



VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

**FIELD OF STUDIES - GENERAL ENGINEERING
STUDY PROGRAM**

GEODESY AND CARTOGRAPHY
(621H14003)

SELF-ASSESSMENT REPORT

2015

Vilnius Gediminas Technical
University Rector

.....
(signature)

prof. dr. Alfonsas Daniūnas

Self-assessment work group
leader

.....
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assoc.prof. dr. Jūratė Sužiedelytė Visockienė

Vilnius, 2015

Study programme key facts

Title of study programme	<i>Geodesy and cartography</i>
State code	621H14003
Type of studies	University studies
Cycle of study	Second
Mode of studies (years)	Full time (4)
Scope of study programme (credits)	120
Qualification degree and (or) professional qualification awarded	Master of Measurement Engineering
Study programme registration date	2010-07-01

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Content

1. INTRODUCTION	4
1.1. University structure - subdivisions, management and interrelation, relevance and shortages of the structure	4
1.2. Composition of the self-assessment work group and scheduled tasks.....	6
1.3. Description of the previous assessment	6
2. PROGRAMME OBJECTIVES AND LEARNING OUTCOMES	6
2.1. Programme objectives and study results.....	6
2.2. Analysis of the study programme goals and learning outcomes.....	7
3. STRUCTURE OF THE STUDY PROGRAMME	11
3.1. Study plan	11
3.2. Logic of the study programme construction	12
3.3. Requirements for the students' final theses	12
4. STAFF	14
4.1. Structure of the teaching staff and turnover.....	14
4.2. Structure of the academic staff by age groups	15
4.3. Ratio of the amounts of teachers and students.....	15
4.4. Participation of the teaching staff in scientific conferences, traineeships, workshops, and academic exchange	16
4.5. Involvement of the teaching staff in research and project activities.....	16
4.6. Ways to improve the qualifications (academic, research, practical) of the teaching staff.....	16
4.7. Workload of the staff	17
5. MATERIAL RESOURCES	17
5.1. Material basis.....	17
5.2. Methodical resources	18
5.3. Renewal of the Material Resources	20
6. THE STUDY PROCESS AND ITS ASSESSMENT.....	20
6.1. Selection of students	20
6.2. The study process	22
6.3. Data on the students' involvement in research, artistic and applied research activities, volume and form.....	23
6.4. Assessment system of the students' achievements	25
6.5. Graduate employment.....	27
7. MANAGEMENT OF THE STUDY PROGRAMME	28
7.1. Structure of the management of the study programme and decision-making.....	28
7.2. Internal assurance of the study quality	29
7.3. Summary of the last evaluation report	30
7.4. Documents regulating management of the programme	31
7.5. Data regarding information collection and analysis	31
7.6. The participation of the social partners in the programme evaluation and improvement processes	32
7.7. The involvement of the social partners into the programme evaluation and improvement processes and their impact on the programme improvement.....	32
7.8. Ways of disseminating the information regarding the programme improvements to the University community and the social partners and their effectiveness.....	32
7.9. Opinion of teachers, students, graduates and employers regarding implementation of the programme.....	33
7.10. The sources of information regarding quality of studies	33
7.11. The most important changes which led to the results of the last external evaluation.....	33
8. ANNEXES	
8.1. Course descriptors	
8.2. List of teachers	
8.3. Descriptions of teachers' activities	
8.4. List of final theses (for the last 2 years)	
8.5. Recommendations of the previous assessment	
9. PREPARATION OF THE REPORT	
9.1. Review of self-assessment results at the Faculty Study Committee and the Faculty Council	
9.2. Preparation of the final version of self-assessment report and handover to CQAHE	

1. INTRODUCTION

1.1. University structure - subdivisions, management and interrelation, relevance and shortages of the structure

1. Vilnius Gediminas Technical University (VGTU) is a state institution of higher education. The university is a public legal entity, which acts as a public institution, established by Seimas of the Republic of Lithuania. VGTU is one of the largest institutions of higher education in Lithuania and strives to become the leader in technology and engineering studies in the Baltic States. VGTU aims to educate highly trained, creative and socially active professionals, who would be able to successfully enter the Lithuanian and foreign labour and research markets; carry out research at the highest competence research divisions; attract well-known scientists, create innovations for society and business based on research; and become the leader among the Baltic States universities in the field of sustainable engineering, transport, sustainable environment, information technologies and communication science; promote cohesive development of the country and region; and develop the innovative society.
2. VGTU consists of faculties, departments, scientific and study laboratories, scientific and academic institutes and centres, the library, the publishing house, administration and other subdivisions. On the Rector's recommendation, the structure of the university is approved and amended by the University Council. The competences and objectives of the subdivisions of the university are determined by the regulations of the subdivisions.
3. The most important divisions of studies and research are the departments. The departments can independently solve any research and study-related tasks set by the university and the faculty. Departments may have laboratories and other subdivisions. Departments are headed by the heads of the departments. Departments may be headed by scientists working in relevant fields of science, if their qualifications meet the established requirements. The candidate for the position of the head is put forward by the department, then the department-proposed candidate or some other candidate is proposed to the Rector by the Dean of the Faculty, and the Rector proposes one or another candidate for the Senate's approval.
4. The subdivision that organizes research and studies is the faculty and the academic institute or centre acting in the capacity of a faculty. The faculty is headed by the Dean, supported by the Dean's Office, head of the council of the faculty, vice-deans and heads of the departments. The tenure of the dean and the head of the department is 5 years. The collegial management body of the faculty is its council. The Council is elected for 5 years by the faculty's academic assembly. The council of the faculty is a decision-making body that organizes the process of studies in the faculty, regulates the faculty's research, economic and financial activities, makes decisions regarding research and study on the faculty level, proposes a candidate for the dean's position to the Rector, analyses the faculty's annual financial report presented by the Dean, submits the names of candidates for the pedagogical and honour titles to the Senate.
5. The university has collegial management bodies - the Council and the University Senate. The vision and mission of the university is approved by the Council, as well as the strategic plan of activities of the university, submitted by the Rector, and the principles of selection and assessment of the employees. Moreover, the Council elects, appoints and dismisses the Rector, and takes care about finding the support for the university. The Council also controls and approves the university's budget, finances and the strategic plan of activities (development). The Senate is a collegial management body for the university's academic affairs. The Senate is chaired by the chairperson and the deputy-chairperson. 5 committees work under the Senate: the Research Committee, the Studies Committee, the Students Committee, the Development and Quality Committee, Law and Ethics Committee. Important issues are usually discussed not only at the Rectorate, but also at the Council, Senate and at the Councils of the Faculties, or at the Studies Committees of the university and the faculties. The Rector is in charge of the University's activities and performance results. The Rector's orders and instructions are mandatory for all the employees and students of the University. The Rector delegates some of his functions to the vice-rectors and the chancellor. Upon the Rector's recommendation, the number and functions of the vice-rectors are approved by the University Council. General issues of the studies at the University are discussed in the Rectorate, which is headed by the Rector. The Rectorate consists of the vice-rectors, deans of the faculties and some other representatives of the departments. Study issues are periodically discussed with the heads of the departments. Key issues may also be discussed at the University Council, the Senate and the councils of the faculties, or at the Studies Committees of the university and

the faculties. Such structure and interrelations are sufficient and appropriate to implement the study programme. VGTU structure is presented in the Figure 1.1.

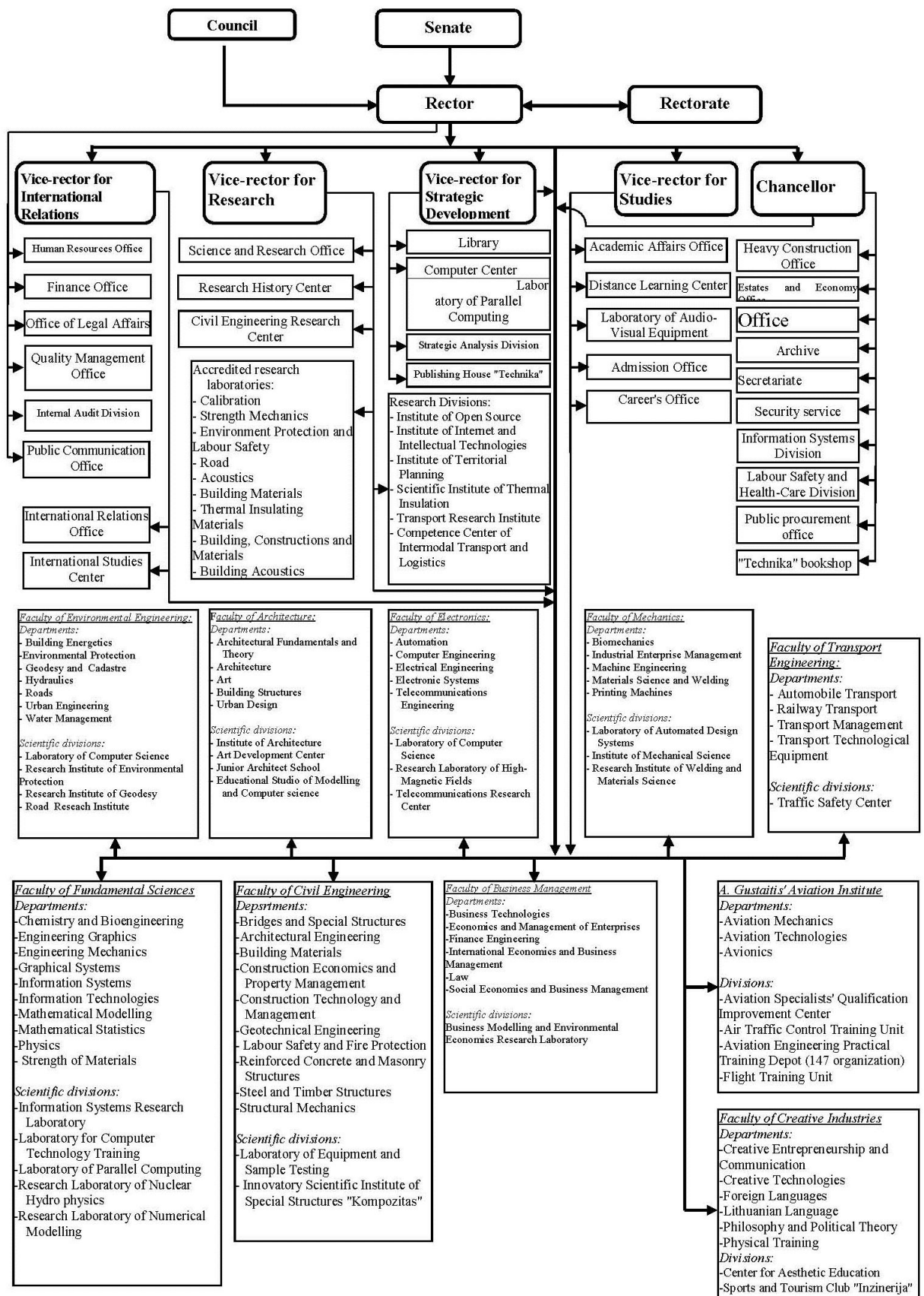


Fig. 1.1. VGTU structure

1.2. Composition of the self-assessment work group and scheduled tasks

6. Work group for the self-assessment of the second cycle of *Geodesy and Cartography* study programme was created and approved by the VGTU vice-rector in charge of studies on September 14, 2015. The leader of the self-assessment work group was the Head of the Department of Geodesy and Cadastre (GKK) assoc. prof. dr. Jūratė Sužiedelytė Visockienė. The scheduled tasks of the group, persons responsible for them and the deadlines are presented in the timetable (Table 1.1.).

Table 1.1. The schedule for preparation of the *Geodesy and Cartography* study programme (state code 612H14003) self-assessment report

Scheduled chapter	Executive	Deadline
1. Introduction	Jūratė Sužiedelytė Visockienė	2015-09-30
2. Programme objectives and learning outcomes	Arminas Stanionis	2015-10-23
3. Structure of the study programme	Rūta Puzienė	2015-10-15
4. Staff	Rosita Birvydienė	2015-11-06
5. Material resources	Eimuntas Paršeliūnas	2015-10-16
6. The study process and its assessment	Jūratė Sužiedelytė Visockienė	2015-09-30
7. Management of the study programme	Vladislovas Česlovas Aksamitauskas	2015-11-06
8. Annexes	Rūta Puzienė, Rosita Birvydienė	2015-11-06
9. Preparation of the report	Jūratė Sužiedelytė Visockienė	2015-11-27

1.3. Description of the previous assessment

7. The previous external assessment of the *Geodesy and Cartography* study programme was performed in May 2008. The assessment was conducted by an international expert group assembled by the Centre for Quality Assessment in Higher Education (CQAHE). The group was chaired by prof. dr. Erik Stubkjaer (Denmark) and consisted of prof. dr. Marien Molenaar, prof. dr. Mercedes Farjas (Spain), dr. Andrius Jurelionis (Lithuania), Vytutas Urbonavičius (Lithuania). The assessed programme was accredited by the decree of the director of Centre for Quality Assessment in Higher Education No. SV6-71 on November 26, 2013. The study programme was accredited for three years, until August 31, 2016. Conclusions and recommendations from the prior assessment are presented in *Chapter 8 Annex 8.5*.

2. PROGRAMME OBJECTIVES AND LEARNING OUTCOMES

2.1. Programme objectives and study results

8. The aim of the *Geodesy and Cartography* study programme is training of specialists with up-to-date knowledge in the field of *Geodesy and Cartography*, geodetic networks, in creation and development of the geographical and cadastre information systems, the ability to understand and analyse different processes, interactions of various kind of knowledge, raise problematic issues and seek decisions through the acquired knowledge-based research, optimize acquisition of geodetic and cartographic information, model analysed processes in Geoinformation Systems, have skill in scientific analysis and research necessary to maintain and improve competences for work in research institutions or doctoral studies.
9. Upon completion of the Master's Degree studies at the university, *Geodesy and Cartography* study program, VII level qualification, approved by the resolution No. 535 of the Government of the Republic of Lithuania in May 4, 2010 is provided.
10. With regards to the present situation and development trends in *Geodesy and Cartography*, as well as to the demands of the Lithuanian science and economy, the study programme includes two specializations: Geodetic Networks and Geographical Information Systems. This enables quick reacting to the future needs of the professionals and planning of training in the required specializations.
11. By implementing the study programme, results of the studies are divided into five groups (see Chapter 2 Annex 2.2.).
12. Relation matrix of the study programme results and subjects is presented in Chapter 2 Annex 2.1. Links between the study programme results and subjects are presented in Chapter 2 Annex 2.2. Relations between the learning outcomes and results of the subjects' studies and methods of assessing the students' achievements and study results are indicated in the description of every subject. Descriptions of the study subjects are given in Annex 8.1.

Sources publishing the goals of the study programme and the intended study results

13. The summarised version of the study programme goals and study results is written in the diploma supplement for each graduate.
14. The detailed description of the goals and study results of the *Geodesy and Cartography* study programme is presented on the VGTU website <<https://medeine.vgtu.lt/programos/programa.jsp?fak=3&prog=109&sid=F&rus=U>> and on the website for the applicants <<http://www.vgtu.lt/studies/-study-programmes-full-range-/53777?lang=2>>.
15. On the GKK website, the subjects of study and their descriptions can be found: <<http://ap.vgtu.lt/fakultetai/padaliniai/geodezijos-ir-kadaastro-katedra/studijos/51616#58036>>.
16. Extended versions of the study subjects with the study results are uploaded by the teachers on the university MOODLE system <http://moodle.vgtu.lt/auth/saml/home_login.php>, and become accessible to every registered student.
17. Furthermore, websites frequently visited by high school pupils, students and social partners have links to the VGTU website, thus the goals and the study results can be easily accessed. E.g., they can be obtained via Open Information and Counselling System (AIKOS): <http://www.aikos.smm.lt/studijuoti/layouts/15/Asw.Aikos.RegisterSearch/ObjectFormResult.aspx?o=LO&f=MokGal&key=7075_2015&pt=of&ctx_sr=8Gzz1EUgIeKfy0cWNVrrVdABKo0%3d>, and the website of the Association of Lithuanian Higher Education Institutions (LAMA BPO) <<http://www.lamabpo.lt/studiju-programos#top>>, website of Spatial Information Portal of Lithuania <<http://www.geoportal.lt/geoportal/web/mokslo-populiarinimas>>, and the Facebook profile of the Department of Geodesy and Cadastre <<https://www.facebook.com/pages/Geodezijos-ir-kadaastro-katedra-VGTU/422320964631695>>.

The frequency of reviewing the study results and involvement of the social partners

18. The reviewing of the study results is supervised by the Committee of the *Geodesy and Cartography* study programme (the review is performed annually according to the VGTU study programmes committee' regulations approved by the VGTU Senate on February 19, 2013, resolution No. 62-2.2.) and the Study Committee of the Faculty of Environmental Engineering. Social partners and students are also involved in the reviewing process as members of both committees. For feedback, cooperation with the graduates, employers and associations is developed, contacts with the Lithuanian Young Geodesists' club are maintained, student surveys are carried out as well. Based on such cooperation, the needs of the involved parties are determined and taken into account when reviewing the outcomes of the programme. Teaching courses are reviewed at the GKK meetings, during which motivated decisions are made along with suggestions for the required improvements. Review of the individual course contents is done annually by the responsible teachers and improved if necessary. Before starting to deliver the course, teachers present students with the updated detailed course descriptions.

2.2. Analysis of the study programme goals and learning outcomes.

Study goals in relation to the legal acts and other documents

19. The study programme learning outcomes for 2014 of 4 groups (knowledge, understanding, general abilities, special abilities) were updated and grouped into 5 groups (knowledge and its application, research abilities, special abilities, social abilities and personal abilities) by adapting them to the study descriptor, approved in November 21, 2011 by the Decree of the Minister of Education and Science of the Republic of Lithuania No. V-2212 following EUR-ACE framework standards for the accreditation of engineering programs.
20. The following legal acts were taken into account while developing the *Geodesy and Cartography* study programme: the Law on Research and Studies of the Republic of Lithuania of April 30, 2009, Nr. XI-242, Vilnius; the Statute of the Vilnius Gediminas Technical University; the Seimas decree Nr. XI-2130 of 20/06/2012; Decree of the Minister of Education and Science of the Republic of Lithuania Nr. V-2212 "On Approval on Study Cycle Descriptors" of November 21, 2011; Decree of the Government of the Republic of Lithuania: "On Approval of the Descriptor of the Lithuanian Qualification Framework" Nr. 535 of May 4, 2010; Decree of the Minister of Education and Science of the Republic of Lithuania Nr. V-826: "On Approval of Description of the Master Degree" of June 3, 2010 and its amendments; Decree of the Minister of Education and Science of the Republic of Lithuania Nr. ISAK-1026: "On Approval of Descriptions of the Full-time and Part-time (Extended) Modes of Studies" of May 15, 2009; Decree of the Minister of Education and Science of the Republic of Lithuania Nr. ISAK-1652 of

July 24, 2009 “On Approval of External Assessment and Accreditation Procedures of Study Programmes” and its amendments; Decree of the Director of Centre for Quality Assessment in Higher Education Nr. 1-01-162 of December 20, 2010: “On Approval of Methods for Assessment of the Implemented Study Programmes” and its amendments; Guidelines for Structure of the Second Cycle Study Programmes, approved by the decree of the VGTU Senate Nr. 57-1.9 of May 29, 2012.

21. While formulating the goals and learning outcomes for the *Geodesy and Cartography* study programme, the following documents were taken into account: EUR-ACE framework general standards for the accreditation of engineering programs, Dublin Descriptors short cycle, first, second and third stage qualification granting, European Qualifications Framework for the Lifelong Learning, Canadian Board of Examiners for Professional Surveyors (CBEPS), and ECTS user’s guide requirements. Since legal acts of the Republic of Lithuania are adjusted to the international legal acts, it is possible to state that the Geodesy and Cartography second cycle study programme is suitable for preparation of specialists with qualification of the VII level.
22. Knowledge provided by the *Geodesy and Cartography* study programme and its application, research abilities, special abilities, social abilities and personal abilities cover requirements for specialists with qualification of the VII level formulated by the international legal acts.
23. Since legal acts of the Republic of Lithuania are adjusted to the European international legal acts, and standard documents regulating the formation of the VGTU study programmes are adjusted to the Lithuanian legal acts, it can be stated that that the *Geodesy and Cartography* second cycle university study programme corresponds to the requirements of the European Union and the Republic of Lithuania valid at the time of preparation of the programme.
24. The study programme has to be reviewed and improved taking into account the requirements of the most relevant legal act, issued after the programme creation, i.e. the decree of the Minister of Education and Science of the Republic of Lithuania No. V-964 of September 10, 2015: “On Approval of the Descriptor of the Group of Engineering Studies Field” <<https://www.etar.lt/portal/lt/legalAct/8300a570584a11e5825682aa0fc6b8d5>>. Descriptor of the group of studies belonging to the engineering field was prepared following the EUR-ACE framework standards for the accreditation of the engineering programmes. 6 learning outcome groups are listed in the descriptor (Obtaining knowledge and abilities; Ability to perform engineering analysis; Knowledge and skills necessary for projecting activities according to the study programme in the field engineering to be performed; Ability to accomplish fundamental and applied research; Ability of practical work in solution of the engineering tasks; Personal and social abilities), which correspond to 6 learning outcome groups listed in the EUR-ACE framework standards for the accreditation of engineering programs: Knowledge and understanding, Engineering Analysis, Engineering Design, Investigations, Engineering Practice, Transferable Skills). Project of the improvement of the “*Geodesy and Cartography*” study programme is under preparation at the moment.
25. New edition of the EUR-ACE framework standards for accreditation of engineering programmes established 8 learning outcome groups (*Knowledge and understanding, Engineering Analysis, Engineering Design, Investigations, Engineering Practice, Making Judgements Skills, Communication and Team-working Skills, Lifelong Learning Skills*) <<http://www.enace.eu/eur-ace-system/eur-ace-framework-standards/standards-and-guidelines-for-accreditation-of-engineering-programmes/>>, therefore the related legal acts of the Republic of Lithuania should be revised and updated. Then standard documents regulating the VGTU study programme will be modified and the study programme improvement started.

International professional activities proving relevance of the intended learning outcomes

26. When formulating goals and learning outcomes of the *Geodesy and Cartography* study programme, the goals and intended results of the international organizations were considered: International Association of Geodesy (IAG); International Federation of Surveyors (FIG); International Society for Photogrammetry and Remote Sensing (ISPRS); International Cartographic Association (ICA); Open Geospatial Consortium (OGC).
27. When formulating goals and learning outcomes of the *Geodesy and Cartography* study programme, the goals and intended results of the European organizations were considered: Association of Geographic Information Laboratories for Europe (AGILE); European Spatial Data Research Network (EuroSDR); European Land Information Service (EULIS); European Land Registry Association (ELRA). ELRA projects CROBECO (cross-border electronic conveyancing) and ELRN (European Land Registry

Network) aim to use information and communication technologies effectively and cooperate on issues of real estate register. The main objective of the Permanent Committee on Cadastre (PCC) is creation of adequate space of coordination within the European Union and Member States with different cadastral information systems and meeting consumer needs. EU Permanent Committee on Cadastre (PCC), association “EuroGeographics”, European Land Registry Association (ELRA), Council of European Geodetic Surveyors (CLGE) and European Land Information Service (EULIS) have developed a unified vision, which includes creation of a common European real estate information service. The aim is integration of data on the real estate and making such data accessible to all European citizens and business regardless of their location. The aim of the European Parliament and Council directives (INSPIRE) is reducing obstacles between public authorities in sharing data, especially in the environmental field, and providing larger and better geographical data for the Community policy-making and its implementation by the Member States at all levels. It helps creating and making functional the legal framework for geographic information infrastructure in Europe for the purpose of formulating, implementing, monitoring and evaluating Community policies at all levels and providing public information. United Nations Economic Commission for Europe (UNECE) seeks to promote the economic integration in the European region as well as the coordination of the Member States' cooperation within the region and beyond in such areas as energy, environmental protection, technology development and others.

28. GKK teachers collaborate and make research at the VGTU Institute of Geodesy. Many teachers took part in the international science programmes that the VGTU Institute of Geodesy was involved in: <<http://ap.vgtu.lt/fakultetai/padaliniai/geodezijos-institutas/mokslas/51829#tab-tarptautine-veikla>>(Chapter 2. Annex 2.3.). This enables them to be acquainted with the activities of the international and European organizations not only in theory, but also in practice, and to use the obtained knowledge in planning the study outcomes.
29. Some teachers currently participate in the European project *GEO VET Skills Plus (Leonardo da Vinci)* programme), which has a mission of exchanging the best practices in transferring the novelties of GEO professional teaching in order to correspond to the GEO labour market needs in Europe according to the EU policy <<http://www.vgtu.lt/tarptautiskumas/-tarptautiniai-projektai/tarptautiniai-studiju-projektai/6874>>. We also participate in the project “NORDPLUS Framework Programme”, which is designed for the teaching institutions in the Baltic countries (Lithuania, Latvia, and Estonia), the Nordic countries (Denmark, Iceland, Norway, Sweden, Finland) and autonomous areas of the Nordic countries (Greenland, Faroe Islands and Aaland Islands). The main objectives of the programme include improving the quality of education and research, as well as implementation of innovation. The programme also seeks to promote cooperation between the teaching institutions, with emphasis on the exchange of experience, best practices and the results achieved. The main categories of activities are associated with mobility, project and network activities.
30. Agreement with Riga Technical University for the joint Master’s degree study programme was signed in 2014. According to the agreement, both universities will establish a joint Master degree. The common study programme will be entitled „Innovative Solutions in Geomatics“. The study programme was created by the GKK in collaboration with the Department of Geomatics, Faculty of Civil Engineering, Riga Technical University. When the newly created study programme will be approved by the Lithuanian and Latvian expert institutions, the motivated and highly qualified students graduating from the first cycle university studies can be admitted. Cooperation between the universities of two neighbouring countries creates conditions for preparing specialists familiar with international experience and able to use their knowledge in the international activities.
31. GKK with partners runs the project *Development of a new Master Programme in Geodesy (MPG)*, with purpose of modernizing the higher education in the field of Geoinformation Technologies at Kosovo (University of Pristina) <http://www.fttk.hu/index.php?option=com_content&task=view&id=153&Itemid=1>.
32. GKK cooperates internationally with the following higher schools <<http://ap.vgtu.lt/fakultetai/apie-fakulteta/remejai-ir-partneriai/52839?lang=1>>: Ostrava Technical University (VŠB - TU Ostrava), Czech Republic; Polytechnic University of Valencia (Universidad Politécnica de Valencia), Spain; Koszalin University of Technology (Politechnika Koszalinaska), Poland; Saxion University of Applied Sciences, The Netherlands; Gjøvik Engineering College, Norway; Liubliana University (Univerza v Liubliana), Slovenia; Mikkeli University of Applied Sciences (Mikkelin Ammattikorkeakoulu), Finland; University of Bonn (Rheinische Friedrich-Wilhelms-Universität Bonn), Germany; Karlsruhe University of Applied Sciences (Hochschule Karlsruhe Technik und Wirtschaft), Germany; Neubrandenburg

University of Applied Sciences (Fachhochschule Neubrandenburg), Germany. This allows coordinating of learning outcomes on the international scale.

33. The expected learning outcomes of the *Geodesy and Cartography* programme meet the requirements for the master qualifications in the general engineering study field in measurement engineering, which are relevant not only in Lithuania, but also globally.

Professional areas, for which the specialists are trained and their relations to the learning outcomes of the study programme

34. Upon acquiring the Master of Measurement Engineering qualification, the graduates can work in the state and private enterprises involved in GIS creation, preparation and management of cadastral information, establish private companies, or continue their education in the third cycle studies.
35. In order to be qualified for the above-mentioned positions the graduates must obtain knowledge and learning outcomes foreseen in the study programme.

The position of the programme among other programmes of the similar area, implemented by other institutions of higher education

36. There are no similar types of university studies in Lithuania in the field of general engineering with *Geodesy and Cartography* study programme of the second cycle studies granting graduates the master degree in measurement engineering.
37. Graduates of first cycle university studies in the field of measurement engineering, obtaining the bachelor's degree are accepted to the *Geodesy and Cartography* programme of second cycle studies. Bachelors of measurement engineering, geography, landscape architecture, land management, forestry and geology can also apply for the second cycle studies in *Geodesy and Cartography* study programme.
38. Graduates of non-university studies from the Vilnius College of Technologies and Design, Kaunas College, Žemaitija College, Klaipėda State College can be admitted to the second cycle study programme *Geodesy and Cartography* after completing university first cycle Geodesy programme extended studies at VGTU (studies for college graduates aiming to obtain university education).

Strengths, weaknesses, and improvements of the study programme goals and intended learning outcomes

Strengths	Weaknesses	Improvements
Students start preparing the final theses from the first semester, therefore there is a consistent process of preparation for defence.	Results of those students who choose to work while studying deteriorate.	Students can continue studies with their group even if they do not pass two examinations. Exams can be passed later. The timetable for the second cycle studies is student-friendly for those working while studying.
Part of the lectures is delivered by the social partners, therefore students get practically familiar with the new achievements.	The timetable for lectures by the social partners is not stable; therefore employing representatives of the companies is complicated.	Harmonizing the qualitative and quantitative aspects of the involvement of the social partners in terms of the programme's results.
Similar learning outcomes allowed signing the agreement with Riga Technical University for the joint Master's degree study programme to be established at both universities.	The process of creating the new joint study programme could be faster.	Speeding up communication for cooperation.
Study committee of the Environmental Engineering Faculty, the <i>Geodesy and Cartography</i> study programme committee, teachers at the Department of Geodesy and Cadastre, social partners and students closely cooperate in the process of improving the programme objectives and learning outcomes.	Description of the engineering study areas (planned 6 groups of learning outcomes) was approved only in September 10, 2015 by the decree of the Minister of Education of the Republic of Lithuania No. V-964. The absence of this legislation act hindered dividing the learning outcomes of the study programme into 6 groups.	The project for further improvement of the <i>Geodesy and Cartography</i> study programme is under preparation at the moment.
Study committee of the Environmental Engineering Faculty, the <i>Geodesy and Cartography</i> study programme committee, teachers at the Department of Geodesy and	Currently, the EUR-ACE accreditation standard for the engineering programs declares 8 groups of learning outcomes, but there are no	Revision of the legislation acts of the Republic of Lithuania is required.

Strengths	Weaknesses	Improvements
Cadastre are familiar with the EUR-ACE accreditation of engineering programs standard and have analysed it. Teachers are willing to actively participate in updating of the learning process.	corresponding regulating legal acts of the Republic of Lithuania at the moment.	

3. STRUCTURE OF THE STUDY PROGRAMME

3.1. Study plan

39. The *Geodesy and Cartography* second cycle study programme is a cohesive interrelated unit of mandatory and elective courses, created in accordance with the valid legislation acts of the Republic of Lithuania (see Chapter 2) and Guidelines for Structure of the Second Cycle Study Programmes approved on May 29, 2012 by the Resolution of the VGTU Senate No. 57-1.9.
40. The programme is part of the Technological Sciences area General Engineering study field (H100) (Decree of the Minister of Education and Science of the Republic of Lithuania No. V-222 of February 19, 2010, concerning the list of branches comprising the study field).
41. Duration of the studies – 2 years. Intensity of the studies – 60 credits per year. There are two specializations of the study programme: *Geodetic Networks (GT)* and *Geographic Information Systems (GIS)*. For the students who plan to take PhD studies, individual study plans can be created with different subjects of up to 15 credits (not planned in selected study programme and students have to study independently).
42. The structure of the programme corresponds to the study programme defined by the decree of the Minister of Education and Science of the Republic of Lithuania No. V-826 “On Approval of Description of Requirements for Master’s Degree Study Programmes” of June 3, 2010 and its amendments. Graduates of the programme are granted master qualification degree. All necessary courses are planned in the study programme with overall scope and distribution following the General Principles of Second Cycle Studies Curriculum Development (Resolution No. 57-1.9 of May 29, 2012). Conformity of the programme with the legal acts is presented in the Table 3.1.

Table 3.1. Conformity of the *Geodesy and Cartography* study programme with the legal acts

Scope of the study programme plan	ECTS credits obtained within the study programme	ECTS credits required by the legal acts
Field of study courses	81 credits	At least 60 credits
Common courses of specialization	49%	At least 45%
General course set by the University	4 credits	4 credits
Elective courses	4 credits	3-6 credits
Final thesis	39 credits	At least 30 credits
Number of credits per year	60 credits	Up to 60 credits
Teachers of the courses delivered in the programme must hold a scientific degree	100%	At least 80% or 60%, when study programme is practice-oriented
Teachers holding professor’s pedagogical title have to deliver courses in the field of studies	36%	At least 20%
Overall scope of the programme	120 credits	90-120 credits
Contact hours	Full time studies 25 %	At least 10 %

43. The courses belonging to the field of study constitute 67,5 % of the overall programme scope (64,2% mandatory and 3,3% elective courses). The programme includes one mandatory general university course – Scientific Research and Innovations (4 credits). 39 credits are for preparing and defending of the Master’s Thesis (BMD). This module consists of four courses (one per semester). General subjects of two specializations make about 49% of the programme content (required at least 45 %).
44. The study time in the *Geodesy and Cartography* second cycle study programme consists of classroom hours (lectures, laboratory works, and practical works), consultations, and individual work. Classroom hours constitute 19%, consultations – 6%, individual work – 75% of the study time.
45. The smallest credit number for the study programme course is 3 credits, while minimum credit number increment is 1 credit. Plan for the full time study programme is presented in Chapter 3. Annex 3.1. If needed, individual study programmes can be created.

Descriptions of the study subjects / modules

46. *Geodesy and Cartography* study programme comprises courses distributed continuously and logically during semesters. The detailed description of the study subjects is presented on the study subjects (modules) cards. Descriptions of the study subjects (modules) are presented in Annex 8.1, and match VGTU course (module) (SD (M)) card form for the first and second cycle studies and integrated studies (approved by decree No. 766 of the VGTU Rector on August 6, 2015). Basic course information is given at the top of the study card: title, study cycle, study programme, code, number of credits, clearing-off form, distribution of hours according to the study forms and methods, study subject annotation, goal, assessment criteria for the student's achievements, and recommended literature. Further, the list of individual works (home-works, course projects, course works, and practices), laboratory works, and topics of lectures with hours provided to them is given. Topics of the subjects are comprehensive and correspond to the relevant issues and technological novelties; they are also based on the research results and recent publications by the teaching staff.
47. At the end of the study subject card, the ties to learning outcomes of the second cycle of *Geodesy and Cartography* study programme and results of the study subjects as well as assessment methods for the students' achievements are given.

Ties between the programme learning outcomes, course learning outcomes and study methods

48. Taking into account the Decree of the Minister of Education and Science of the Republic of Lithuania of November 27, 2011 "On Approval on Study Cycle Descriptors" and comments from the external experts, the learning outcomes of the *Geodesy and Cartography* study programme were updated. Conformity of the *Geodesy and Cartography* programme learning outcome with the Decree of the Minister of Education and Science of the Republic of Lithuania "On Approval on Study Cycle Descriptors" is presented in Chapter 3. Annex 3.2.
49. After updating the learning outcomes of the programme, the ties between the programme subjects and study learning outcomes were modified. The ties are presented in Chapter 3. Annex 3.3.

3.2. Logic of the study programme construction

50. The *Geodesy and Cartography* study programme is a cohesive entity of subjects. The study process starts with the compulsory general subject set by the university, namely, the Scientific Research and Innovation, and subjects of the relevant field, which are placed in succession from the first till the third semester. At the end of each semester, the student presents an account on the part of the BMD module, which is evaluated with a mark. An elective course is scheduled for the third semester in order to allow students more time to decide on the subject that would be most useful for the preparation of the final work.
51. Course units are distributed throughout semesters following logical principles. The study programme is designed in a way that learning outcomes of different subjects (knowledge and abilities) can be applied in upcoming courses. Courses, mandatory prior to taking up a particular course unit, are indicated in a course's module card.
52. The duration and distribution of courses in semesters is regulated by the Guidelines for Second Cycle Study Programmes Structure, approved by a decree of the VGTU Senate No. 57-1.9 of May 29, 2012, thus the programme was formulated in conformity with the requirements laid out in the document. The current programme matches structure for full-time studies, when the scope of the programme is 120 credits (Chapter 3. Annex 3.4.).

3.3. Requirements for the students' final theses

53. Master Degree concludes with preparation and defence of BMD. The BMD is an original work, independently performed by the student, in which broader and more detailed knowledge in the relevant study field than that acquired during the first cycle studies is demonstrated. BMD has to be based on the independent scientific or applied research, application of knowledge, or has to be prepared as a project, which should disclose skills that are in compliance with the study programme objectives. In their final thesis, students should demonstrate knowledge, a level of comprehension, the ability to analyze the chosen topic, to evaluate the previous work in the same direction (field), carried out by others, to independently study and carry out research of the relevant direction (field), to describe the carried out research, to clearly and reasonably formulate the research conclusions in compliance with the requirements approved by the university.

54. In the BMD, the analyzed problematics has to be clearly presented, the goals and tasks of the work clearly and adequately defined, the possibilities of applying the achieved results in practice as well as other aspects related to practical use of the topic in question discussed. Detailed survey of the scientific, technical, legal and normative basis related to solving of the problem in question has to be performed. The data collected, as well as experiments performed by the magister have to be precise, concrete and original. The supplied analysis of the data and experimental research has to be detailed, performed by using modern means, and related to the topic of the work. The final work has to comprise the fully completed theoretical and practical parts; the detailed description of the work in compliance with formal requirements for the final theses has to be presented, the novelty and relevance of the work as well as its theoretical and practical value have to be elucidated.
55. The preparation of the BMD starts in the first semester and is completed in the last one with the public defence of the work at the commission for awarding the qualification degrees (further – LSK). The scientific advisor is appointed for each magister student. According to the study semester, requirements for the final work differ. At the end of the first to the third semesters, reports on the preparation of the BMD are presented, according to which the results achieved by the student in the course of the semester are evaluated with a relevant mark. At the end of the fourth semester, reviews of the final works are organized by the department, following which the teachers comment on the final theses in preparation.
56. BMD titles and supervisors are approved by the decree of the Dean before the date stated in the study timetable. Lists of students including their BMD titles and names of the supervisors are entered into the final theses database in the study subsystem of the University Information System by the manager of the department, after coordination with the head of the department.
57. In the course of their studies, magister students have to prepare a research paper to be presented at a scientific conference or a seminar. The participation at the conference or seminar is certified with a publication or a conference (seminar) report, which has to be submitted as an annex of the final work.
58. The final theses defence commission (BMDVK) consists of 5–7 competent specialists in the relevant study field (direction), i.e. researchers, professionals, and representatives of the social partners. At least one member of the commission (desirably, the chairperson) should be a representative from another research and study institution than the one that the magister studies took place at. The chairperson of the commission is required to have a scientific and / or academic degree. The scientific advisor of the final work has also to be a member of the commission (see The Guidelines for the Second Cycle Study Programmes Structure, approved by a decree of the VGTU Senate 2012-06-29 No. 57-1.9).
59. BMDVK composition is approved by the Rector’s decree on BMDVK. Project of the decree is prepared by the faculty administrator in coordination with the Dean. The project should be presented to the Study Directorate no later than 3 weeks before the beginning of the final theses defence. No later than 3 weeks before the final theses defence and/or beginning of the final examinations, the departments deliver to the Study Directorate the timetables of the BMD defence, final examinations and diploma award time schedules. Results of the BMD defence and final examinations are entered into the UIS assessment database no later than 1 day after the BMD defence.
60. The scientific advisor and two reviewers evaluate the BMD with a mark. The deadlines for the BMD submissions should be set so that no less than a week is left for reviewing. The department appoints two reviewers for each work; therefore the magister students have to submit two signed copies of the work as well as an electronic file. The reviewers evaluate the work and complete the review forms, entering their conclusions regarding the possibility of presenting the work to the defence at the commission and the suggested mark. The scientific advisor also presents his / her evaluation and mark on a separate form. If the evaluation by the advisor is negative, the work is considered not ready for the defence and is not even presented to the reviewers. If one of the two reviews is negative, the head of the department appoints a third reviewer, who decides on the readiness of the work for the defence.
61. During the BMD defence procedure, the student is required to demonstrate his / her ability to present conclusions of the work to the audience in clear and understandable way, to substantiate the conclusions with the accumulated data and the independently achieved results. The work is presented to the public defence commission, and then reviewers give their comments and ask questions. Subsequently, also other members of the commission and the audience are free to ask questions. Minutes are taken during the defence procedure. Finally, with only the members of the commission remaining in the room, each member of the commission suggests evaluations to all the defended works. The final mark is computed as the average of the evaluations by the commission members. The marks by the advisor and the reviewers, as well as evaluations of the separate parts of the final work (the interim reports) are not

taken into account when computing the final mark; these are nevertheless presented to the members of the commission as additional information.

62. The defence results for the students defending their theses at a foreign university are recognized on the basis of the Rector's Decree No. 962 signed on October 31, 2013 "On the Approval of Rules of Recognition of Students' Study and (or) Practice in the Foreign University under the Lifelong Learning Programme (LLP) / Erasmus Programme Results".
63. Prior to the defence of the theses, students have to complete abstracts in Lithuanian and English for the UIS Final Theses subsystem, which is available at: <<https://medeine.vgtu.lt/studentams/login.jsp>>. Abstracts have to be included in the subsystem at least one week before the defence. Abstracts printed out from the UIS have to be included into the explanatory notes of the thesis, which are presented to the Master's Degree Awarding Commission.
64. Students have to sign a declaration of integrity prior to submitting the thesis for defence, which assures that the final thesis is not plagiarised. The declaration is attached to the thesis. If instances of student dishonesty (plagiarism) are discovered and confirmed by the academic advisor and the head of the department, the dean of the faculty is informed of this in a written form by the head of the department. If such instances are discovered during the defence, the chairperson of the Master's Degree Awarding Commission informs the dean of the faculty in a written form. The dean of the faculty decides on the student's dismissal from the university. The submitted thesis can be defended only once. If a student fails to defend the thesis, a new thesis is prepared and defended the following year.
65. According to the previously described criteria, the BMDVK has evaluated the final theses of the second cycle *Geodesy and Cartography* study programme for the analysed period as follows: excellent-10 – 31% of the theses; very good-9 – 40%; good-8 – 23%; highly satisfactory-7 – 3%, satisfactory-6 – 3%, sufficient-5 – 0 %. Considering the presented assessment results, it can be concluded that the current assessment procedures are transparent and comprehensive, and the level of the theses is high.
66. Titles and supervisors of the final theses for the academic years 2012/2013 and 2013/2014 are presented in Annex 8.4.

Strengths, weaknesses and improvements of the structure of the study programme

67. The study programme *Geodesy and Cartography* is created following the legislation of the Republic of Lithuania, and its structure fully meets the legal requirements. The programme has been created on a sufficiently high level; recommendations from the external experts, students and employers were taken into consideration.

4. STAFF

4.1. Structure of the teaching staff and turnover

68. In the course of the recent three years, classes in the *Geodesy and Cartography* study programme were given by 16 teachers, 5 of which have already ceased working at the VGTU. On average, 11 teachers were delivering classes annually (27 % of them professors, 73 % associate professors). Three young teachers are employed since 2015. Teachers from GKK and the Department of Water Management are working in the programme. There are two professors emeritus in the Department of Geodesy and Cadastre.
69. Over the last three years, spontaneous turnover of the teachers at the department could be observed (3 of 5 teachers who left the department were over 62 years old). The distribution of the teaching positions is shown in Chapter 4. Annex 4.1.
70. During the analysed period number of associate professors decreased. At the end of the 5-year tenure, teachers reaching the retirement age left the university. The number of teachers is diminishing due to the number of the available staff positions, and the latter is related to the number of students entering the study programme.
71. Distribution of the employees by gender is in line with the EU guidelines, sufficient balance between men and women is achieved, constituting 62% and 38% respectively (in the academic year 2015/2016 this distribution is 55% and 45% respectively).
72. Information on teachers and teaching courses is given in Annex 8.2., and CVs of the teachers are presented in Annex 8.3.
73. According to the teachers' CVs, their academic experience varies from 1 to 45 years. The academic experience of the teachers by year intervals is presented in Chapter 4. Annex 4.2. Teachers with academic experience up to 5 years constitute 19%. Teachers working 6-10 years constitute 13%, 11-15

years - 31%, 21-25 years - 6%, 31-35 years - 6%, 36-40 years - 19%, 41-45 years - 6%. Three young teachers with PhD have joined the Department in 2015.

4.2. Structure of the academic staff by age groups

74. The structure of the academic staff in 2014/2015 by the occupied positions and age groups is presented in Table 4.1.

Table 4.1. Structure of the academic staff by the occupied positions and age groups in *Geodesy and Cartography* study programme (academic year 2014/2015)

Occupied position	Age groups, years					Total	Total, %
	≤30	31-40	41-50	51-60	>60		
Professor	0	0	0	1	2	3	27.3
Associate professor	0	5	1	0	2	8	72.7
Lecturer	0	0	0	0	0	0	0.0
Assistant	0	0	0	0	0	0	0.0
Total:	0	5	1	1	4	11	100
Total, %:	0	45.5	9.1	9.1	36.4	100	

75. All the teachers fulfil the qualification requirements. The qualifications of the teaching staff are illustrated by their wide research activities, presented in CVs (Annex 8.3.). The research activities of the teachers are presented in Chapter 4 Annex 4.3. The scientific work experience is as follows: 0-5 years - 13% of teachers, 6-10 years - 19%, 11-15 years - 31%, 16-20 years - 13%, 21-25 years - 6%, 26-30 years - 6%, 31-35 years - 6%, 41-46 years - 6%.

4.3. Ratio of the amounts of teachers and students

76. Ratio of teachers and students of in the *Geodesy and Cartography* study programme is presented in Chapter 4 Annex 4.1, generalised data is presented in Fig. 4.1.

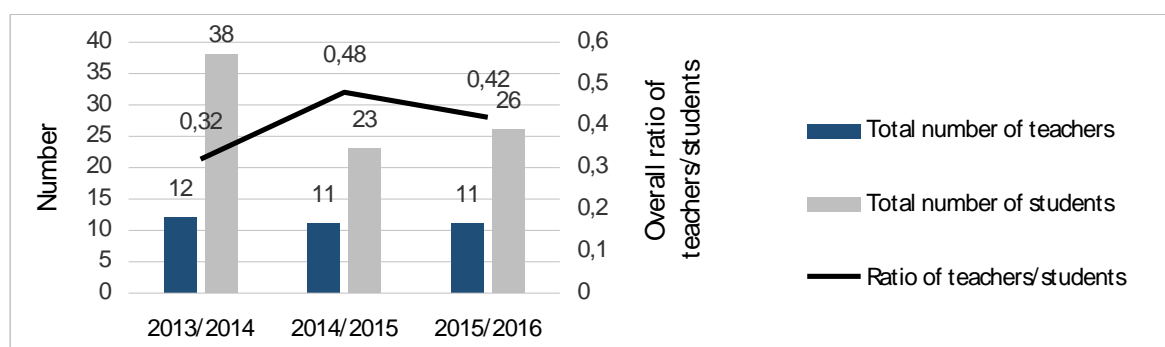


Fig. 4.1. Overall variation of teachers and students number in the *Geodesy and Cartography* study programme

77. On average, during 2013/2014 and 2014/2015 academic years, 3 professors and 8 associate professors were involved in teaching of the study programme in question. In academic year of 2015/2016, 1 professor and 1 associate professor left the GKK and the study programme. 1 associate professor did not qualify for the position. They have been replaced by 3 lecturers with a PhD. The number of students is related to the number of places financed by the state and varies from year to year.

4.4. Participation of the teaching staff in scientific conferences, traineeships, workshops, and academic exchange

78. The order of traineeships for the VGTU teachers was approved by the Resolution of the VGTU Senate No. 69-2.4 on January 28, 2014. The main objective for the traineeships for the teachers is gaining the relevant practical knowledge on the subject, being able to apply it during instruction in order to improve the practical qualifications of the students. The duration of the traineeship can be from 1 to 4 months. The traineeship can be conducted in one or two institutions, but each time it should last no less than 1 month (abroad – 2 weeks). Teachers may choose between traineeship programmes in production, research, engineering, consulting or similar institutions abroad or in Lithuania.
79. According to the CVs of the teachers working in the *Geodesy and Cartography* study programme, 12 teachers were involved in the traineeship programmes during 2013–2015. The average duration of traineeships was 2 months.
80. According to the main conferences listed in the CVs, the teachers working in the study programme have made 47 presentations at various foreign and local conferences.
81. Teachers of the *Geodesy and Cartography* study programme took part in the staff mobility programme. They travelled to give lectures under Erasmus and other exchange programs, as well as to participate in the organizational meetings of the international research projects. The purposes of these visits were related to their subject or area of the research interests, or their research activities in the international projects. Such practice enables continuous updating of the subjects of study, improvement of skills and quality of education.
82. The mobility of teachers is shown in Table 4.2. Numbers of visits and teachers are different because there are cases when the same teacher travelled several times to different institutions.

Table 4.2. Teachers' of study programme mobility

Academic year	Number of teacher visits	Teachers participated	Countries visited
2013/2014	7	4	Poland, Latvia, Norway and Slovenia
2014/2015	3	3	
2015/2016	0	0	

83. Besides being directly employed in the study process of the *Geodesy and Cartography* study programme, teachers actively participate in the international and national professional committees, associations, research, and expert groups.

4.5. Involvement of the teaching staff in research and project activities

84. According to the VGTU minimum qualification requirements, teachers working in the field of technological sciences during their tenure have to take part in scientific and/or study research activities, applied or organizational work. One of the key methods for improving professional qualifications of the teachers is involvement in the research projects. The teachers of the *Geodesy and Cartography* study programme participate in the local and international research projects, funded by the Lithuanian State Science and Studies Foundation, the Research Council and various companies. They were also engaged in EU-funded research, studies and development projects. Over the last three years, 8 teachers from 16 of the *Geodesy and Cartography* study programme participated in 13 research projects. List of international research projects is presented (Chapter 2. Annex 2.3.).

4.6. Ways to improve the qualifications (academic, research, practical) of the teaching staff

85. According to the requirements described in the VGTU procedure for organizing competitions to obtain the teaching and research positions (decision by the Senate No. 73-2.1 on June 17, 2014), teachers can be appointed to their positions only by taking part in a public tender. The time-limited agreements for 5 years-long tenure are signed. Each teacher has to prove that his/her qualification meets the minimum requirements for the position. The research and development work, publications on behalf of the University, active participation in scientific conferences and traineeships and academic exchange programs during the previous tenure are evaluated. Various forms of qualification improvement are used, the most popular being: traineeships, training courses, and academic exchange. Moreover, the teachers constantly improve their skills and enhance their qualifications by taking part in various national and international conferences and exhibitions, in various international projects, and collaborating with experts in the field of their interest. Therefore, in the course of preparing their

lectures, the teachers constantly improve, update and complement the contents of their subjects. That is the way to raise the level of knowledge and quality of the education.

86. Since 1992, the VGTU Institute of Geodesy is functioning. 10 teachers of the *Geodesy and Cartography* study programme take part in the activities of the Institute, performing production, organizational and research work, which is directly related to the study.
87. The Laboratory of Geodesy was established in 2011 at the VGTU Civil Engineering Research Centre. Teachers of the *Geodesy and Cartography* study programme take part in its work too.
88. Each year, the University organizes courses for development of the andragogic competence for the teachers. During the analyzed period, 5 teachers of the study programme improved their teaching skills by participating in these courses.
89. The level of the language skills of the teachers is improved by developing the international contacts and participating in the international projects, by publishing their research results in the international scientific journals. Both academic and technical staff can attend foreign language learning / improvement courses at the university or at other educational centres.
90. The improvement of the professional, educational and management experience of teachers has an undoubtedly positive impact on the study programme. The theoretical and practical knowledge conveyed to the students being based on the professional experience is more easily understandable, better absorbed, and allows implementing the study programme more effectively.

4.7. Workload of the staff

91. Along with the programme under consideration, all professors and associate professors are involved in implementation of other programmes, thus, their teaching workload in the *Geodesy and Cartography* study programme constitutes only a small part of the general teaching workload (Chapter 4. Annex 4.4). During the assessment of the academic workload of the teachers, the following has been considered: in-class activities (lectures, laboratory works, training), and all the time provided to the course subject (in-class hours, independent work (home works, tests, colloquiums, essays), examinations, course projects, supervising final theses, their reviewing and defence).
92. According to the presented data (Chapter 4. Annex 4.4), during the academic year 2014/2015, the general annual academic work in the analysed programme totalled to 1841,7 hours (including 742,5 hours by professors and 1099,2 hours by assoc. professors). Study field subjects – 1131,7 hours. Preparation of the final theses (projects), processing and defence – 710,0 hours. Among the study field subjects the workload of the professors formed 22,4 %, assoc. professors – 39,0 %. In preparation of the BMD, processing and defence the workload of the professors formed 17,9 %, assoc. professors – 20,7 %. In-class work of teachers makes 41,1 % of the total academic workload.

Strengths, weaknesses and improvements of the study programme and staff

Strengths	Weaknesses	Improvements
Competent teachers with sufficient academic and research experience.	The number of professors is decreasing. Requirements for qualification are getting increasingly strict, making it complicated to fulfil them.	Encouraging teachers to improve their qualification and providing more time for research.
Courses in the study programme are taught by scientists (all teachers have doctoral degree).	The university has lost the right to conduct the doctoral studies in the field of Measurement Engineering, there are no more PhD students and therefore the number of researchers will naturally decrease.	Establishing the doctoral studies.
Research projects are carried out, with data used in the study process and for the final theses.	Teachers have large academic workload.	Decreasing of the academic workload and providing more time for research.

5. MATERIAL RESOURCES

5.1. Material basis

93. Academic classes for students of the *Geodesy and Cartography* study programme are organized in the premises of AIF, Saulėtekio al. 11, Vilnius.
94. According to the data for 2015, the AIF premises allocated for studies and research make up 8838,39 sq. meters. Classrooms, laboratories, computer rooms and science laboratories (hereinafter - the training

rooms) make up 2627,45 sq meters, or 1368 workplaces. The biggest part of the training rooms is made of classrooms (70.0%) and laboratories (19.7%). There are 1099 places for students in the classrooms (that is 80.3% of the places in all the training rooms). Laboratories and computer rooms have 15.1% and 4.6% of the working places respectively. There is 4.93 square meter of working space per one full-time student and master degree student. Due to insufficient amount of space for students, the teaching hours last from 8:30 to 19:45, i.e. six pairs of academic hours. Conditions to study for the working students are provided. The second cycle studies start at 14:30 or 16:20.

95. Facilities comply with regulations for safety and hygiene and are regularly cleaned. If necessary, they are repaired or renovated according to pre-arranged plans.
96. AIF students are free to use wireless internet, lounges and if necessary – classrooms. All classrooms are equipped with devices for studies and teaching: boards, power outlets to connect equipment, tables, seats etc. Additional **specialized equipment** required for lectures and laboratory work is available in several classrooms (Nos. 2703, 2705). Deteriorated equipment in the classrooms is replaced according to pre-arranged plans. In addition to the computer classrooms for joint use of the faculty, there is a 15 places **computer room** of GKK.
97. Departments involved in the study programme (GKK and the Department of Water Management) are well-equipped with the office equipment necessary for teaching (laptops, overhead projectors, screens, film projectors, laser pointers, copiers, laser and inkjet printers, inkjet plotters). Teachers and students can use the equipment available in the departments for study purposes by prior arrangement with the employees responsible for the equipment.
98. GKK is sufficiently equipped with all the necessary and most modern technical means and actively uses them for the academic and research purposes. The laboratory equipment is used for lectures, laboratory works, class exercises and practices. The department owns this specialised technical equipment: GNSS receivers (13 pcs.), total stations – various models (14 pcs.), digital level NA-3003 (2 pcs.), invar coded staff GPCL3, invar ruler with bar-code LD11 /1 m/, optical automatic level SELT AT 20D (36 pcs.), optical theodolite with centring device 4T30P (24 pcs.), laser distance meter (12 pcs.), stecometer, theodolite WILD T2, theodolite WILD T1000, EDM instrument distomat1000, flat angle calibration bench, photo camera Canon EOS 350Dkit, digital planimeter Sokkia KP-90N (3 pcs.), automatic self-levelling rotating laser Rugby 100 (4 pcs.), cable finder Digicat 200 (4 pcs.), multifunctional camera YC-400.
99. In addition, for teaching purposes the department uses equipment belonging to the Institute of Geodesy and to the Civil Engineering Research Centre Laboratory of Geodesy: Leica ScanStation C10 laser scanner, Leica Total Station TS30 0,5”, set of magnetometric instruments ENVI PRO (2 pcs.), non-magnetic theodolite MinGeo 010A (2 pcs.), gravimeter CG-5, GNSS Receiver Leica Viva GS15, Software for GNSS measurements processing Bernese 5.0, levelling set Leica DNA 0,3 mm, GNSS receiver Trimble 5700 (2 pcs.).
100. In the GKK activities, software for creating, developing and operating the geo-information systems is very important. Most of the software is installed in PCs of the Geodesy and Cadastre Training Laboratory (room No.2715). The software used by the department according to the courses is listed in Chapter 5. Annex 5. Annex 5.1.
101. GKK has the necessary modern equipment, which is actively used for academic and research purposes.
102. Room occupancy is planned by way of constructing timetables at the beginning of every semester. The timetables are available at the beginning of every semester on the VGTU webpage <http://medeine.vgtu.lt/tvarkarastis/tvarkarastis.jsp>.

5.2. Methodical resources

103. The availability of publications required for the VGTU students is ensured by the VGTU library, which is among the most modern libraries in Lithuania. The amount of books accumulated at the central library is over 0.5 million. Here, the students are free either to study on spot or to take the books home; research journals and internet are also available. The methodical publications and methodical tools are available on internet as well: <http://e-stud.vgtu.lt> and <http://moodle.vgtu.lt/>. The latter site contains expanded study cards for the renewed study subject modules, including summaries for every lecture, methodical materials, and descriptions of the laboratory works. Slides for the lectures and other relevant instruction materials are also available.
104. The library of the VGTU acquires new textbooks and instructional books on yearly basis. The lists for the publications to be acquired are compiled according to the orders received from the departments. This ensures the most recent literature to be available. Students and teachers are free to use the library

delivery desk and reading rooms. In the course of the recent years, the library has accumulated large number of the most recent specialized technical publications in English as well. These include the most recent publications produced globally and made available to all the students studying respective subjects. Therefore students are very well equipped with technical literature.

105. VGTU has created a platform for electronic books at <http://www.ebooks.vgtu.lt/>. This website contains over 400 academic publications presented by use of the modern iPublishCentral™ technologies. The continuous enhancement of the number of these publications is planned, since the use of these technologies enables reading the books online or downloading them and reading offline. Part of the books available here have been printed and can be purchased at the bookstores, but others are only available digitally. Here, one may also find earlier publications that are currently out of print, although these publications are still necessary for the students.
106. Since April 2000, the VGTU library has introduced the electronic library system ALEPH, which today connects 10 libraries of the Lithuanian universities, 6 libraries of the Lithuanian Academy of Sciences, and other libraries of the scholarly institutions and colleges. At the delivery desk, the ordering, delivery and return of the books is automatic. The electronic system ALEPH provides a possibility to order books via internet and assists the reader in finding a bigger variety of literary resources. On the Lithuanian Academic Libraries Network website <http://www.labt.lt/>, one may find a number of links to the other electronic libraries, e.g. Lithuanian Academic Electronic Library (eLABa) <http://www.elaba.lt/>; Lithuanian Virtual Library www.lvb.lt; Lithuanian Scientific Libraries Association <http://www.lmba.lt/> as well as data base of M. Mažvydas National Library of Lithuania.
107. The library's working hours for the common reading room during weekdays are since 9 a.m. to 9 p.m.; on Saturdays since 10 a.m. to 5 p.m. At night, since 10 p.m. to 8 a.m. the internet reading room is available with a special electronic card. The use of computers is free for 16 hours per month, but max. 2 hours per day. Wi-Fi is available at the reading room of the central library, as well as the database of the publications by the VGTU researchers, the VGTU research journals database, the patents' database, the subscribed and restricted databases, and publications that are not available for taking away. This way, the most convenient terms for acquiring the necessary literature are provided for the students. The library also offers printing, scanning and binding services.
108. Students and teachers are free to connect to the databases using Wi-Fi at the VGTU premises and in the library. The most recent information and ordering of publications is available at the VGTU library website <http://biblioteka.vgtu.lt>, the search can be performed through the electronic catalogue http://aleph.library.lt/F?func=find-b-0&local_base=vgt01. The orders are fulfilled in the course of 30 minutes up to an hour. If the required publication is not available at the delivery desk, it can be ordered from other libraries in Lithuania or abroad.
109. Students may order a necessary methodical publication by distance and collect it at the library delivery desk. The theoretical part for the majority of the disciplines and the guidelines for performing practical tasks and home works are available on personal teachers' websites and at the virtual long-distance studying system moodle.vgtu.lt. As mentioned, the electronic form of the publications is popular. Acquiring such materials is very handy to the students, since connecting to the VGTU publisher website <http://leidykla.vgtu.lt> is possible from any computer anywhere, and downloading the electronic publication. The methodical rooms established by the department are rich in research journals both in Lithuanian and English, publications by the teachers, conference materials, the acquired recent European norms (LST EN), collections of the technical requirements for construction works (STR), technical requirements for geodetic works (GKTR), various produce catalogues from different enterprises and other additional materials for this study programme.
110. Full-text electronic versions of the publications by the VGTU teachers published by the VGTU publisher "Technika" are available to the students at the special website of the publisher www.ebooks.vgtu.lt. It can be reached from the local VGTU network or from the networks of the students' dormitories. Students residing elsewhere may reach this website using the service VGTU VPN provided by the Computation centre.
111. The plan for the teaching literature to be issued is made annually. This plan makes part of the general publishing plan of the university, which is reconsidered before providing finances to the particular books to be published. For this purpose, the requirements (textbooks, explanatory exercise books, manuals, etc.) for individual subject modules are estimated. In the course of 2013–2015, the GKK employees published the following textbooks: Puzienė, R.; Stanionis, A. "Administration of Real Estate in Lithuania" Vilnius: Technika, 2015. 280 p.; Aksamitauskas, Č.; Šlikas, D. "Surveying of

- Underground Engineering Communications” Vilnius: Technika, 2015. 319 p.; Bagdžiūnaitė, R. “Methods of Cartographic Imaging and Map Creation”, electronic source Bagdžiūnaitė, R. 100 p.
112. The VGTU library has a database where the most important special journals can be found, including the Journal of Civil Engineering and Management (ISSN 1392-3730 print / ISSN 1822-3605 online), Journal of Geodesy (ISSN: 0949-7714 print / ISSN: 1432-1394 electronic version), Journal of Geodynamics (ISSN: 0264-3707), Journal of Geodetic Science (ISSN: 2081-9919 print version/ ISSN: 2081-9943 electronic version), Geophysical Journal International (ISSN 1365-246X online), ZFV: Zeitschrift für Geodäsie, Geoinformation und Landmanagement (ISSN 1618-8950), Journal of Geodesy and Geoinformation.
113. VGTU is also subscribing to the following Lithuanian databases: Bibliographic base of Lithuanian Periodical Papers, Verslo žinios (Business News) and Foreign databases: ACM Digital Library, ACS (American Chemical Society) Publications, American Institute of Physics (AIP)/ American Physical Society (APS), Annual Reviews: Physical Sciences Collection, Computers & Applied Sciences Complete (access through EBSCO Publishing), EBSCO Publishing, Emerald Engineering eJournals Collection, Emerald Management eJournals Collection, Environment Complete (access through EBSCO Publishing), ICONDA, IEEE Xplore, IOPscience EXTRA(Institute of Physics) and IOP Publishing Archive collection 1874-1999, Oxford University Press Journals Collection, Oxford Reference Online: The Premium Collection, Grove Art Online, Grove Music Online, Passport GMID (Global Market Information Database), SAGE Journals Online, Science Direct, Science Online, Springer LINK and Springer Link Archive, Taylor & Francis, Wiley Online Library (Science Technology Medicine).
114. Every year conferences of the young Lithuanian researchers “Science – the Future of Lithuania” are organized. GKK is supervising the section on geodesy of these conferences. Following each conference, the selected papers are published in periodical peer-reviewed collection of scientific papers “*Geodesy and Cartography*”, which is referenced in the international database IndexCopernicus. Since 2014, all the papers of the conference are included into the Open Access database.
115. Teachers use various means of instruction: from distributed materials to the DVD visual material demonstrations. Particularly popular method of instruction is slide show and commenting with use of the multimedia.

5.3. Renewal of the Material Resources

116. In the course of 2013–2015, GKK has purchased equipment: total stations (3 pcs.).
117. Updated software: Network license ArcGIS (15 pcs.), Software “Inventorizacija mokymo įstaigoms” (“Inventory for Education Institutions”) (15 pcs.).

The strengths, weaknesses and improvements of the study programme material resources

Strengths	Weaknesses	Improvements
The material resources obtained during long period are used for study. Instruments and software are continuously updated according to the financial possibilities.	Lack of financing limits the possibilities to update the instrumental basis.	Input from business partners to the material basis could give dividends in a form of students well-prepared for the labour market.
Participation of the department staff in the international projects ensures high level of employees’ qualification and encourages their interest in and usage of the most modern equipment.	Students who work during studies are not willing to take part in the research projects.	Some resources for updating the material basis necessary for the studies can be acquired through participation of GKK in various projects.
Materials for the laboratory works and manuals are available as printouts and digital books and can be accessed by students easily. Books can be ordered using distance method.	Not all the students use relevant methodical materials, particularly in paper form.	Teachers should prepare methodical materials for studies in digital form.

6. THE STUDY PROCESS AND ITS ASSESSMENT

6.1. Selection of students

6.1.1. Admission requirements

118. Three specializations of the second cycle of the *Geodesy and Cartography* study programme, i.e. *Geodetic Networks* (GI), *Cadastral Information Systems* (KIS) and *Geographic Information Systems* (GIS) accept applicants who completed the first cycle university studies and have a bachelor degree; completed the first cycle extended studies and obtained bachelor degree; have bachelor degree in

another study field or degree of professional bachelor and completed extended studies with certificate permitting to participate in competition to enter the particular second cycle study programme.

119. Since 2013, no applications were received to enter KIS specialization, therefore this specialization was closed since July 2015 by request from GKK, approved by the VGTU vice-rector for science.
120. There are no entrance examinations to enter the VGTU second cycle studies. The line of applicants is formed based on their competitive marks. All applicants need to have passed examinations in compulsory subjects and completed their course works. Those who have not collected sufficient total amount of credits in compulsory subjects have to apply to the VGTU Students' Admission and Information Centre for permission to enter the selected programme and pass the lacking exams.
121. Applicants for specializations (GI and GIS) in the *Geodesy and Cartography* study programme have to fulfil requirements listed in Table 6.1.
122. Applications for entering the second cycle studies are filled in, corrected and the documents registered at the web-based applications' registering system <http://www.vgtu.lt/norintiems-studijuoti/magistranturos-studijos/stojimo-prasyimo-registravimas/92820>.

Table 6.1. Admission requirements for the second-cycle study programme

2013 - 2015 m.		
Specialization	Education required for admittance	Compulsory subjects of the first-cycle study programme and minimum scope
GIS, GI	Bachelors of Measurement Engineering, Land Administration, Land Management, Geology	Basic study subjects: Mathematics - 15 credits. Physics - 6 credits. Information Technologies - 5 credits. Special study subjects: (Geodesy, Cartography, Photogrammetry, Geoinformation Systems, Digital Maps, Land Management, Real Estate Cadastre) - 21 credit.

6.1.2. Competitive mark of admission to the studies

123. Competitive line for the applicants to the *Geodesy and Cartography* second cycle study programme is created according to the competitive mark; its formulas are given in Table 6.2.

Table 6.2. Competitive mark

$KB = (10 + SV - LSV) + P,$ <p>KB – competitive mark; SV – the average weighted grade indicated in the applicant's diploma supplement; LSV – the average weighted grade of marks of all the graduates of the study programme; P – 1 additional point – for a research paper in the peer-reviewed journals or for the report's summary in the "Students' research practice" or "Students' scientific research" proceedings.</p>	$KB_p = K_B \times (10 + KSV - KLSV) + K_p \times PSV + P,$ <p>KB_p – competitive mark; K_B – weighted coefficient of credits of the professional bachelor; KSV – the average weighted grade indicated in the professional bachelor's diploma supplement; KLSV – the average weighted grade of marks of all the graduates of the study programme of non-university; K_p – coefficient of the additional study credits estimation; PSV – the average weighted grade of marks of all the graduates of the additional study programme; P – 1 additional point – for a research paper in the peer-reviewed journals or for the report's summary in the "Students' research practice" or "Students' scientific research" proceedings.</p>
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124. In case of the equal total of competitive marks, the priority is given to a person with higher grade of final thesis or final examination grade, to the one who applied to the specialization listed higher in the application form, to the one who has lower number in the registration form and obtained lower number during application procedure.
125. The number of students applying and admitted to the full-time and extended master studies in the *Geodesy and Cartography* study programme during 2013–2015, the competitive and weighted assessment marks are presented on Tables 6.3 and 6.4. Composition of competitive marks of students

who entered the second cycle studies of the *Geodesy and Cartography* study programme in 2013–2015 is presented on Table 6.2. Maximum possible competitive mark is 12,5.

Table 6.3. The number of students admitted to the *Geodesy and Cartography* second cycle full-time study programme and their competitive score in 2013 - 2015

Admission and selection		2013	2014	2015
Applications submitted		62	55	25
Applications submitted under the first priority		34	21	25
Number of admitted students		13	13	14
Competitive marks of the admitted students	The highest mark	12,01	11,53	11,79
	The lowest mark	8,91	10,06	10,13
	The average mark	10,81	10,79	10,93
Transition mark to	State-funded position	10,94	11,00	11,00
	State non-funded position	8,91	10,06	10,02

126. The number of the state-funded places is set by the government of the Republic of Lithuania with regards to the requirements of the national economic, social and cultural development and the available financial resources. In 2014, the general amount of the state-funded places was smaller by 0.32 percent in comparison with 2013. Also the study places can be founded with money from the EU structural funds allotted in compliance with the national integrated programs and with the project finances of the VGTU.
127. Detailed information on the second cycle study programme *Geodesy and Cartography* is publicly available on the VGTU internet website www.vgtu.lt under „Norintiems studijuoti“ (for prospective students); in the publication “Master studies at the Vilnius Gediminas Technical University” and during the open days. Every year, AIF appoints a teacher – the secretary in charge of the admission committee, who takes care of the admission to the faculty, spreads the information regarding studies, and provides advice on these matters to everyone interested.

6.2. The study process

128. The training timetables are constructed under supervision of the vice-dean of AIF, in accordance with the occupancy rate of relevant teachers and requests from the students. The timetables are approved by the Dean of the Faculty and by the Office of Academic Affairs. Recently, classes for the students in the second cycle studies are from 16:20 to 21:30. In case of the teacher’s illness or leave, an appropriate replacement has to be found ASAP and approved by the Dean. The process of study in the course of semester is supervised by the head of the department.
129. Students should receive credits for the course projects, home works, laboratory works and other individual assignments scheduled for each semester before the relevant exam session starts.
130. During the first month of each semester, the administrator of the Dean’s office issues the president of each student group with the list of exams to be passed during session. The president of the student group has two weeks to make the relevant timetable in accordance with this list and get it approved by the relevant teachers.
131. The timetables for the exam sessions are entered to the UIS studies subsystem timetables’ database (UIS TDB). At the faculty level, this is the responsibility of the vice-dean in charge of studies. If necessary, the vice-dean can modify the date, time and place of the exam agreed on by the students and teachers, providing the relevant information to both the students and teachers.
132. The approved timetables for the exams and consultations are available on the VGTU site at www.vgtu.lt under “Studies” or at <https://medeivne.vgtu.lt/tvarkarastis/tvarkarastis.jsp>.
133. The dates of examinations have to be distributed evenly in the course of the whole time period allotted for the session, to ensure that time to prepare for each exam is proportionate to the number of credits received for the subject. The exams have to be separated by no fewer than 3 days, while the first exam has to be scheduled not earlier than the third day of the session.

134. Those failing to pass or arrive to the exam can repeatedly take it during the special time scheduled for the repeated exams in the calendar study plan. After the repeated exams, those who still have academic debts can take their exams at the special commissions approved by the relevant departments.
135. Already at the start of the first semester students choose supervisor for their final theses and coordinate titles of their final theses.

6.2.1. Ratio of the admitted and graduate students of the study programme

136. Under the *Geodesy and Cartography* study programme, there are state-funded (vf), non-state funded (vnf) and university funded (uf) full-time study places. The figures of the admitted and studying students are presented in the Table 6.4.

Table 6.4. Number of students admitted to the *Geodesy and Cartography* full-time second cycle study programme

Year	Official plan of admission			Admitted to full time studies			Admitted Total
	vf	vnf	uf	vf	vnf	uf	
2013 (GIS)	8	1	2	8	3	2	13
2014 (GIS)	8	5	2	8	4	1	13
2015 (GIS)	14	10	-	14	-	-	14

137. The analysis of the data on Table 6.3 shows that number of students admitted to the *Geodesy and Cartography* study programme is 13 in 2013 and 2014, and 14 in 2015. This is only 40-60 % of the number of applicants. All the state-funded positions are taken in VGTU (see Table 6.4.). Due to high study costs at the non-state funded positions, students frequently leave their studies. It is illustrated in Table 6.5.

Table 6.5. Variation of the number of students

Admission year (Specialization)	2011 (KIS, GT)	2012 (GIS, KIS)	2013 (GIS)
Graduation year	2013	2014	2015
Number of admitted students	16, 13	16, 16	13
Number of non-graduated students	2, 2	4, 3	3
Number of graduate students	14, 11	12, 13	10
Ratio (graduate/admitted) in %	86	78	77

138. About 80% of the students admitted to the *Geodesy and Cartography* second cycle study programme complete it and graduate.

6.3. Data on the students' involvement in research, artistic and applied research activities, volume and form

6.3.1. Academic support

139. Information about the VGTU study programme could be found on the VGTU website www.vgtu.lt. Detailed information on forms of studies, specializations, funding, objectives of studies, the foreseen learning outcomes, assessment of achievements, optional study subjects, timetables, etc. is available there. The relevant information is published in „VGTU studijų programos“ (“VGTU study programmes”) and other university publications, etc. The most important studies-related information is also presented on the website <http://mano.vgtu.lt>. Information is also announced on the faculty website, the departments' websites and notice boards.
140. Every year at the beginning of September, meetings with the dean of the faculty, chairs of the departments and teachers are organized for the students.
141. All the students are encouraged to take counsel with teachers working in the study programme either during the instruction time or during their scheduled duty hours. The teachers indicate their duty hours

and compile the duty timetable for the whole semester. The counselling can be carried on not only during visits, but also by phone, in the forums created for the teachers' communication in the "moodle" system (<http://moodle.vgtu.lt/>) or by e-mail.

142. The teachers' counselling time is available on the VGTU website. The teachers' e-mails can be found on the department website, under "Contacts".
143. Individual study programmes can be organized for the disabled students, active sportsmen or foreign students if necessary. The individual study plan has to be approved by the dean of the faculty.
144. Thanks to the activity of the Integration and Career Office of the VGTU, students are presented with opportunities to enhance or modify their qualifications, to find jobs, to manage connections with other universities or institutions. During March and April, the VGTU Career festival is organized, bringing together students, graduates and employers, presenting information on the activities at the enterprises registered for the festival, on the possibilities to carry out practice there, to find jobs at the institution the students are interested in, to enhance knowledge and competence during the seminars conducted by the employers' representatives. The employers can in turn select prospective employees under the simulated job encounters, to introduce their enterprises and their activities, the possibilities they present to the motivated young people, teachers and researchers.

6.3.2. Social support

145. Psychological, sports, health and cultural support is provided to students, who want to participate in the activities of the following VGTU collectives: Students' Representation, photography club "Fotyvas", academic choir "Gabija", theatre studio "Palėpė", folk dance ensemble "Vingis", rock bands "Skydeirs" and "Weekends" as well as electronic music band "ELE7". The university students may cultivate the following sport branches: basketball, football, volleyball, judo, sambo, track and field athletics, lawn and table tennis, rowing, orienteering and tourism.
146. The scholarship is irrevocable financial support to the VGTU students occupying the fully or partly state-financed study places. There are different kinds of scholarships – the social and personal types. Social scholarship is 3 BSP (basic social payouts) (1 BSP is 37,65 Euro). A student may be granted one social scholarship per semester of study. The personal scholarships are granted by the rector's order for excellent achievements in studies and research activities.
147. One-off scholarships are granted for cultural activities, sports and other social activities on behalf of the university. The maximum size of the one-off scholarship or grant is 3 BSP (1 BSP = 37,65 Euro). During the calendar year, the student can not get more than total of 6 BSP grants and benefits.
148. Students engaged in part-time studies and /or practice under Erasmus or other university exchange programs are granted motivation scholarship on the basis of the last semester average results.
149. Financial support for the disabled. Since 2012, the State Studies Foundation together with higher education institutions (VGTU included) implements the project "Securing accessibility of studies to students with special needs" No. VP1-2.3-ŠMM-07-V-01-001. Since 2015, target payments of 152 euros to the disabled students are planned on a monthly basis. The information is available at <https://www.vsf.lt/index.php?id=1504> and <http://www.ndt.lt/>, under "Support for the disabled students".
150. Financial support to the foreign students of Lithuanian origin. Descendants of the Lithuanians in exile and foreign students of Lithuanian origin can be granted two types of support: the scholarship for the academic achievements and / or social payment. The monthly amount of support is 3 BSP (basic social payouts). The scholarships are granted for one semester and paid monthly until the end of the semester. The social payments are one-off payments granted with regard to the social situation of the applicant (it ranges from 202 to 319 euros). The support is granted on the competitive basis twice a year, in the fall and spring semesters.
151. Study loans. The loans may be given for paying the tuition fees (without competition), for living expenses and part-time studies under international agreements and contracts. Students may get loans from the Lithuanian State Science and Studies Foundation.
152. *The students' accommodation in dormitories.* Applications for rooms at the student dormitory are addressed to the faculty dean's office. Applications are reviewed by appointed personnel and approved by the dean. Detailed information on the VGTU regulations regarding accommodation in dormitories is available at <http://www.vgtu.lt/media/files/1/tvarka.pdf>.

6.3.3. Number of students taking part in mobility programmes

153. The international student mobility is a priority related to the recommendations by the EU Council regarding stimulation of the mobility of the young people for study purposes and implementation of the agenda for modernization of the systems of the higher education in Europe.
154. The lifetime study (MVG) / Erasmus programme is the most popular exchange programme. The majority of students under Erasmus programme leave to study in Denmark, Spain, Portugal, Norway, Italy, Hungary, etc. Students participating in the Erasmus exchange not only intend to study, but also to write and defend their diploma works.
155. GKK has close contacts with the University of Bonn, Neubrandenburg University of Applied Sciences, Karlsruhe University of Applied Sciences, Stuttgart University of Applied Sciences in Germany; Polytechnic University of Valencia in Spain; Gjøvik Engineering College in Norway, Ljubljana University in Slovenia; Koszalin University of Technology and Warsaw University of Technology; Swiss Federal Institute of Technology; University of Southampton in UK, Riga Technical University in Latvia; Carinthia University of Applied Sciences in Austria; Lund University in Sweden, Helsinki University of Technology in Finland etc.
156. On average under Erasmus programme, students travel for 4-5 times, average scholarship is 500 € per month. During last three years, 1-2 students of the *Geodesy and Cartography* study programme travelled abroad under Erasmus programme.
157. Information on possibilities to study abroad is provided by AIF vice-dean responsible for science and international relations, heads of departments and teachers.

6.4. Assessment system of the students' achievements

6.4.1. Principles of assessment system of students' achievements

158. In the *Geodesy and Cartography* study programme, the criteria for assessment of the students' achievements are related to the expected study results. At VGTU, students' knowledge is assessed according to the ten points assessment scale and the criteria proportionate assessment system. This system ensures assessment of the students' learning results in relation to the requirements according to certain criteria. The evaluation mark corresponds to the exact percent of the achieved study results computed in accordance with the scope established by the subject programme (see Table 6.6.).

Table 6.6. Marks and levels of knowledge according to criteria proportionate assessment system

Evaluation	Mark	Percent of study goals reached	Short description of knowledge and skills
Excellent	10	All learning outcomes reached	Excellent performance, outstanding knowledge and skills
Very good	9	At least 90% of learning outcomes reached	Strong performance, good knowledge and skills
Good	8	At least 80% of learning outcomes reached	Above the average performance, knowledge and skills
Highly satisfactory	7	At least 70% of learning outcomes reached	Average performance, knowledge and skills with unessential shortcomings
Satisfactory	6	At least 60% of learning outcomes reached	Below average performance, knowledge and skills with substantial shortcomings
Sufficient	5	At least half of learning outcomes reached	Knowledge and skills meet minimum criteria
Insufficient	4	Less than half of learning outcomes reached	Knowledge and skills do not meet minimum criteria/below minimum criteria
	3		Bad
	2		Very bad
	1		Extremely bad

159. The studies of each study subject module are completed with a settlement. The settlement is assessed in the form of a mark or as "passed/failed". The following settlement types are foreseen in the study programme: examination (E), examination before session (E1), credit (I), course project (KP), course work (KD), final thesis/project (BMD). Assessment criteria are described in the "VGTU description of

the students' assessment procedure". Every teacher presents and explains the composition of the assessment grade to the students at the beginning of the course.

160. The constituent parts of the examination and values of their weighted coefficients are set by the department that has developed the study subject module, taking into consideration the fact that the mark accumulated by the student during evaluations for the practical tasks foreseen in the study subject module are credited only when they meet the minimum requirements. Regardless of the size of the accumulated mark from the mid-term assessments and practical tasks, the students must take an exam at the end of the semester. The students may not be allowed to take the exam if they have not settled the tasks foreseen in the study subject module description. The submitted and defended course project (KP) is assessed with a mark. Students who complete all the tasks planned in the card of module correctly, qualitatively and before the deadline can be encouraged with 10% bonus to the mark they score. Students can pass the examination when accumulated mark for the practical tasks completed during the semester meets the minimum requirements and the interim settlement for the theory is accomplished, while the sum of the accumulated marks meets the minimum requirements for positive evaluation. The teacher informs students about the study subject module programme, presents the list for recommended reading, explains the forms and terms of examination and the mid-term assessment procedures, evaluation criteria and indicates how the level of knowledge will be determined. All the assessment criteria of the learning outcomes are indicated in the study subject descriptions. The teacher presents them to the students in the beginning of the course. The indicated composition of the assessment marks is appropriate for thorough and objective assessment of the students' achievements. Such dissemination means are sufficient to reach every student. Teachers directly inform students about their marks accumulated during the semester. The assessment of examinations, course works, credits are available to each student in the information system (<https://medeine.vgtu.lt/studentams.html>). The defence results of the course projects (works) are entered into the university information system (UIS) examinations sessions database before the beginning of the session.
161. Results of every examination are entered into the UIS examinations sessions database within two calendar days (days-off not counted) after examination. Examination results for the evening courses' students of continual and extended studies can be corrected within three calendar days, for students of extended studies studying in correspondence and extended distant studies - within 20 calendar days after examination.
162. After the announcement of the results, students have the right to discuss their results with the teacher. The examination work is not corrected during the discussion. When presenting the examination results, teachers may provide feedback orally or in writing. When required, feedback may be given individually to every student. Such feedback is sufficient for students to get information about their achievements. The main measure that the implementers of the programme follow in order to ensure students' reactions to the feedback is public announcement of the results. The results are discussed at the department, the faculty dean's office meetings, and, biannually, at the rectorate's meetings, during which, after the analysis, the conclusions are drawn. Of course, feedback impact on student achievement depends on the students' initiative: how much they are interested in the information provided, if they make appropriate conclusions on the improvement of the achievements, etc. The above-mentioned means have a positive effect on improvement of the achieved results.
163. After each subject exam, students can fill in the survey questionnaire and give their opinions on each subject taught and on the teacher. Feedback influence to student achievements can be estimated if a teacher during his/ her tenure (5 years) did not receive positive reviews and was a not-certified for further pedagogical work in VGTU. No negative feedbacks of students were received for the *Geodesy and Cartography* programme.
164. The second-cycle students having no more than two academic debts after the examination session are allowed to continue their studies together with their group. The status of the student is not changed. Students while continuing studies with their group, have a week, after end of commission work, to register for lectures and exams of those subjects that their academic debts are in, with a lower course group. These students are obliged to make supplementary study contract and to pay for the credits in the respective subject modules. Students have to apply to the dean in order to gain permission to attend lectures and take exams together with a lower course group. The dean indicates the amount of payment to be paid at the bank on the application submitted by the student. When the student informs of the payment made, the dean's office issues permission for the student to attend lectures and take exams with the lower course group.

165. If after taking exams at the commission the students have academic debts and are not willing to continue studies with their group, the dean issues decree within a week regarding excluding such students from the lists or suggest them to register for the repeated course starting from the same semester of the next year of study under the status of students paying in full for the studies.

6.4.2. Evaluation of the final projects

166. BMD (1) is an independent (80 hours per semester) applied or research work, by doing which the student selects the topic, performs the search of the relevant scientific literature and technical documents, and analyzes the achieved results. Finally, the report is prepared. The work is evaluated by the advisor of the BMD work.

167. While performing BMD (2) and (3) – in the 2nd and 3rd semester – students collect additional materials with regards to the innovations in technology. The report is prepared. The work is evaluated by the advisor of the BMD work.

168. BMD (4) (800 hours per semester) involves summarizing of the materials collected in the course of performing works (1), (2) and (3). The results are presented at the meeting of the department. According to the comments received during this meeting, the work is subsequently modified. The final theses of the BMD work are prepared and structured according to the relevant requirements, which are then defended at the defence commission of the BMD works.

169. The final thesis for the Master degree is presented to the commission during the public defence. The commission evaluates it with a grade according to the VGTU assessment system (see Table 6.5.). The prior evaluations by the advisor and two reviewers are mere recommendations and do not affect the final grade.

170. The BMD defence results are entered into the UIS database of academic achievements no later than in the course of 24 hours following the defence.

6.4.3. Measures to ensure fair studies

171. According to the VGTU study regulations chapter 9: “Rights and obligations of the students and auditors”, students have to adhere to the general norms of ethics and the code of the academic ethics of the university, and to observe honest dealing during exams.

172. For cheating, the students are bound to get penalty: warning, reprimand, strict reprimand or removal from the university. The latter penalty is issued by the rector.

173. Before submitting KD, KP, BMD (1, 2, 3, 4) work for evaluation, the student at the UIS (<https://medeine.vgtu.lt/studentams/login.jsp>) fills in, prints out and signs the declaration of integrity, stating that the work has not been plagiarized, and includes it into the work. If the student is found to have been cheating, the head of the department submits this information in writing to the dean of the faculty, who makes the decision regarding the student’s further studies.

174. The works can be checked according to the system www.plag.lt, which allows establishing the percent of the plagiarism in the work in question.

175. In 2014, the new project against academic dishonesty was started by the VGTU Student Office. Its aim is showing to the students what necessary skills are lost as result of the dishonesty during studies. The attitude of the potential employers towards this shortcoming and the resulting lack of the skills of the specialists are revealed by the heads of enterprises and popular society figures that are interviewed. The regularly updated videos of these interviews are displayed on YouTube: www.youtube.com/nusirasineklegaliai.

176. From 2015, along with the study contract, the students sign the declaration of integrity therefore this document will not be added to KD and KP.

6.5. Graduate employment

177. Graduates of *Geodesy and Cartography* study programme are employed by the state owned and private companies such as National Land Service under the Ministry of Agriculture of the Republic of Lithuania; HNIT-BALTIC GeoInfoServisas; UAB Aerogeodezijos institutas; State Enterprise Centre of Registers; State Enterprise Valstybės Žemės Fondas; State Enterprise GIS-Centras; UAB Cad ir F Projektservisas; UAB Kadastras jums; UAB GPS partneris; UAB Korporacija matininkai; UAB Geodera; UAB Geomatininkas; UAB Hidrostatybos projektai; UAB Kordimatas; UAB Aristoma; UAB Geoplanas and others. Also they can find jobs in the companies supplying the surveying instruments: UAB TPI; UAB Geomax; UAB GPS partneris; UAB Geovizija; UAB Netkada and others.

178. Graduates completing the *Geodesy and Cartography* studies usually already have 2 years of experience within geodetic companies and can establish private (individual) enterprises. Surveying and geodetic works can be carried out only with certificate of surveyor or geodesist. For this purpose, qualification courses can be attended and qualification examination passed. Such courses are organized by UAB Korporacija matininkai, VGTU GKK; Lithuanian Association of Surveyors, Kaunas College. Registration for the courses is performed online.
179. According to the survey of the employers, 23 companies (19,8%) of 116 completing the survey, perform surveying and geodesy related activities, i.e. companies with 6 - 10 years of experience dominate in the field of geodesy.
180. In the field of geodesy, contrary to others, the largest part of the market (over 50%) is taken by micro enterprises. Large companies occupy only a few percent of this sector. This is the result of the specifics of this activity: to perform geodetic measurements, process them, and issue the documentation two persons are sufficient.
181. Based on the AIF survey, it is possible to point out the future perspectives of the surveying companies during the next five years: 50% of the respondents expect their companies to expand marginally and 40% do not expect their companies to expand.
182. According to the survey carried out by AIF, it can be stated that the number of specialists in geodesy is sufficient (according to 40% of the respondents), except for those with high qualifications, i.e. with the university education (50% of the respondents). Geodetic companies require geodesists with programming skills; real estate and cadastre specialists; specialists with high qualification and skills in practical measurements with good knowledge in legislation; GIS specialists; land improvement designers and practitioners; and geodesists – constructors of metal and reinforced constructions.
183. Integration and Career Office at the VGTU carries on registration of the graduates. This project is meant for students and employers. It should assist students in finding jobs and making their first steps in the labour market. It should also help employers to find young, energetic, talented and eager graduates. The project aims at introducing the best graduates of the VGTU to the Lithuanian and foreign companies and organizations; encouraging students of the Lithuanian technical universities to be more aware of the needs of the Lithuanian and foreign companies and to improve their special knowledge; promoting technological sciences; creating favourable conditions for establishing relations between the business representatives and the young professionals.

Strengths, weaknesses and improvements of the process of studies and assessment

Strengths	Weaknesses	Improvements
All the state-funded places are taken by applicants.	Failing to enter the state-funded place, applications are withdrawn due to the high fees in the non-funded places.	Encouraging employers to finance studies of the employees.
Graduates of the studies easily integrate into activities not only of the Lithuanian, but also of the foreign companies.	Students graduating from other education institutions enter the studies. Sometimes their studies are complicated due to lack of knowledge.	Encouraging students to use the exchange programmes for travel to the foreign universities.
Students participating in Erasmus exchange programme gain knowledge in the foreign universities, as well as preparing and defending final theses abroad.		Seeking closer cooperation with students in the course of their studies in order to help them solve various problems and to prevent termination of studies.
Most of the students already work and can express work-related wishes for the second cycle studies.		
Study timetable is convenient for working students.		

7. MANAGEMENT OF THE STUDY PROGRAMME

7.1. Structure of the management of the study programme and decision-making

184. The Study Programme Committee is supervising and updating the *Geodesy and Cartography* study programme in accordance with the Vilnius Gediminas Technical University Study Programmes Committee's regulations, approved on February 19, 2013 in Resolution No. 62-2.2. The Study

Programme Committee is subordinate to the AIF Dean and the Faculty Study Committee.

185. New AIF Faculty Study Committee was approved for 2015-2016. Committee includes representatives of the social partners and one GKK student. AIF Study Committee follows “Regulations of the Study Committee of the Faculty of Vilnius Gediminas Technical University, Resolution No. 6-2.6 of March 2, 2005. The Committee also follows Statute of the University, decisions of the Senate and Faculty Council, Studies Regulations, orders of Rector and Dean, University Study Committee, considerations and decisions of the Area Study Committee and other regulations. The main goal of the Faculty Study Committee is the quality of the study programmes and modules fulfilling the requirements for academic degrees and qualifications.
186. The *Geodesy and Cartography* Study Programme Committee was approved on September 11, 2015 by Rector’s decree No. 909. The Committee is chaired by the head of GKK. There are student representatives, a social partner and GKK teachers in the Committee.
187. The *Geodesy and Cartography* study programme committee performs the following functions: developing a self-assessment report of the ongoing study programme in accordance with the existing requirements; submitting the self-assessment report and other necessary documents to CQAHE for their external evaluation and accreditation; carrying out continuous monitoring of the designed programme (including organization of the curriculum and the teaching process, the teachers’ compliance to the requirements and their expertise, the appropriateness and adequacy of the material and information resources); identifying drawbacks and initiating their removal; organizing surveys from students, faculty teachers, alumni and employers on issues of the quality of the study programme; analysing the results of the surveys and publicizing them at the University, its departments and faculties; organizing a proper presentation of the study programme on the University website; considering the appropriateness of the educational literature scheduled to be released for the study programme; initiating introduction of innovative teaching methods, including distance learning, to the study programme; developing the list of courses for complementary studies.
188. Relevant issues of the studies are discussed at the GKK meetings. Proposals concerning the contents of the subject modules and their implementation are submitted to the leaders of the study programme and to the study committee. According to the Dean’s orders, meetings of the vice-deans with presidents of the student groups are organized on regular basis (at least once a month) for discussing issues related to the quality of the studies; complaints and recommendations from the students are taken into consideration. Regular meetings with students are organized as well, including verbal (if necessary, also written) questioning.
189. Following the fall and spring sessions, the study results and quality are analysed. The analysis of the students’ achievements helps to identify shortcomings of the study process and to plan means for their elimination. Student surveys regarding the subjects and teachers, their teaching methods and contents of the courses are carried out at least once per semester.
190. Meetings with social partners are organized as well to discuss the quality of the studies, theoretical and practical qualifications of the students.

7.2. Internal assurance of the study quality

191. The internal system for the study quality assurance at the University is based on the Standards and guidelines for quality assurance in the European Higher Education Area (ESG). In order to ensure the internal quality of studies, the following processes and procedures are implemented: preparation, approval, monitoring and assessment of the study programmes, provision of guidance associated with the curriculum issues, systematic assessment of the learning outcomes, provision of conditions for teachers to enhance their educational competences, provision of study resources, as well as academic, cultural and social support, for students, provision of career guidance services for students, promotion and development of students' participation in higher education quality assurance activities.
192. In order to maintain the internal study quality assurance, the quality management system of all processes at the University is implemented, which corresponds to the requirements of EUA higher education quality assurance standard. National and international requirements are integrated in the VGTU documents for the quality management system, relevant to organization and management of the high quality university studies. In these requirements, processes creating the direct value are clearly and precisely structured.
193. The University continues the project entitled “Implementation of the Internal Study Quality Management System”. The aim of the project is ensuring the efficient and effective use of the management tools in order to improve the quality of services provided by the University.

194. One of the teaching assessment methods is giving students the opportunity to get an access to teaching evaluation questionnaire in online information system. After each exam students provide their feedback on each teacher and each course taught at the University. According to the teachers' assessment procedure, defined by the resolution No. 73-2.1 adopted by the Senate of the Vilnius Gediminas Technical University on June 17, 2014, if a teacher is evaluated by the students as lower than satisfactory, the teacher is not licensed for further pedagogical work in the VGTU. In order to encourage the students to fill in the questionnaires, during the academic year 2014/2015 the University decided to change the system to prevent students from accessing the information system unless they have filled in the evaluation questionnaire. This should result in a more objective assessment of the teachers' performance.
195. Since 2013, for ensuring the teaching quality visiting of the lectures is introduced. According to a pre-established schedule, the Study Programme Committee members and the vice-deans of the Faculty visit lectures on different courses and check the means that teachers use for lecturing and whether the students' activity is stimulated.
196. In addition to the above-mentioned means, the head of department communicates with the students and listens to their opinions on individual programme courses and teachers. This helps to improve the programme taking into consideration the students' opinion and wishes.
197. Surveys by students and by the social partners are conducted every year. This allows estimating employers' needs and the level of the students' theoretical knowledge.
198. For the convenience of students, the VGTU division of Information System has created separate e-mail for each student group (group name) and each individual student (name and surname). If necessary teachers and students can communicate via e-mail. New information reaches both students and teachers quickly.
199. The head of the department consistently controls the quality of lectures, practical training, laboratory works, course projects, final theses, diploma projects as well as methodical means (General Regulations of the Department of the Vilnius Gediminas Technical University were approved by the Resolution of the Senate No. 57-1.6 of May 29, 2012). The preparation of the final theses and projects is regularly inspected. Students have to present the goals and tasks of their scientific work and the achieved results during the inspection process.
200. On the Facebook profile of the department (profile <https://www.facebook.com/Geodezijos-ir-kadastro-katedra-VGTU-422320964631695>), impressions on achievements, studies, and current news are shared.
201. The VGTU Institute of Geodesy has a positive impact on the quality of the studies. The Institute of Geodesy performs research related to the modern geodetic reference establishment in Lithuania, using the current methods of satellite geodesy, gravimetry, etc. Students specializing in Geodetic Networks and Geographic Information Systems can get familiar with the activities of the Institute, the modern instruments used and the methods for processing the collected data. Some students take part in observation campaigns and regular measurements performed by the scientists of the Institute of Geodesy. Students can have their training at the Institute. Many students write their final theses on topics related to the research activities of the Institute of Geodesy.
202. Information regarding plans of improvement of the study quality and learning outcomes is publicly available to the University academic society, social partners and employers. Part of such information is presented on the web, and part is shared during meetings with students, social partners and employers.

7.3. Summary of the last evaluation report

203. The previous external evaluation of the *Geodesy and Cartography* programme took place in May 2013. The Study Programme was given positive evaluation and accredited for 3 years. In the summary, it was concluded that the *Geodesy and Cartography* study programme is unique in Lithuania in its scientific aspect, and the personnel, employers providing jobs to the graduates and the students are well-aware of that and appreciate it. Collaboration with companies is intense, while employers are satisfied with the graduates. During last evaluation, three specializations were analysed: Geodetic Networks (GT), Geographic Information Systems (GIS) and Cadastre Information Systems (KIS). It was noted that learning outcomes in the GIS and KIS specializations are not sufficiently different, therefore in a 2013-2015 period KIS specialization was removed. Contents of the GT specialization was considered as well created and enabling the students of the second cycle to take part in research on the international level (Scanned document added to Annexes).
204. The international expert group presented its main recommendations as follows: 1) The definition of the aims and learning outcomes of the study programme should be revised in order to fit EUR-ACE

framework standards for the accreditation of engineering programs; 2) The further development of learning outcomes may benefit from comparing with the study resources provided by the Canadian Board of Examiners for Professional Surveyors (CBEPS); 3) The review team advises to reconsider the overlap between the specializations and reduce the volume of common courses and increase the volume of specialization specific courses; 4) The review team strongly advises that the core lecturers of the programme and the (academic) leadership of the department develop a more structured and strategic approach to research with a coherent vision on the development of this academic and professional field. Research considerations should include the development of Lithuanian spatial information portals and related services. This will support a stronger research orientation of the Master Program, especially the specializations Geographic information systems and Cadastre information systems; 5) The review team advises the management to give special attention to the age build-up of the lecturing staff in order to ensure teaching continuity over the coming years; 6) The review team strongly advises to review the assessment process and attitude to check whether the assessment of students work is sufficiently critical. The summary of the previous evaluation is presented.

205. Changes implemented in the *Geodesy and Cartography* study programme and decisions made following the evaluation of 2013 are presented in Chapter 7.11.

7.4. Documents regulating management of the programme

206. The process of the VGTU study programme and quality assurance, as well as responsibilities of the programme implementers are described in documentation of different levels: documents describing the vision and mission of the VGTU; description of science and education quality management system model; long-term development plans; the Statute; the Study regulations; the general university procedures; the quality policy of the University division; the descriptions of the programme and its modules; methodologies; procedures and other internal and external documents regulating the studies and scientific activities.

207. The study quality is ensured in accordance with the decrees of the VGTU Senate and decrees by the Rector of VGTU (Chapter 7 Annex 7.2).

208. All information regarding the execution of the programme is stored in the VGTU information system "Alma Informatika". In addition, information is collected by the department, the faculty dean's office and the Directorate of Studies. The minutes of the programme reviews and evaluations are also stored in these divisions.

7.5. Data regarding information collection and analysis

209. The quality of the University studies is monitored using a variety of traditional monitoring tools (surveys of students, teachers, graduates and social partners, self-assessments of the programmes) by means of which the data collected helps establishing the current situation and providing measures for the quality improvement.

210. Students, as the main party interested in the quality of studies, in collaboration with teachers and administration, can contribute to improving of the quality of education. The method presenting an opportunity for all the students to participate in the study process improvement is giving feedback on studies by expressing their view in student surveys.

211. The feedback is ensured through systematic surveys of students and the aggregated survey results are used in order to improve the study programmes, to develop the organization of the study process and to strengthen the composition of the academic staff and their capacity.

212. Since 2007, an automated student survey system has been operating successfully in the information system of the University. Using the automated survey system two surveys of students are organized every year: after the winter and spring sessions. During the surveys, the quality of teaching, teaching methods, written material and preparation for the lectures is assessed. The survey is designed as a test. Teachers can see the results of the survey online when logging onto the information system. On the basis of the results of the student survey teachers can improve their teaching methods and the teaching quality.

213. The survey results are discussed in the meetings at the Rectorate, at the academic units of the university and during meetings with students and members of the Student Office which are held once a year. In order to improve the dissemination of information and its availability, from this year onwards, all the survey results are publicly available on the VGTU webpage: <<http://www.vgtu.lt/studijos/studiju-procesas/apklausu-rezultatai/57807>>.

214. The graduate survey is carried out by MOSTA (Research and Higher Education Monitoring and

Analysis Centre), which provides questionnaires consisting of 40 different questions related to career and job upon completion of relevant studies.

7.6. The participation of the social partners in the programme evaluation and improvement processes

215. Social partners are involved into the GKK study programs evaluation and improvement processes. Social partners are also involved in the self-assessment preparation group.
216. GKK is engaged in close communication with the social partners: the National Land Service under the Ministry of Agriculture of the Republic of Lithuania; State Enterprise Centre of Registers; State Enterprise Valstybės Žemės Fondas; HNIT-BALTIC GeoInfoService; State Enterprise GIS-Centras; UAB Aerogeodezijos institutas. At least once per year meetings with the social partners are organized. During these meetings, the existing problems and recommendations from the employers are discussed and taken into consideration.
217. At the meetings of the faculty and department study committees, student representative is taking part.

7.7. The involvement of the social partners into the programme evaluation and improvement processes and their impact on the programme improvement

218. Social partners evaluate the study process, the quality and content of the studies.
219. Student representative can express the students' opinion regarding the programme improvement at the meetings of the faculty and department study committees. Here, the subject modules, the programme timetable, contents and quality of the student course works and final theses are discussed.
220. Every teacher can propose suggestions for the programme improvement during the department meetings. Decisions made during the department meetings are recorded and the records kept in the secretariat of the Department. Teachers are obliged to present the study material clearly and in good quality, to regularly update it with regards to the research results or new products appearing on the market. Teachers are recommended to maintain close relations with their students, to advise them on study and career choices, to involve students into the international projects (see chapters 4.4.-4.5.). Teachers maintaining good contacts with companies often recommend their best students to the employers.
221. As mentioned in Chapter 7.2, students can express their views on the Geodesy and Cadastre study programme by completing questionnaires online and during meetings with the head of the department. When study programmes are updated, the student opinion is taken into account.
222. Suggestions from the social partners and potential employers regarding updating of the study programme are extremely important; therefore close contacts with surveying companies are maintained.
223. According to the requirements for the structure of the final theses defence commission, adopted by the VGTU, employers and social partners are chairpersons of these commissions. Following the defence, discussion on the final theses is held, opinions of various representatives are collected and considered, and subsequently, requirements for themes and contents of the theses are modified.
224. After graduation, contacts with the graduates are preserved: the Department of Geodesy and Cadastre is interested in the achievements and career prospects of its former students, and involves them into the programme evaluation and improvement processes already as social partners or their representatives.
225. Representatives of the social partners are involved into the study process. They are invited to deliver lectures and present the new equipment. In the course of 2013–2015, lectures were delivered by representatives of the following companies: UAB "Reon", UAB "Baltijos matavimų organizacija", UAB "Tera Modus", UAB "Info Era", UAB "Geo Novus", UAB "Ero Via", State Enterprise "GIS Centras", State Enterprise Centre of Registers, UAB "TPI Vilnius". Students apply knowledge obtained during these lectures in preparation of their course projects and final theses.
226. Qualified employees of the companies can be offered part-time jobs at the GKK. Practical knowledge and examples from production activities are presented during their lectures. At the moment there are three representatives of the companies employed as teachers at the Department.

7.8. Ways of disseminating the information regarding the programme improvements to the University community and the social partners and their effectiveness

227. Information on the relevant programme modules and their descriptions, as well as detailed descriptions of the programme's objectives is available on the VGTU website (http://www.vgtu.lt/studijos/studiju-programos/bakalauro-studiju-programos/26679?pid=66597&y=2014&fo=1&f=609#Apie_programa). The information is presented in Lithuanian and English. The information on studies is given in the

Chapter 3 of this report.

228. Information regarding the study programme revisions and improvements from the VGTU intranet is available on the VGTU Studies Directorate website (<http://intranetas.vgtu.lt/Studij%20direkcija/Forms/AllItems.aspx>).

229. Traditional international exhibition on education, knowledge and career planning “Studies” is held every year at LITEXPO Exhibition and Congress Centre, inviting students to learn the current information about the proposed second cycle studies curriculum.

7.9. *Opinion of teachers, students, graduates and employers regarding implementation of the programme*

230. Information on the quality of the *Geodesy and Cartography* study programme from the social partners is accumulated in the GKK survey forms and on the VGTU webpage (see Chapter 7.5.).

231. Decisions on the updates of the *Geodesy and Cartography* study programme and other resolutions are stored on the records of the GKK study committee.

232. Faculty study committee resolutions are stored at AIF.

233. Changes and statistics are presented in the annual joint reports by the Dean of AIF and Rector of the VGTU (see Chapter 7.10.).

7.10. *The sources of information regarding quality of studies*

234. The main information about the quality of studies is published on the VGTU website (publicly available) or employee intranet system (available on the internal network of VGTU).

235. The most important documents of the University are publicly available, including: Development strategy for 2014-2020, Strategic Plan for 2014-2016, Rector's report of 2013 <http://www.vgtu.lt/universitetas/planai-ir-ataskaitos/59?lang=1>; results of a survey of all the university students on the subjects and the teachers are available at <http://www.vgtu.lt/studijos/studiju-procesas/apklausu-rezultatai/57807>;

236. Documents accessible on the internal network of VGTU: Self-assessment and external evaluation reports on the VGTU activities during 2007-2012 <http://intranetas.vgtu.lt/VGTU%20veiklos%2020072012%20savianalizes%20suvestin%20angl%20ka/Fo rms/AllItems.aspx>; indicators of activity, <http://intranetas.vgtu.lt/Lists/Rodikliai/visi.aspx>; Information provided by the Studies Directorate <http://intranetas.vgtu.lt/Studij%20direkcija/Forms/AllItems.aspx>; the website of the Public Communications Office, <http://intranetas.vgtu.lt/Vieosios%20komunikacijos%20direkcija/Forms/AllItems.aspx>; Report of the Faculty of Environmental Engineering of the VGTU.

237. Teachers can access the survey results on their courses in the VGTU Information System “Alma Informatika”(every year, every semester and every course).

7.11. *The most important changes which led to the results of the last external evaluation*

Conclusion of the previous evaluation	Achievements
<p>1. The definition of the aims and learning outcomes of the study programme should be revised in order to fit EUR-ACE framework standards for the accreditation of engineering programs.</p>	<p>Learning outcomes of 2014 study programme from 4 groups (knowledge, understanding, general abilities, special abilities) were updated and grouped into 5 groups (knowledge and its application, research abilities, special abilities, social abilities and personal abilities) by adapting them to the study descriptor, approved November 21, 2011 by Decree of the Minister of Education and Science of the Republic of Lithuania No. V-2212 following EUR-ACE framework standards for the accreditation of engineering programs.</p> <p>The most relevant legal act was issued after the programme creation, i.e. the decree of the Minister of Education and Science of the Republic of Lithuania No. V-964 of September 10, 2015: “On Approval of the Descriptor of Group of Engineering Studies Field“. Descriptor of the group of studies belonging to the engineering field was prepared following the EUR-ACE framework standards for the accreditation of the engineering programmes. 6 learning outcomes groups are listed in the descriptor (Obtain knowledge and abilities; Ability to perform engineering analysis; Knowledge and skills necessary for projecting activities according study programme in the</p>

Conclusion of the previous evaluation	Achievements
	<p>field engineering to be performed; Ability to accomplish fundamental and applied research; Ability of practical work in solution of engineering tasks; personal and social abilities). New Geodesy programme improvement project is under preparation.</p> <p>New edition of the EUR-ACE framework standards for accreditation of engineering programmes established 8 learning outcome groups (Knowledge and understanding, Engineering Analysis, Engineering Design, Investigations, Engineering Practice, Making Judgements, Communication and Team-working, Lifelong Learning, therefore the related legal acts of the Republic of Lithuania should be revised and updated. Then standard documents regulating the VGTU study programme will be modified and the study programme improvement started.</p>
<p>2. The further development of learning outcomes may benefit from comparing with the study resources provided by the Canadian Board of Examiners for Professional Surveyors (CBEPS).</p>	<p>While formulating <i>Geodesy and Cartography</i> study programme goals and learning outcomes the following documents were taken into account: EUR-ACE framework general standards for the accreditation of engineering programs, General Dublin descriptors short cycle, first, second and third stage qualification granting, European Qualifications Framework for Lifelong Learning, Canadian Board of Examiners for Professional Surveyors (CBEPS), and ECTS user's guide requirements.</p>
<p>3. The review team advises to reconsider the overlap between the specializations and reduce the volume of common courses and increase the volume of specialization specific courses.</p>	<p>After revision and improvement of the first cycle study programme "Geodesy" and the second cycle study programme "<i>Geodesy and Cartography</i>" in 2014, the determined overlapping between the topics of the programmes was eliminated.</p> <p>In consideration of the experts' conclusions after the external evaluation, the specialization of Cadastre Information Systems in the second cycle <i>Geodesy and Cartography</i> study programme was cancelled in 2015, following the Vilnius Gediminas Technical University Rector's order „On cancelling the specialization in the study programme“ No.257, on March 10, 2015.</p>
<p>4. The review team strongly advises that the core lecturers of the program and the (academic) leadership of the department develop a more structured and strategic approach to research with a coherent vision on the development of this academic and professional field. Research considerations should include the development of Lithuanian spatial information portals and related services. This will support a stronger research orientation of the Master Program, especially the specializations Geographic information systems and Cadastre information systems.</p>	<p>Approved monitoring indicators of development strategy for 2014-2020 (Senate resolution No.4-3 of September 10, 2013) (http://www.vgtu.lt/media/files/1/pletros-strategija.pdf).</p> <p>For better involvement of the VGTU study and/or research departments into solution of strategic tasks and better compatibility of the visions of the departments' development "Description procedure of VGTU study and/or research departments strategic planning" was approved (May 6, 2014, RI No.413), also establishing criteria for assessing the effectivity of the activities of the departments. Activity plans for 2014-2016 of the university studies and/or research departments were prepared and approved by the councils of the departments.</p>
<p>5. The review team advises the management to give special attention to the age build-up of the lecturing staff in order to ensure teaching continuity over the coming years.</p>	<p>Natural fluctuation of teachers took place during recent years. During the academic year of 2014/2015, 45,5 % of teachers were 31-40 years old. 2 teachers (a professor and associate professor) were 41-60 years old. Three young teachers with PhD are employed since 2015. The teaching team in the <i>Geodesy and Cartography</i> study programme is getting younger.</p>
<p>6. The review team strongly advises to review the assessment process and attitude to check whether the assessment of students work is sufficiently critical.</p>	<p>Assessment process was reviewed. Teachers evaluate the course projects, examinations and final theses more critically.</p>

The strengths, weaknesses and improvements of the study programme management

Strengths	Weaknesses	Improvements
<ul style="list-style-type: none"> • Advanced and constantly updated system for the student surveys. 	<ul style="list-style-type: none"> • There is a lack of systematisation in conducting surveys of teachers, graduates and the social partners. 	<ul style="list-style-type: none"> • Developing common, systematized university-wide questionnaires for teachers, graduates and the social

<ul style="list-style-type: none"> • Students consider the quality of teaching and the teachers' preparation for the lectures as good or very good. • Close relations with the social partners are maintained, helping graduates to obtain practical knowledge. 	<ul style="list-style-type: none"> • There is no database on the graduates' employment. • Students lack skills in leadership and project management. 	<ul style="list-style-type: none"> partners' surveys. • Student activeness could be increased as result of additional explanatory work. • Recommending that VGTU Career Directorate starts collecting detailed data about the graduates' employment period, jobs, etc. • Creating opportunities for teachers to learn modern teaching methods, encourage them to review the tasks for practice, involve more students in teamwork, encourage them to use specialized computer programmes for doing their homework and course work projects. • In cooperation with the social partners, finding ways to improve students' practical skills to meet the employers' expectations.
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