisition	T1A_W05, T1A_W07,
GiK_W25	has a basic knowledge of imaging used in remote sensing and of methods applied in thematic information extraction from multi-spectral images	T1A_W05 T1A_W07
GiK_W26	knows the components and design solutions used in residential and public buildings	T1A_W06 T1A_W07
GiK_W27	knows the basic methods, techniques and tools used in solving engineering tasks in the field of surveying and cartography	T1A_W07
GiK_W28	knows how to organize, arrange and prepare the workstation according to the principles of ergonomics	T1A_W08
GiK_W29	is familiar with the fundamental principles of the intellectual property law	T1A_W08 T1A_W10
GiK_W30	has a basic knowledge of conducting economic activity and property protection	T1A_W09 T1A_W10 T1A_W11
GiK_W31	has the knowledge of physical geodesy, concerning the gravity field of the Earth, tidal phenomena and height systems, has a basic knowledge of the Earth's magnetic field, knows the rules of performing absolute and relative gravimetric surveys	T1A_W03, T1A_W04, T1A_W05, TA1_W07



GiK_W32	knows the principles of producing or updating topographic maps all through the scale series, as well as general geographic maps, knows the principles of cartographic reproduction and the preparation of maps for printing	T1A_W03
GiK_W33	knows the characteristics of conceptual models of topographic data, knows the principles of performing field works in the process of constructing and updating topographic databases and data acquisition for the topographic objects database	T1A_W03
GiK_W34	has the knowledge of close-range photogrammetry, concerning the existing sensors and their calibration, terratriangulation, 3D models and visualization, knows the principles of data acquisition with the application of laser scanning, has the knowledge of block alignment (scan orientation)	T1A_W03, T1A_W06
GiK_35	has the knowledge of the fundamentals of digital image processing, knows the fundamentals of digital processing and analysis of aerial and satellite images, has a deepened knowledge of the applications of remote sensing, knows the available photographic materials as well as the kinds of satellite data and their potential application	T1A_W03, T1A_W05, T1A_W07

SKILLS

GiK_U01	knows how to search for information in various reference sources, including Internet resources, can evaluate the merits of the information and use it in practice	T1A_U01
GiK_U02	can expertly use computer software in surveying, has the capacity to develop and modify software applicable in geodetic information technology	T1A_U01 T1A_U02 T1A_U03 T1A_U05 T1A_U07
GiK_U03	has the ability of self-study and individual preparation for seminars, lab classes, tests and exams	T1A_U01 T1A_U05
GiK_U04	can prepare and present an engineering problem related to the field of surveying and cartography in the Polish and a foreign language.	T1A_U01 T1A_U06
GiK_U05	is capable of using different techniques of communication in the professional environment and other environments	T1A_U02
GiK_U06	is able to use registry database in geodetic work, planning process and real estate management	T1A_U02 T1A_U05 T1A_U07 T1A_U16



GiK_U07	has the capacity to prepare surveying technical specification and geodetic engineering project	T1A_U03 T1A_U06,
GiK_U08	has substantive and methodical knowledge and skills necessary to deliver a presentation connected with the field of surveying and cartography and other related areas	T1A_U04 T1A_U06
GiK_U09	can select the methods of cartographic visualization depending on the purpose, can perform an appropriate cartographic visualization has the ability to edit general geographic maps with the application of digital and analogue technology	T1A_U07
GiK_U10	can convert the coordinates between the spherical, spatial and cartographic coordinate systems used in official documents and choose the most appropriate cartographic projection	T1A_U07 T1A_U08
GiK_U11	is able to interpret the contents of remote sensing images, aerial and satellite photographs, can perform thematic analysis of remote sensing data, can use the techniques of digital image processing in digital photogrammetry and remote sensing	T1A_U07 T1A_U08 T1A_U09
GiK_U12	can register real world objects in Land Information System as well as develop and implement procedures in the formal language using software tools	T1A_U07 T1A_U010
GiK_U13	is able to perform basic tasks related to the establishment and updating of real estate cadastre	T1A_U08
GiK_U14	has the capability of planning and carrying out surveys, interpreting the results and drawing conclusions	T1A_U08
GiK_U15	is able to perform a statistical analysis of the data and properly apply statistical methods and models in different areas of surveying and cartography, can perform the adjustment of different types of geodetic control networks	T1A_U08 T1A_U09
GiK_U16	is able to prepare and implement algorithms designed to solve a specific geodetic problem	T1A_U08 T1A_U13
GiK_U17	is capable of performing image-related measurements and doing calculations in order to obtain data for the basic products of photogrammetry, can use photogrammetric techniques and technologies, can conduct photogrammetric engineering surveys	T1A_U08 T1A_U14
GiK_U18	is able to use analytical, simulation, and experimental methods to formulate and solve engineering tasks	T1A_U09
GiK_U19	knows how to combine spatial data from different sources, is able to perform simple spatial analysis in the SIS and to use a geo-portal that meets the requirements of European spatial information infrastructure, can perform 3D model elaboration, can acquire and update data for topographic objects databases (ability to edit data)	T1A_U09 T1A_U10



GiK_U20	is professionally qualified to perform surveying works for businesses and institutions	T1A_U11
GiK_U21	has theoretical knowledge and practical training in creative solving of standard and non-standard engineering tasks and organization-related problems	T1A_U1 T1A_U15
GiK_U22	is capable of identifying and specifying measures designed to update the real estate cadastre	T1A_U14
GiK_U23	has the capacity to make geodetic preparations of projects and set out objects by different surveying techniques	T1A_U1 T1A_U16
GiK_U24	can - in accordance with the standards and after a preliminary economic analysis – prepare and complete the documentation related to the implementation of geodetic preparations	T1A_U16
GiK_U25	has the ability to perform construction-stage and as-built surveys as part of investment surveying services	T1A_U16
GiK_U26	can make use of and interpret technical documentation of buildings and structures	T1A_U16
GiK_27	can perform relative gravimetric surveys, calculate gravimetric reductions and anomalies, can calculate systemic levelling corrections and tidal corrections for geodetic surveys	T1A_U16
GiK_28	can perform GNSS surveys for the purpose of establishing satellite networks and use the services of GNSS survey support systems, can perform satellite levelling in small areas	T1A_U16
GiK_29	can do basic calculations on the ellipsoid of revolution (spheroid), can perform transformations between systems of coordinates , calculate coordinates and reductions in cartographic projections	T1A_U07, T1A_U08
GiK_30	can check the correctness of surveying instruments operation	T1A_U03, T1A_U06
GiK_31	can perform the generalization of topographic objects database and the NTM base for the purpose of standard cartographic documents	T1 A_U08
GiK_32	can compare and evaluate the quality of cartographic documents and select an appropriate cartographic product or its components as reference for thematic analysis	T1 A_U08
GiK_33	can compare and evaluate the quality of photogrammetric and remote sensing documents with regard to the type of document	T1 A_U08



SOCIAL SKILLS		
GiK_K01	understands the need of continuous education and knows the measures to pursue it (second and third-cycle studies, post-graduate studies), is aware of the importance of professional, social and personal development	T1A_K01
GiK_K02	is aware of the need for self-improvement and professional conduct that is responsible and consistent with the principles of professional ethics	T1A_K01 T1A_K02 T1A_K05 T1A_K07
GiK_K03	realizes the extra-technical effect of various technologies, especially their impact on the environment, and the responsibility for the results	T1A_K02
GiK_K04	respects the principles of intellectual property protection and patent law	T1A_K02
GiK_K05	understands and is aware of the importance of extra-technical aspects and effects of geodetic activity, including its impact on the economy, realizes the significance of the decisions related to this issue	T1A_K02
GiK_K06	is aware of the responsibility for the team tasks performance	T1A_K03
GiK_K07	is capable of cooperation and group working while implementing various engineering projects	T1A_K03
GiK_K08	has the capability of identifying appropriately the priorities aimed at conducting a task set by themselves or others	T1A_K04
GiK_K09	can act in an entrepreneurial manner, since studying Surveying and Cartography provides students with the opportunity to develop optimum organizational skills	T1A_K06
GiK_K10	can pass and explain the acquired knowledge to persons and institutions outside their own professional environment in order to facilitate the circulation of information and decision taking	T1A_K07
GiK_K11	has competences in the organization of topographic field works, has competences in forming and managing map editing teams	T1A_K03