VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

FIELD OF STUDIES - GENERAL ENGINEERING
STUDY PROGRAMME

GEODESY
(612H14001)

SELF-ASSESSMENT REPORT

2015

Vilnius Gediminas Technical University Rector	..... (signature)	prof. dr. Alfonsas Daniūnas
Self-assessment work group leader	..... (signature)	assoc.prof. dr. Jūratė Sužiedelytė Visockienė

Vilnius, 2015

Study programme key facts

Title of study programme	*Geodesy*
State code	612H14001
Type of studies	University studies
Cycle of study	First
Mode of studies (years)	Full time (4)
Scope of study programme (credits)	240
Qualification degree and (or) professional qualification awarded	Bachelor of Measurement Engineering
Study programme registration date	2013-07-01

List of the self-assessment working group members

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Content

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 higher educational institution. 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 higher education institutions 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 university structure is approved and amended by the University Council. The competences and objectives of the university subdivisions 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 studies-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 of definite science fields, 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 university's vision and mission is approved by the Council as well as the University's strategic activities plan, submitted by the Rector, and the principles of selection and assessment of 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 strategic activities (development) plan. 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 University and Faculty's Studies Committees. The Rector is in charge for 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 Faculty Councils or at the University and the Faculty Studies Committees. Such structure and interrelations are sufficient and appropriate to implement the study programme. VGTU structure is presented in the Figure 1.1.

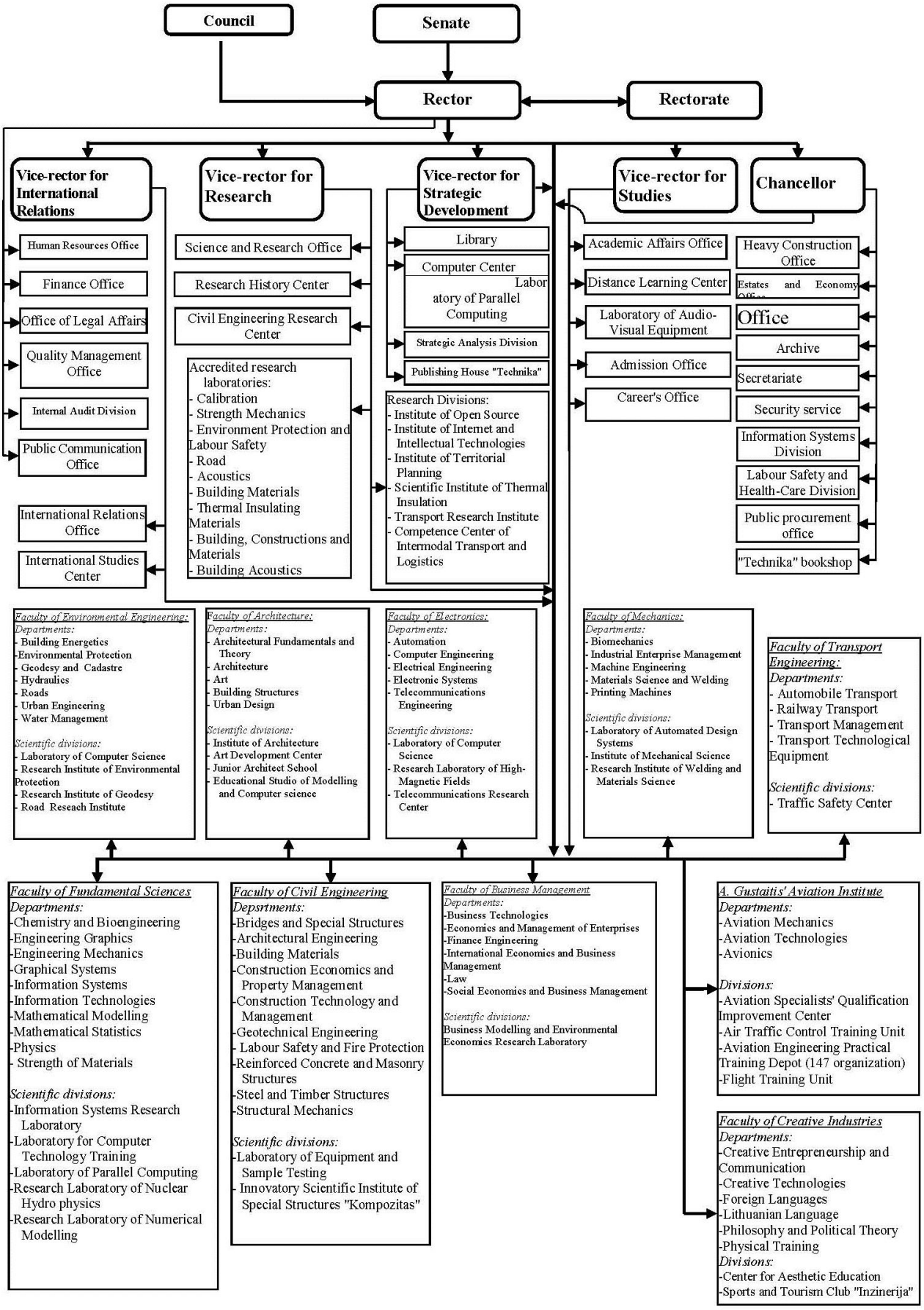

Fig. 1.1. VGTU structure

1.2. Composition of the self-assessment work group and its schedule

6. The work group for the self-assessment of the first cycle of the *Geodesy* study programme was created and approved by 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* study programme (state code 612H14001) self-assessment report

Scheduled chapter	Executive	Deadline
1. Introduction	Jūratė Sužiedelytė Visockienė	2015-09-30
2. Programme objectives and study results	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* study programme took place 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), and Vytautas Urbonavičius (Lithuania). The assessed programme was accredited by the decree of the director of the 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 *Annex 8.5*.

2. PROGRAMME OBJECTIVES AND STUDY RESULTS

2.1. Programme objectives and study results

8. The aim of the *Geodesy* study programme as the university studies of the first cycle granting bachelor's degree of measurement engineering, is to train specialists, who upon completing their studies of the basic courses and special courses obtain fundamental and special knowledge in geodesy, necessary for mastering the new technologies, for being able to select the most suitable methods of surveying for obtaining the necessary data, to understand functioning of the geodetic instruments and observation systems, to perform processing of observation data, to know ways and methods of determining the observables´ reliability and uncertainty and be able to use it in their work, to be able to apply geoinformation technologies to solve tasks related to geodesy, cartography, real estate cadastre and registering.
9. Upon completion of the university studies in the Geodesy study programme, the VI level of qualification, approved by the resolution No. 535 of the Government of the Republic of Lithuania in May 4, 2010 is provided.
10. In order to estimate the demand for the specialists and to cover up the gap between the graduates' qualifications and the most important specific tasks appearing currently in Lithuania and on the international market of the EU, as well as expected specific tasks for the next decade, two specialisations are introduced in the study programme: geodesy and cartography, and real estate cadastre.
11. By implementing the study programme, the study results are divided into five groups (some results are assigned to particular specialization) (see Annex 2.2).
12. Relation matrix of study programme results and subjects (modules) is presented in Annex 2 Table 2.1. Links between the study programme results and subjects (modules) are presented in Annex 2 Table 2.2. Relation between the learning outcomes with results of the subjects' studies and methods of assessment

the students' and studies' results are indicated in the description of every subject (module). Descriptions of study subjects (modules) 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 study programme is presented on the VGTU website <https://medeine.vgtu.lt/programos/programa.jsp?fak=3&prog=143&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-kadastro-katedra/studijos/51616#58033>.
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 school pupils, students and social partners have links to the VGTU website, thus the goals and the study results can be easily accessed. For instance, 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=8182_2015&pt=of&ctx_sr=8Gzz1EUgIeKfy0cWNVrrVdABKo0%3d> and the website of 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>, the Facebook profile of the Department of Geodesy and Cadastre <https://www.facebook.com/pages/Geodezijos-ir-kadastro-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* 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 Committee of Environmental Engineering Faculty studies. 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.
19. Taking into account the conclusions of the evaluation by the external experts, responses from the social partners and students, the following changes were made in 2015: the Chemistry course FMCHB11204 was replaced with the course APGDB15006 Optical Geodetic Instruments. The study programme was supplemented with the course APGDB15001 Digital Technologies of Topography and Cadastre. Course APPEB11195 Renewing Energy Technologies was replaced with APGDB15002 Engineering Geodesy 1, while APGDB14002 Engineering Geodesy was replaced with APGDB15003 Engineering Geodesy 2. The course APASB11115 Technologies of Waste Management and Re-use was removed. This enabled to extend the following courses: APGDB15004 Applied Geodesy (Specialization of Geodesy and cadastre), APGDB15005 Cadastral Measurements of Constructions (Specialization of Real Estate Cadastre).

2.2. Analysis of the study programme goals and learning outcomes
Study goals in relation to the legal acts and other documents

20. 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. Bachelor Degree in Measurement Engineering corresponds to the VI level of qualification of Lithuanian and European Qualifications Framework as well as to the first cycle of Qualifications Framework of European Higher Education Area.

21. The following legal acts were taken into account while developing the Geodesy 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-501: "On Approval of Description of the First Cycle Degree and Integrated Studies" of April 9, 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 First Cycle Study Programmes, approved by the decree of the VGTU Senate Nr. 57-1.8 of May 29, 2012.
22. While formulating the goals and learning outcomes for the Geodesy 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 first cycle study programme is suitable for preparation of specialists with qualification of the VI level. Their work could be characterized as complex, performed individually dealing with variety of tasks and in need to be adjusted to constant changes. Such specialists need to have sufficiently developed skills of self-education.
23. Knowledge provided by the Geodesy study programme and its application, research abilities, special abilities, social abilities and personal abilities cover requirements for specialists with qualification of the VI level formulated by the international legal acts.
24. 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 first 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.
25. 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 Group of Engineering Studies Field" <https://www.e-tar.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.
26. 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*) <http://www.enaee.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.

Results of professional activities proving actuality of intended learning outcomes

27. When formulating goals and learning outcomes of the *Geodesy* study programme, the goals and intended results of the international organizations were considered: International Association of

Geodesy (IAG), which considers its mission to promote development of geodetic technologies and coordinate activities at international level; International Federation of Surveyors (FIG), which aims to promote international cooperation and understanding among surveyors worldwide to reach progress in different fields of activities; promoting research and technical development, exchange of experience and ideas; International Society for Photogrammetry and Remote Sensing (ISPRS), which aims to promote photogrammetric measurements, remote sensing research and teaching by cooperating at the international level; International Cartographic Association (ICA), which promotes cartographic research and teaching, coordinates cartographic research between countries, strengthens contacts and cooperation of the academic society, organises international conferences and exhibitions, participates in other meetings and activities of the international academic society; Open Geospatial Consortium (OGC), which aims to promote creation and implementation of geospacial data transfer standards, and to improve GIS data exchange technological aspects at international level.

28. When formulating goals and learning outcomes of the *Geodesy* study programme, the goals and intended results of the European organizations were considered: Association of Geographic Information Laboratories for Europe (AGILE), with mission to promote GIS academic teaching and research at the European level; International non-profit association, uniting European National Mapping, Cadastral and Land Registry Authorities (EuroGeographics), which aim is Development of European Geographic Data Infrastructure and representation of association members and their competences in Europe and outside its borders; European Spatial Data Research Network (EuroSDR), which aims at developing spatial data acquisition, management and delivery; European Land Information Service (EULIS), which provides reliable, direct and easy access to official land registers in Europe. This portal provides all kinds of information, e.g. the real estate registration rules in different countries. EULIS website provides links to all European property registers and lists information about them. EULIS service offers easy online access to all the official information about the land and other real estate of the participating countries. Real estate registries organizations provide information about real estate to EULIS portal, thus distributing. The Service provides internet information about the legal framework for the registration, real estate transactions and mortgage loan process, services, institutional functions and responsibilities in the real estate transfer process in each participating country. Information on each country can be useful for the register search, it is also used as general information about the local conditions. EULIS has developed a common terminology and translation tool to understand the different real estate law concepts used across the EU. European Land Registry Association (ELRA) considers its main objective improvement of the real estate registration procedures and information on the importance of the real estate and capital markets. ELRA seeks discussing those globally important issues at the European level and attempts providing structure and network for the exchange of ideas. ELRA project CROBECO (cross-border electronic conveyancing) and ELRN (European Land Registry Network) aims to use information and communication technologies effectively and cooperate on issues of real estate register. Permanent Committee on Cadastre (PCC), whose main objective 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. European Parliament and Council directives (INSPIRE) aiming at reducing obstacles between public authorities in sharing data, especially in the environmental field, and providing bigger 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.
29. A number of GKK teachers collaborate and make research at the the VGTU Institute of Geodesy. They take part in the international science programmes that the VGTU Institute of Geodesy is involved in: <http://ap.vgtu.lt/fakultetai/padaliniai/geodezijos-institutas/mokslas/51829#tab-tarptautine-veikla> (Chapter 2. Annex Table 2.3.). This enables them to get 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.

30. Some teachers currently participate in the European project *GEO VET Skills Plus* (*Leonardo da Vinci* programme), which has a mission of exchange 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 autonomic areas of the Nordic countries (Greenland, Faroe Islands and Aaland islands). The main objectives of the program include improving of the quality of education and research, as well as implementation of innovation. The program also seeks to promote cooperation between 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.
31. GKK cooperates internationally with 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 Koszalinska), Poland; Saxion University of Applied Sciences, The Netherlands; Gjovik 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 coordination of learning outcomes on the international scale.
32. The expected learning outcomes of the *Geodesy* programme meet the requirements for the general engineering study field bachelor qualifications 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

33. Upon acquiring the Bachelor of Measurement Engineering qualification, the graduates can work in different state and private enterprises of geodesy and cartography, municipalities, engineering companies, land management services, real estate agencies, or continue their education in the second cycle studies. After obtaining some practical experience they can establish private companies.
34. 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 higher education institutions

35. There are no similar types of university studies in Lithuania in the field of general engineering with *Geodesy* study programme of the first cycle studies granting graduates the bachelor degree in measurement engineering.
36. Non-university studies are available at the Vilnius College of Technologies and Design, Kaunas College, Žemaitija College, Klaipėda State College, but these are significantly different from the Geodesy study programme offered at the Vilnius Gediminas Technical University in terms of the contents of studies, learning outcomes and the amount of credits (Table 2.1.).

Table 2.1. Summary of the VGTU *Geodesy* study programme and non-university study programmes

State code	Programme	Qualification awarded	Scope in credits (ECTS) and mode	Institution
612H14001	**Geodesy**	**Bachelor of measurement engineering**	**240, FT, E**	**Vilnius Gediminas Technical University**
653H14007	Geodesy and cadastre	Professional Bachelor of measurement engineering	180, FT	Vilnius College of Technologies and Design
653H14003	Geodesy	Professional Bachelor of measurement engineering	180, FT, E	Kaunas College
653H14004	Real estate	Professional Bachelor of	180, FT, E	Kaunas College

	measurements engineering	measurement engineering		
653H14001	Geodesy and land management	Professional Bachelor of measurement engineering	180, FT, E	Žemaitija College
653H14006	Geodesy	Professional Bachelor of measurement engineering	180, FT, E	Klaipėda State College

37. Graduates of the non-university studies at the above-mentioned colleges willingly choose extended studies (studies for college graduates aiming to obtain university education) at VGTU, Geodesy study programme. Bachelor qualification degree in measurement engineering is granted to the graduates.
38. VGTU also offers the second cycle Geodesy and Cartography study programme in the general engineering field, which consists of two specializations (Geodetic Networks and Geographic Information Systems) and is especially adapted to continue studies for gaining the Master degree after completing the *Geodesy* study programme. Bachelors of measurement engineering, geography, landscape architecture, land management, forestry and geology can also apply for the second cycle studies Geodesy and Cartography study programme.

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

Strengths	Weaknesses	Improvements
High demand on the labour market (employers asking for contact details and employing even the undergraduates)	Results of those students who choose to work while studying deteriorate	Students can continue studies with their group even if they do not pass examinations. Exams can be passed together with a junior group.
Improvement of the general courses and inclusion of the new ones into programme, useful for students learning specialised courses.	Limited understanding about geodetic projects' economy after completing the bachelor studies.	Practical classes should help to improve the understanding about the economy of geodetic projects. Attention should be paid not only to the general economy basics but to the special aspects as well (since 2014, the content of courses on Economics 1 (presently Economics) and Economics 2 (presently Business projects) was improved).
Part of the lectures is delivered by the social partners, therefore students not only get practically familiar with the new achievements but also get acquainted with prospective employers	The timetable for lectures by the social partners is not stable; therefore employing representatives of the companies is complicated.	Quantitative and qualitative participation rates of the social partners (regarding the programme learning outcomes) should be combined.
Study committee of the Environmental Engineering Faculty, the *Geodesy* 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.	Further improvement of *Geodesy* study programme project is under preparation at the moment.
Study committee of the Environmental Engineering Faculty, the *Geodesy* study programme committee, teachers at the Department of Geodesy and Cadastre are familiar with the EUR-ACE accreditation of engineering programs standard and have analyzed it (8 groups of learning outcomes are planned). Teachers are willing to actively participate updating the learning process.	Currently, the EUR-ACE accreditation standard for the engineering programs declares 8 groups of learning outcomes, but there are no regulating legal acts of the Republic of Lithuania at the moment.	Revision of the legislation acts of the Republic of Lithuania is required.

3. STRUCTURE OF THE STUDY PROGRAMME

3.1. Study plan

39. The *Geodesy* first 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 First Cycle Study Programmes approved on May 29, 2012 by the VGTU Senate Resolution No. 57-1.8.

40. The program 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 – 4 years. Intensity of full-time studies – 60 credits per year. There are two specializations of the study programme: Geodesy and Cartography, and Real Estate Cadastre. If necessary, individual study programmes can be offered.
42. The programme structure corresponds to the study programme defined by the decree of the Minister of Education and Science of the Republic of Lithuania No. V-501 "On Approval of Description of the First Cycle Degree and Integrated Studies" of April 9, 2010 and its amendments. Graduates of the programme are granted bachelor qualification degree (Measurement Engineering Bachelor). All necessary courses are planned in the study programme with overall scope and distribution following General Principles of Bachelor's Degree Studies Curriculum Development (Resolution No. 57-1.8 of May 29, 2012). Conformity of the programme to the legal acts is presented in the Table 3.1.

Table 3.1. Conformity of the first cycle study programme with legal acts

Scope of the Geodesy study programme plan	**ECTS credits obtained within the Geodesy study programme**	**ECTS credits required by the legal acts**
Field of study courses	189 credits	At least 165 credits
General university courses	15 credits	At least 15 credits
Specialization courses	33 credits	Up to 60 credits
Practices	18 credits	At least 15 credits
Final thesis	15 credits	At least 12 credits
Elective courses	8 credits	At least 8 credits
Number of courses studied and accounted for during a term	Up to 7	Up to 7
Number of credits per year	60 credits	Up to 60 credits
Percentage of study field and specialization courses delivered by researchers	93 %	At least 50 %
Overall scope of the programme	240 credits	210-240 credits
Contact hours	Full time studies 43 %	At least 20 %

43. *Geodesy* study programme is composed of the general university courses constituting about 6%, study field course units –79%, speciality courses –15% of the study programme scope. Three practices are planned in the study programme: introductory practice (3 ECTS credits), Geodesy training practice (3 ECTS credits) and professional activities practice (12 ECTS credits, Geodesy and cartography specialization), Real Estate Administration practice ((12 ECTS credits, Real Estate Cadastre specialization). Three-sided agreement between the VGTU, an enterprise and the student is signed for the professional activities practice. Students gain knowledge and practical experience during practices, which helps them to prepare the final thesis.
44. *Geodesy* first cycle study programme study time is divided into classroom hours (lectures, laboratory works, and practical works), consultations, and individual work. Classroom hours constitute 39%, consultations – 4%, individual work – 57% 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.

Descriptions of the study subjects / modules

46. *Geodesy* 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).
47. 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, student achievement assessment criteria, 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.

48. At the end of the study subject card the ties to learning outcomes of the first cycle of *Geodesy* study programme and study subject results as well as assessment methods for the students' achievements are given.

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

49. 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 audit of the study programme, the learning outcomes of the *Geodesy* study programme were updated. Conformity of the *Geodesy* 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.
50. 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 2. Annex 2.1.

3.2. Logic of the programme construction

51. The *Geodesy* study programme is a cohesive entity of subjects. The subjects are distributed throughout semesters in accordance with certain logical principles. Neither subjects nor topics are repeated throughout the programme. The study programme is developed in such a way that students are not able to study some courses without completing the previous ones. Thus, logical relations between course units are ensured.
52. The logical sequence of the study subjects ensures smooth transition from the common university courses, common subjects of the education field and field of study subjects to the courses on special subjects. Study process begins with the fundamental world outlook, humanitarian, social and general theoretical subjects that form the basis for further understanding of the study subjects.
53. Courses of general education field are concentrated in the initial four semesters. The basic subjects of the field of study are distributed from the first to the seventh semester. Distribution into specializations takes place in the fifth semester, when most of the compulsory courses have been passed. Such distribution of subjects by groups in sequence is logical and creates harmonious interrelated ties.
54. Course works (2) are included in some subjects as well as course projects (4). Two subjects are optional and can be chosen from the general university list of the subject modules (4 ECTS credits each). Most of the optional subjects are from the general education field. Complex projects are planned in the sixth and eighth semesters for specialisation subjects' knowledge application and skills training. Preparation of the final thesis starts in the seventh semester and is completed in three stages at the end of the eighth semester.
55. In determining the scope of the studies the time necessary for achievement of the learning outcomes is taken into account. The more complicated are study learning outcomes, the more credits are given to the subject. 240 credits is the appropriate number of credits for students to achieve the intended learning outcomes - to acquire knowledge and skills necessary for measurement engineering bachelor.
56. Scope and distribution of the course unit groups is also regulated by the Guidelines for Structure of the First Cycle Study Programmes, approved by a decree of the VGTU Senate No. 57-1.8 of May 29, 2012. Thus, the programme was developed in accordance with the requirements set in the document. *Geodesy* study programme corresponds to the structure of a full-time study programme with one professional practice (Chaper 3. Annex 3.3.).
57. Taking into account comments and recommendations by the external evaluation experts of the previous assessment to revise the programme subjects (the so-called general university courses) and remove certain courses in natural sciences, adding more social science courses, as well as recommendations to provide more attention to GIS, the list of subjects in the *Geodesy* study program was updated. Course in Chemistry was eliminated (this course was criticized by students, former students and employers). In order to provide more attention to GIS, the course in Digital Technologies of Topography and Cadastre was included into the study programme. Courses in social sciences were revised and modified according to the recommendations from the external experts, employers, and students (courses in Management and Law). Course in Economics 1 was replaced with Economics, and Economics 2 – with the Business Projects.

3.3. Requirements for the students' final theses

58. Final bachelor's thesis (further BD) must be an individual work of applied science or research type. Students should demonstrate having gained enough knowledge, acquired the necessary skills and sufficient experience in the relevant study field (branch), analytical or design work. By the final thesis / project and its defence the student must show his/her creativity, understanding of the social and commercial environment, legislation and finance opportunities, skills to search the information and analyse it, full understanding of the topic, ability to solve the arising tasks, to use the information technology and written communication, correct language usage skills, and ability to properly formulate the conclusions.
59. BD titles and supervisors are approved by the decree of the Dean before the date stated in the study timetable. Lists of students including their BD titles and names of the supervisors are entered into the University Information System's (UIS) study subsystem's BD database by manager of the department, after coordination with the Head of the Department.
60. Having received positive review from the thesis supervisor, BD is further presented for review to a senior teacher of the department. If both reviews are positive, the thesis is then defended at the Bachelor Degree Awarding Commission: here the student publicly and shortly (15 min.) presents, explains and motivates the key ideas of the thesis. Every member of the Commission can ask questions regarding the computations and solutions presented in the thesis. Members of the Commission then enter their evaluations into the assessment sheet. If the final result of the evaluation is questionable, the original quality of the thesis, its novelty, practical application, publications can be taken into consideration.
61. Theses are defended in the Bachelor Degree Awarding Commission (BDAC). BDAC is created following the Descriptor of the Decree of the VGTU Examination Sessions and Final Theses Preparation and Defence Organization No. 748 of 2015-07-30. BDAC consists of 5 competent research specialists and professional practitioners, potential employers of the graduates. At least three members of the commission have to have scientific degrees or pedagogical titles. No more than two thirds of the commission should be from the Faculty offering the study programme. The chairperson of the commission should be a professional practitioner from outside of the VGTU.
62. BDAC composition is approved by the Rector's decree. Project of the decree is prepared by the faculty administrator in coordination with Dean. The project should be presented to the Study Directorate no later than 3 weeks before the beginning of final theses defence.
63. No later than 3 weeks before the final theses defence and/or beginning of the final examinations, the departments deliver to Study Directorate the timetables of the BD defence, final examinations and diploma award time schedules.
64. Results of the BD defence and final examinations are entered into the UIS assessment database no later than 1 day after the BD defence or final examination.
65. 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".
66. 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 Bachelor Degree Awarding Commission.
67. 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 Bachelor 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.
68. Students of the first cycle studies who have completed their theoretical course, but not defended their theses or failed during the defence, or not passed the final examinations, can register for the preparation or defence of the final thesis next year. In such case they have to pay the tuition fee. In accordance with

the regulations of tuition fee for studies and additional services for persons studying at the VGTU, the dean decides on the fee size for the thesis preparation and defence.

69. According to the previously described criteria, the BDAC has evaluated the final theses of first cycle *Geodesy* study programme for the 2013-2015 as follows: excelent-10 – 28 % of the theses; very good-9 –31 %; good-8 – 26%; highly satisfactory-7 – 11 %, satisfactory-6 – 4%, 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 theses is high.
70. After the external assessment of the Geodesy study program, it was recommended to review the assessment process and to reconsider if the assessment of the students' works is critical enough. These recommendations were taken into account. As is obvious from the comparison of the current and previous results of the theses' evaluation, the difference is the following: the number of works receiving the excelent-10 points evaluation is 7 % less (before – 35%, now – 28%), very good -9 point – 6 % less, good-8 points –8 % more, highly satisfactory-7 points – 4 % more, satisfactory-6 points – 2 % more.
71. Titles and supervisors of the 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

72. The first cycle study programme Geodesy 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

73. In the course of the recent three years, classes in the *Geodesy* study programme were given by 80 teachers, 13 of which have already ceased working at the VGTU. On average, 47 teachers were delivering classes annually (10 % of them - professors, 52 % associate professors, 30 % lecturers and 8 % assistants). There are two professors emeritus in the Department of Geodesy and Cadastre.
74. Over the last three years, spontaneous turnover of the teachers at the Department could be observed (7 of 13 teachers who left the Department were over 65 years old). The distribution of the teaching positions is shown in Table 4.1. 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.
75. The practising professionals are included in the teaching process, therefore the number of the lecturers remains constant.
76. Distribution of the employees by gender is in line with the EU guidelines, sufficient balance between men and women is achieved, constituting 43% and 57% respectively (in the academic year 2015/2016 this distribution is in 50%).
77. Information on teachers and teaching courses is given in Annex 8.2., and CVs of teachers are presented in Annex 8.3.
78. According to the teachers' CVs, their academic experience varies from 1 to 45 years. Most of the teachers have experience less than 25 years, i.e. experience of 17% of the teachers does not exceed 5 years, 22% – 6–10 years, 25% – 11–15 years, 13% - 16–20 years and 11% - 21–25 years. The academic experience of the teachers by year intervals is presented in Chapter 4. Annex 4.1.

4.2. Structure of the academic staff by age groups

79. The structure of the academic staff 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* 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	2	3	**5**	10
Associate professor	1	13	3	4	7	**28**	56

Occupied position	Age groups, years					Total	Total, %
	≤30	31-40	41–50	51–60	>60		
Lecturer	0	7	3	2	2	**14**	28
Assitant	2	0	1	0	0	**3**	6
Total:	**3**	**20**	**7**	**8**	**12**	**50**	100
Total, %:	6	40	14	16	24	100	

80. All the teachers fulfil the qualification requirements, 68% of them have PhD. The qualifications of the teaching staff are illustrated by their wide research activities, presented in CVs (Annex 8.3.).
81. 84% of the courses in the study program are taught by teachers with academic degree. According to the legal acts, part of the teachers with academic degrees in the program of such level should make up over 50%. The research experiences of the teaching staff are described in Chapter 4. Annex 4.2. The scientific work experience in case of more than 70% of teachers is up to 15 years , of which 31% have 5 years of the research experience, 21% - 6-10 years, 21% - 11-15 years, 7% - 16-20years, 7% –21 -25 years, 7% - 26-30 years, and the remaining 4% have scientific experience of more than 31 years.

4.3. Ratio of the amounts of teachers and students

82. During the last three years, the number of teachers working in the *Geodesy* study programme was decreasing as well as the number of students (Fig. 4.1.). Detailed data on the ratio between the teachers and students is presented in Chapter 4. Annex 4.4.

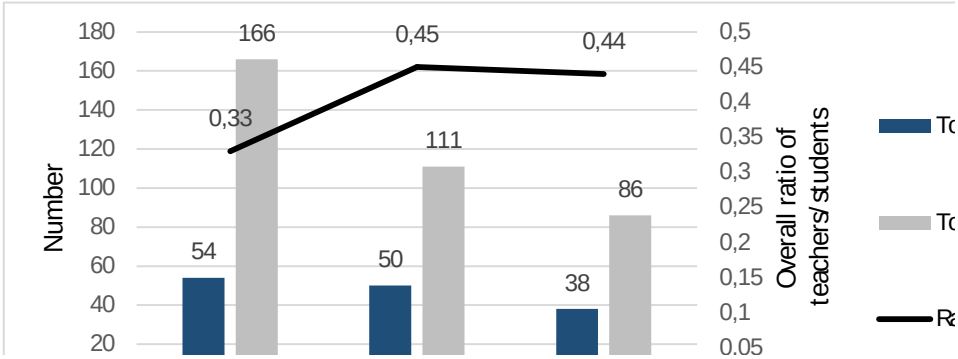

Fig.4.1. Overall variation of teachers and students number in the *Geodesy* study programme

83. On average, 5 professors, 24 associate professors, 14 lecturers and 4 assistants deliver lectures to students in the Geodesy study programme. The number of students during the analyzed period decreased by 48%, the number of teachers decreased by 30%. The overall teachers/students ratio variation during the analyzed period is shown in Fig. 4.1. Due to the increase of the teachers/students ratio, students can better master the material in the theoretical and practical classes and have more time for direct contact with the teachers. This strengthens the special abilities and obtainable knowledge of the students.

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

84. 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 in the course of the tenure. 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.

85. According to the CVs of the teachers working in the Geodesy study programme (Annex 8.3.), during 2013–2015, 30 teachers were involved in the traineeship programmes. The average duration of traineeships was 2 months.
86. According to the main conferences listed in the CVs, the teachers working in the study programme have made 111 presentations at various foreign and local conferences.
87. 9 teachers of the Geodesy study programme took part in the staff mobility programme. Teachers gained experience in the institutions of Poland, Latvia, Norway, Germany, the Netherlands, Denmark, Portugal and Slovenia. 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.
88. Besides being directly employed in the study process of the Geodesy 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

89. 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.
90. One of the key methods for improving professional qualifications of the teachers is participation in the research projects. The teachers of the Geodesy 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, 19 teachers of the Geodesy study programme participated in 33 research projects (Chaper 2. Annex 2. Table 2.3.).

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

91. 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.
92. Since 1992, the VGTU Institute of Geodesy is functioning. 10 teachers of the Geodesy study programme take part in the activities of the Institute, performing production, organizational and research work, which is directly related to the study process.
93. The Laboratory of Geodesy was established in 2011 at the VGTU Civil Engineering Research Centre. Teachers of the Geodesy study programme take part in its work too.
94. Each year, the University organizes courses for development of the andragogical competence for the teachers. During the analyzed period, 5 teachers of the study programme improved their teaching skills by participating in these courses.
95. The level of the foreign 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.
96. Technical staff has an opportunity to go abroad for a week under the Erasmus / Lifelong Learning staff mobility program. Technical staff and teachers may attend computer courses and get the ECDL international standard certificate.

97. The improvement of the professional, productive, educational and management experience of the teachers has an undoubtfully 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

98. Along with the programme under consideration, the majority of professors, associate professors, lecturers and assistants are involved in implementation of other programmes, thus, their teaching workload in the Geodesy study programme constitutes only a small part of the general teaching workload (Chapter 4. Annex 4.3). 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, complex projects, practices, supervising final theses, their reviewing an defence).
99. According to the presented data (Chapter 4. Annex 4.3), during the academic year 2014/2015, the general annual academic work totalled to 6959,4 hours (including 1209,7 hours by professors, 4529,1 hours by assoc. professors, and 1220,6 hours by the others). Part of the general university studies made up 348,9 hours, study field subjects – 3536,7 hours. Part of specialization courses – 1460,2 hours, preparations of the final theses (projects), processing and defence – 1613,6 hours. Among the general university study subjects the workload of the assoc. professors formed 0,6 %, other teachers – 4,4 %. In the study area part, the workload of professors composed of 6,9%, assoc. professors – 34,9 %, others – 9,0%. In the specialization subjects part, the workload of professors composed 7,1%, assoc. professors – 11,7%, others – 2,2%. In the preparation, processing and defence of the final theses (projects), the workload of professors composed 3,3%, assoc. professors – 18,0%, others – 1,9%. In all the in-class activities by the teachers, the analysed programme takes up 38% of time. The main problems related to the teachers' work include high workload, its uneven distribution in relation to semesters, and insufficient means of financial stimulation.

Strengths, weaknesses and improvements of the study programme and staff

Strengths	Weaknesses	Improvements
Competent teachers with sufficient academic and research experience.	Because of the decreasing staff number the workload for teachers increases, since the number of subjects constituting the study programme remains the same.	Reviewing the amount of the academic hours of the study programme in order to enhance the number of hours for independent work.
More than 50% of subjects in the study programme are taught by scientists. Research projects are carried out, providing the data to be used in the study process and for preparation of the final theses.	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.	Attempts to establish the doctoral studies.

5. MATERIAL RESOURCES

5.1. Material basis

100. Academic classes for students of the *Geodesy* study programme are organized in the premises of AIF, Saulėtekio al. 11, Vilnius.
101. 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 second cycle student.
102. Facilities comply with regulations for safety and hygiene and are regularly cleaned. If necessary, they are repaired or renovated according to pre-arranged plans.
103. 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.

104. Departments involved in the study programme 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.
105. 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 (131391) (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.
106. In addition, the department uses for teaching purposes the 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 SCINTREX CG-5, GNSS Receiver Leica Viva GS15, Software for GNSS measurements processing Bernese 5.2, levelling set Leica DNA 0,3 mm, GNSS receiver Trimble 5700 (2 pcs.).
107. 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 Geodesy and Cadastre Training Laboratory (room 2715). The software used by the department according to the courses is listed in Chapter 5. Annex 5. Table 5.1.
108. 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

109. 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.
110. 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 a 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.
111. 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.
112. 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/ etc.

113. 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. Wifi 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.
114. Students and teachers are free to connect to the databases using wifi 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.
115. 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 Engish, 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.
116. 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.
117. Plan for the teaching literature to be issued is made annually. This plan makes part of the general University publishing plan, 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 required for the Geodesy study programme: 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". 100 p.
118. 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.
119. VGTU is also subscribing 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 eJournlas 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).

120. 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 selection 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.
121. 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

122. In the course of 2013–2015, GKK has purchased equipment: total stations (3 pcs.).
123. 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.	The number of instruments used during practice periods is insufficient (depending on the number of students).	Input from business partners to the material base could give dividends in a form of students well-prepared for the labour market.
Participation of the department staff in international projects ensures high level of employees' qualification and encourages interest in and usage for the studies of the most modern equipment.	Lack of financing limits the possibilities to update the instrumental basis.	Some recourses for updating the material basis necessary for the studies can be acquired through participation of GKK in various projects.
Instruments and software are updated depending on the study programme needs and finances available. 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

124. The general admission to the first cycle studies is organized and carried out by the Lithuanian Higher Education Institutions Association for Organization of General Admission (LAMA BPO) authorized by Ministry of Education and Science of the Republic of Lithuania. One LAMA BPO information office is located at the VGTU Faculty of Architecture.
125. Annual requirements for admission to studies are uploaded to the LAMA BPO website (www.lama.bpo.lt) and the site web mastered by the VGTU commission for admission (http://www.vgtu.lt/stojantiesiems). At these websites, all the news related to admission, including deadlines, the competitive mark calculator, study programmes, example of application letter, results of the last 3 years of general admission, minimum requirements for competitive mark, and list of the most popular study programmes can be found.

6.1.2. Competitive grades for admission to studies

126. In accordance to the Article 52 of the Law on Science and Studies of the Republic of Lithuania, persons having at least the secondary education can be admitted on competitive basis to any study programme of the first cycle and an integrated study programme in a higher education institution, taking into account their learning results, the results of the entrance exams or other criteria laid down by a higher education

institution. A list of competitive subjects according to study fields and principles of composition of a competitive grade, a lowest passing entrance grade and other criteria shall, upon the evaluation by a students' representation, be set by higher education institutions and announced by them not later than two years prior to the beginning of an appropriate academic year. General number of the study places is determined by the university based on the potential to ensure the appropriate quality of the studies.

127. In accordance to the order No. V-445 of May 27, 2013 of the Minister of Education and Science of the Republic of Lithuania „Procedure description of top ranking secondary education graduates", the succession of the best graduates is created according to the basic and supplementary criteria. The basic criteria are as follows: grade of the first subject maturity examination or entrance examination; grade of the second maturity examination or annual grade, grade of the third maturity examination or annual grade, grade in Lithuanian language and literature maturity examination. The supplementary criteria include: awards from the international and national science Olympiads and competitions; estimation of motivation; professional experience (admitted to college study programs). Persons can apply to study at the state-funded positions if their secondary school graduation results are above the ones determined by the Minister of Education and Science of the Republic of Lithuania in May 10, 2013 by order No. V-397 „Educational minimum performance indicators setting for individuals claiming to state-funded first-cycle and integrated study places". Persons with lower grades can apply to study at the positions non-funded by- the state.
128. To be admitted to the *Geodesy* study programme one should meet the basic criteria listed in Table 6.1.
129. 0–100 score scale for basic criteria was used till 2014. Since 2014, the 0–10 score scale is used. The grades of the maturity and entrance examinations presented in 0–100 score scale are divided by 10 and multiplied by an appropriate weighted coefficient, listed in Table 6.1., then summed up. The score of the additional criteria is added to the obtained sum.

Table 6.1. The composition of the competitive score for the applicants to the *Geodesy* study programme of the first cycle studies (2012-2015)

Study	Competitive subjects							
program me	First		Second		Third[1]		Fourth	
	Subject	Weighted coefficient	Subject	Weighted coefficient	Subject	Weighted co-efficient	Subject	Weighted co-efficient
Geodesy	Mathe-matics	0,4	Physics	0,2	History /Biology/ Geography /Arts/ Information technologies / Physics / Chemistry / Qualifying examination3 / Foreign language	0,2	Lithua-nian language and literature	0,2

[1] The third subject should not coincide with the second subject.

130. If the person has not taken the state maturity exams intended for the study programme or field, the relevant examination grade is then replaced by the corresponding subject annual grade from the Maturity Certificate (or, the annual grade can be replaced with the school maturity examination grade upon agreement). Re-computation is based on the order No V-445; annex 3 of May 27, 2013 of the Minister of Education and Science of the Republic of Lithuania. Exceptions listed here are not applied to the first subject of study programme or the field with highest weighted coefficient (except for persons with the Maturity Certificate marked with "Maturity examinations not taken (exempted)" and Lithuanian language and literature (Lithuanian (native) till 2013 or Lithuanian (state) language) subject.
131. In case of persons holding the Maturity Certificate marked with "Maturity examinations not taken (exempted)", instead of the grades from the maturity examination, annual grades are recomputed according the order No. V-445, annex 3 of May 27, 2013 of the Minister of Education and Science of the Republic of Lithuania. Separate maturity examination grades and annual grades re-computation principles are listed in the annex 4 of the above mentioned order.
132. According to the decree No. V-435 of March 16, 2011 of the Minister of Education and Science of the Republic of Lithuania "On the procedure of approval of international foreign language examinations

and equivalents to the state maturity examination of foreign language determination order", the indicated international foreign language examination grades are scored and recomputed.

133. Competitive scores of the students admitted to the *Geodesy* study programme during 2012–2015 are presented in Table 6.2. The maximum possible competitive score in 2013 was 20.6, from 2014 – 10.

Table 6.2. Competitive scores of applicants admitted during 2013-2015 to the *Geodesy* study programme first cycle studies (state-funded):

Admission and selection		**2013**	**2014**	**2015**
Number of applications submitted		312	260	159
Number of applications submitted under the first priority (state-funded positions)		34	30	31
Number of admitted students (state-funded and non-funded positions)		20	22	27
Competitive scores of the admitted students	The highest score	17,12	7,22	8,18
	The lowest score	14,24(6,91)	4,06	3,89
	The average score	15,68(7,61)	5,64	6,04
Transition score to	State-funded position	16,30(7,91)	4,04	3,89
	State non-funded position	14,21(6,89)	3,60	1,94

134. On the grounds of the presented data, it can be concluded that students with sufficiently high competitive scores were admitted to the *Geodesy* study programme in the course of 2013-2015.

6.2. The study process

135. To ensure that studies meet the appropriate requirements and are rational, their organization follows principles of the study programme structure, individual plans and timetables. 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 Academic Affairs Office. 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.
136. 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.
137. 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, compiled by the university information system (UIS) in order to establish the timetable for the session's exams and consultations. 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. The timetable is then presented to the employee at the Dean's office responsible for the compilation of the exams' timetables.
138. 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 the teachers.
139. The dates of exams 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 that the third day of the session. One consultation has to precede each exam. To ensure the most even occupancy of the academic premises, the timetable for the exams is made in accordance with the timetable of the lecturing time.
140. The approved timetables for exams and consultations are available on the VGTU site at www.vgtu.lt under "Studies" or at https://medeine.vgtu.lt/tvarkarastis/tvarkarastis.jsp.
141. 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.
142. During the 7th semester of studies the students of the Geodesy study programme, specializing in geodesy and cartography have 8 weeks of the professional practice, while those specializing in real estate, have

practice in the real estate management organized at the national institutions or private companies. Diligent and talented students are frequently offered jobs after completing this practice.

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

143. Under the *Geodesy* study programme, there are state-financed and non-state financed full-time and extended study places, as well as non-state financed study places for the college graduates. The figures of the enrolled and studying students are presented in the Table 6.3.

Table 6.3. Number of enrolled students to *Geodesy* study program first cycle studies

Year	Admitted to full-time studies			Admitted to extended* studies			Admitted to university studies for college graduates **	Admitted
	vf	vnf	Total	vf	vnf	Total	vnf	Total
2013	15	5	20	2	2	4	14	38
2014	19	3	22	2	4	6	7	35
2015	21	6	27	-	-	-	2	29

*-extended studies of 6 years; **-University studies for college graduates aiming to obtain university education.

144. The analysis of the data on Table 6.3. shows that number of students admitted to the Geodesy study programme decreases. This is likely to be affected by the generally decreasing number of the secondary schools graduates in Lithuania, the increasingly available possibilities to study and work at the European universities or worldwide, the longer time for the university studies and higher costs in comparison to the college studies.
145. The admittance to the extended studies was first launched in 2012. This 6-years-long study programme was meant for the working people in need of a more liberal study schedule. The number of the students admitted was not high for this study form (see Table 6.3.), therefore in 2015 the decision was made to terminate admittance to these studies.
146. To the university studies for the college graduates those graduating from colleges under relevant profiles of study are admitted on the competitive basis according to the average grade of subjects weighted grades listed in diploma supplement. The study time is 2 years, the volume is 120 credits. The electronic guidance provided at http://www.vgtu.lt/norintiems-studijuoti/kolegiju-absolventams/islyginamuju-ir-papildomuju-studiju-elektroninis-vedlys/ enables the candidates to find out if their profile allows them to enter the Geodesy study programme. There is increasing interest in this form of studies.
147. The Table 6.4. shows the percent of the admitted students vs. graduating ones. However, this data does not discriminate between the studies accomplished under the planned time or those prolonged because of taking the academic breaks. During three years, 8 students returned to complete their studies. According to the AIF annual report for the year 2014, the graduates of the Geodesy study programme make up 23–24 percent of the total number of graduates at this faculty.

Table 6.4. Variation of the number of students

Admission year	2009	2010	2011
Graduation year	2013	2014	2015
Number of admitted students	83	85	48
Number of non-graduated students	28	29	9
Number of graduate students	55+3*	56+3	44+2
Ratio (graduate/admitted) in %	66	66	92

* previously admitted graduates.

148. Among the chief implicit reasons for the first year students' decisions to terminate their studies, the insecurity regarding the choice of the study programme can be mentioned. Those entering the university in 2009-2014 could indicate as many as 16 desired study choices. Therefore even persons inclined to study social sciences or humanities ended up studying technical disciplines. The inappropriate choices grew obvious already during the first year of study, in the course of which the basic subjects (mathematics, physics) were taught. The lack of knowledge in these subjects resulted in termination of studies already during the first year. In order to enhance the achievements in the above-mentioned

subjects, the VGTU started organizing complementary courses and instruction during the first semester. This yielded good results, as students acquiring additional knowledge were able to continue their studies. In 2011, the number of admitted students diminished, but 91 percent of them graduated (see Table 6.4.). It may be concluded, that since 2011, motivated students sure of their choice started entering the Geodesy study programme.

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

149. 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. For the first semester, the student groups are appointed with teachers - tutors, who supply the students with all the necessary information.
150. All the students are able 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. The teachers' counselling time is available on the VGTU website. The teachers' e-mails can be found on the department website, under "Contacts".
151. 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. In the course of three years, there was only one student studying under individual program and acquiring the lacking credits for entering the second cycle of study.
152. Thanks to the activity of the Integration and Career Office of 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 it presents to the motivated young people, teachers and researchers.

Social support

153. 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 "Palepe", 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.
154. 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. More information on social scholarships is available at www.vsf.lt (The National Studies Foundation). The personal scholarships are granted by the rector's order for excellent achievements in studies and research activities.
155. 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.
156. 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.
157. ***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. From 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".
158. ***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.

159. ***Study loans.*** The loans may be given for tuition fees payment (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. To apply for a loan, students have to register on the Foundation website (www.vmsfondas.lt). The loan is started to be repaid within a period of no more than 2 years after graduation or termination of studies and has to be repaid within 15 years, making instalments every quarter (up to 23 euros) plus interest. Every year, the interest size (not bigger than 5 %) is set by the Government of the Republic of Lithuania, and is indicated in the loan agreement.
160. ***The students' accommodation in dormitories***. Rooms at the student dormitory are allocated by VGTU in compliance with a single, officially approved and rather complicated methodics, which is supported by the Students' Office. Under this methodics, not only the financial situation, but also the distance from home, the applicant's year of study (the lower course is a priority), family status (whether a student has both parents, or whether there are disabled members in the family), social activities (participation in the representational collectives is a priority) are evaluated. This data has to be certified by documents, submitted by the applicant.
161. The rooms at the dormitory can be provided only to the full-time regular students. The students under the extended studies programme also have a possibility to rent a room during the exam sessions, but the faculty does not keep records for the number of such residents.
162. Those applying for the place at the dormitory have to submit applications to the name of the dean at the Dean's office of their faculty. The applications are examined by the specially appointed employees of the faculty. The allocation of the residence place is certified by a special decree of the dean. More detailed information can be obtained at (http://www.vgtu.lt/media/files/1/tvarka.pdf).

Number of students taking part in mobility programmes

163. 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.

164. 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. The mobility of students of GKK and AIF study programmes in the course of three recent years is presented in Figure 6.1.

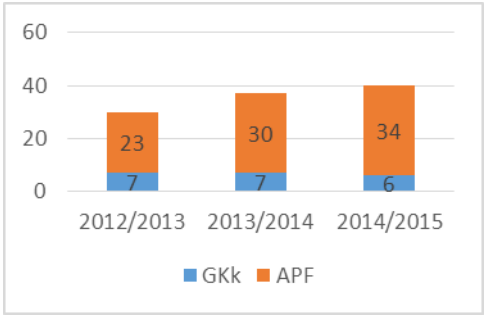

Fig. 6.1. Number of students taking part in mobility programmes

165. According to the data on Figure 6.1., 6-7 students of GKK leave to study abroad under Erasmus programme on yearly basis, which makes up more than 20 percent of all the amount of the AIF student mobility.
166. Since 2009/2010, the Erasmus has enhanced the practice mobility at the AIF. The students of geodesy are noted for this activity as well. Most frequently they go for practice in Spain, Germany, Poland, Latvia, Estonia, etc.
167. Starting 2013, every summer AIF hosts practice for students from the California Polytechnic State University (USA). The special programme for the international summer school is aimed at stimulating

the international communication in research. The guest students work together with the students of VGTU. The practice also includes performing of the geodetic measurements.

6.4. Assessment system of students' achievements

6.4.1. Principles of assessment system of students' achievements

168. In the Geodesy study programme, the criteria for assessment of 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 student's 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 volume established by the subject programme (see Table 6.5.).

Table 6.5. 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

169. The studies of each study subject module are completed with a settlement. The settlement is assessed in the form of a mark or "passed/failed". The following settlement types are foreseen in the study programme: examination (E), examination before session (E1), credit (Į), course project (KP), course work (KD), complex project (KS), final thesis/project (BD). Assessment criteria are described in "VGTU description of students' assessment procedure". Every teacher presents and explains the composition of the assessment grade to students at the beginning of the course.

170. 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 examination 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 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. 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 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.

171. Every examination results are entered into UIS examinations sessions database within two calendar days 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.
172. After the announcement of 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.
173. After each subject exam, students can fill in the survey questionnaire and give their opinions on each subject taught and about 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 programme.
174. First-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 having one or two academic debts (in the spring semester after September 30), while continuing studies with their group, have a week 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.
175. If the students after taking exams at the commission 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 next year of study under the status of students paying the full study costs.

Evaluation of the final projects

176. The final thesis / project (BD) is meant for the students to demonstrate their knowledge of the technical requirements and legal acts, their capacity to implement fundamental and special knowledge to solve practical tasks, their awareness of the requirements associated with the measurement engineering activities, their self-sufficiency and capacity for fluent and correct self-expression.
177. All the study directions and study programmes offered by VGTU include interim assessments of the BD.
178. For the BD 1, the survey of the relevant literature and the preliminary program of the project have to be completed. This makes up to the 20 percent of the whole work and has to be finished and assessed by the end of the session following the 7^{th} semester (in case of extended studies, the 10^{th} semester). The BD1 assessment is carried out by the teachers of the department during the review of the projects. BD 1 is evaluated with a credit.
179. For the BD 2, tasks scheduled in the BD program for this stage have to be completed. This makes up to 20 percent of the work and has to be finished and assessed by the end of the session following the 8^{th} semester (in case of extended studies, the 11^{th} semester). The BD2 assessment is carried out by the teachers of the department during the review of the projects. BD 2 is evaluated with a credit.
180. For the BD 3, the project has to be fully completed and presented to the teachers of the department 1-2 weeks before the public defence of the thesis takes place at the commission for awarding the bachelor degree. BD3 is evaluated with a credit and permission to defend the thesis at the commission.

181. The final thesis for the bachelor 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 reviewer are mere recommendations and do not affect the final assessment.
182. The BD defence results are entered into the UIS database of academic achievements no later than in the course of 24 hours following the defence.

Measures to ensure fair studies

183. 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.
184. 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.
185. Before submitting the coursework, complex work, final project and/or 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.
186. 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.
187. 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.
188. From 2015, along with the study contract, the students sign the declaration of integrity.

6.5. Graduate employment

189. Graduates of Geodesy study programme are employed by the state owned and private companies such as National Land Service under the Ministry of Agriculture of the Respublic 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.
190. Graduates completing the *Geodesy* studies and those having 2 years of experience within geodetic companies 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 qualificative examination passed. Such courses are organized by GKK as well.
191. In the field of geodesy, contrary to others, 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.
192. According to the survey carried out by AIF, it can be stated that the number of specialists in geodesy is sufficient (according to 40% respondents), except for those with high qualifications, i.e. with the university education (50% 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 practicians; and geodesists – constructors of metal and reinforced buildings.
193. 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 interested in 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
Studies provide possibilities for students to get easily integrated into the work of not only Lithuanian, but also foreign companies. Students start communicating with the social partners already from the first year of study, when they perform the introductory practice. Subsequently they enter the labour market as result of the industrial practice.	Because of the demographic situation and emigration the number of the young people willing to study is decreasing.	Searching for modern ways to popularize the speciality. 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.
The students can twice a year participate in the Erasmus exchange programme and study at the foreign universities. They can also go abroad to write and defend their final works.	If students fail entering the state-financed studies, they decline the possibility of the non-state financed studies because of the rather high study costs.	Encouraging students to use the exchange programmes for travelling to the foreign universities.

7. MANAGEMENT OF THE STUDY PROGRAMME

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

194. The Study Programme Committee is supervising and updating the Geodesy study programme in accordance to 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. Teachers from departments are also involved in the implementation of the programme.
195. For the 2015/2016 academic year, new AIF Study Committee was approved, incorporating a representative from students as well.
196. The Geodesy 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 two student representatives and a social partner in the Committee.
197. The *Geodesy* 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; analyzing 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.
198. 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.
199. Following the fall and spring sessions, the study results and quality are analyzed. 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.
200. 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

201. 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.
202. 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 structurised.
203. 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.
204. 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 University. According to the teachers' assessment procedure, defined by the resolution No. 55-2 adopted by the Senate of the Vilnius Gediminas Technical University on January 31, 2012, 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.
205. 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. More information on the results of visiting of the lectures is given in Chapter 7.8.
206. 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. For example, according to the students' opinion and results of visiting the lectures during the academic year 2014/2015 it was decided to replace the module Sustainable Living Environment with another one. Also, as a result of visiting the lectures, a discussion with the Faculty of Business and Management was initiated regarding the contents of the module Economics 2. Based on the proposals received, this module was improved to meet the objectives of the study programme better.
207. To improve the quality of the introductory and professional practice, surveys by students and by the social partners are conducted every year. This allows selecting the best places for practice and helps the practice managers to form an opinion on the particular of companies' performance, their needs and the level of the students' theoretical knowledge. Practice has become the key source for the final theses.
208. 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 work and the achieved results during the inspection process.
209. On the Facebook profile of the department (https://www.facebook.com/Geodezijos-ir-kadastro-katedra-VGTU-422320964631695), impressions on practices, studies, and current news are shared.
210. 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 studying Geodesy 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 and professional practices at the Institute. Many students write their final theses on topics related to the activities of the Institute of Geodesy.

211. 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.
212. The internal control of the study quality helps implementing the general study plans of the University and fulfilling the requirements for their realization. The basic requirement valid to all the University studies is the continuous improvement of the study quality.

7.3. Summary of the last evaluation report

213. The previous external evaluation of the Geodesy 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 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 (Annex 8.5.). It was stressed that the measurement engineering is a rapidly developing branch of research, and the teaching staff follows the news in this field and is well-prepared for the work.
214. The international expert group presented its main recommendations as follows: 1) The definition of the aims and learning outcomes of the study program should be revised in order to fit EUR-ACE framework standards for the accreditation of engineering programs. Attention should be paid to the absence of links between the programme learning outcomes and the results of the study subjects and teaching methods as well as students' assessment methodologies. A matrix of the relations was missing, learning outcomes seems to be created by following rules in rather artificial way, but not to benefit the learning and teaching processes; 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 management of the program should map the area of influence of the particular study program on a national scale as well as relate it to the other institutions providing similar education; 4) The review team advises the management of the program to perform a thorough scrutiny of the courses in the program part under general university subject, dismissing some natural science courses, and introducing more social science courses. The criteria for including fundamental courses should be that the specific learning outcomes of the fundamental courses compares to explicitly stated, needed prerequisites for the core courses of the Geodesy study program; 5) Evaluation group recommends to improve process of quality assurance of Geodesy study programme, which is related with determination of procedures and various information readability and accessibility (matrix of the relations between learning outcomes of the program and subjects (courses)); 6) Recommendation was given leading academic and scientific personnel to develop a more structured approach and a strategic vision for the further development of the program. Research areas more should include Lithuanian infrastructure for spatial information portal and development related services; 7) It was recommended to pay special attention to the increasing age of academic staff and possible lack of academic staff which ensures further training; 8) 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 (Annex 8.5).
215. Changes implemented in the Geodesy study programme and decisions made following the evaluation of 2013 are presented in Chapter 7.11.

7.4. Documents regulating management of the programme

216. 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.

217. The study quality is ensured in accordance with the decrees of the VGTU Senate and decrees by the Rector of VGTU (Chapter 7 Annex 7.1).
218. 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

219. The quality of the University studies is monitored using a variety of traditional monitoring tools, by means of which the data collected helps establishing the current situation and providing measures for the quality improvement.
220. 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.
221. 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.
222. Three types of student surveys are constantly carried out at the VGTU: 1) A survey of all the university students on the courses taught and the teachers conducting the teaching; 2) First cycle students opinion survey on their choice of the University studies; 3) Second cycle first year student survey on the quality of the Bachelor's Degree studies. A survey about the study conditions was launched in 2012.
223. 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.
224. 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>.
225. 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.
226. Graduates are also questioned during the GKK qualifying courses.

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

227. Social partners are involved into the GKK study programs evaluation and improvement processes. Social partners are also involved in the self-assessment preparation group.
228. At the meetings of the faculty and department study committees, student representative is taking part.
229. 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.

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

230. Social partners evaluate the study process, the quality and content of the studies.
231. 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.

232. 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.
233. As mentioned in Chapter 7.2, students can express their views on the Geodesy 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.
234. 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.
235. 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.
236. 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.
237. The social partners and employers contribute to organizing the introductory and professional practice. During introductory practice, students visit 3-4 companies, get familiar with their activities and instrumentation used. During professional practice, employers evaluate the level of the students' readiness for the professional activities.
238. 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.
239. 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

240. 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 programą). The information is presented in Lithuanian and English. The information on studies is given in the Chapter 3 of this report.
241. 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).
242. 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 high school curriculum.

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

243. Information on the quality of the *Geodesy* study programme from the social partners is accumulated in the GKK survey forms and on the VGTU webpage (see Chapter 7.5.).
244. Decisions on the updates of the *Geodesy* study program and other resolutions are stored on the records of the GKK study committee.
245. Faculty study committee resolutions are stored at AIF.
246. 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

247. 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).
248. 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. 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%20savianalizs%20suvestin%20angl%20ka/Forms/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.
249. Teachers can access the survey results on their courses in the VGTU Information System "Alma Informatika".

7.11. The most important changes inspired by the results of the previous external evaluation

Conclusion of the previous evaluation	Achievements
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.	Learning outcomes of 2014 study programme from 4 goups (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. 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 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 program improvement project is under preparation. 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.
2. The further development of learning outcomes may benefit form comparing with the study resources provided by the Canadian Board of Examiners for Professional Surveyors (CBEPS), especially learning outcomes for each of the 11 core and 4 elective subjects in geodesy.	While formulating Geodesy 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

Conclusion of the previous evaluation	Achievements
	guide requirements.
3. The management of the program should map the area of influence of the particular study program on a national scale as well as relate it to other institutions providing similar education, e.g. professional bachelor study programs.	There are no similar types of university studies in Lithuania in the field of general engineering with Geodesy study programme of the first cycle studies granting graduates the bachelor degree in measurement engineering. Non-university studies are available at the Vilnius College of Technologies and Design, Kaunas College, Žemaitija College, Klaipėda State College, but these are significantly different from the Geodesy study programme offered at the Vilnius Gediminas Technical University in terms of the contents of studies, learning outcomes and the amount of credits. Graduates of the non-university studies at the above-mentioned colleges willingly choose extended studies (studies for college graduates aiming to obtain university education) at VGTU, Geodesy study programme. Bachelor qualification degree in measurement engineering is granted to the graduates. Purpose of the Geodesy study programme is closely related to the VGTU strategic goal – preparation of specialists and scientists of highest qualification, with regards to the labour market development trends and needs, processes of European integration and strategy of Lithuanian development. Reorganization of study programme through the project has created conditions for existing study programmes at VGTU AIF to obtain closer topographic and interdisciplinary links, and for the students to acquire wider competence for solution of questions of sustainable development, ability to work in mixed working groups. Since legal acts of the Republic of Lithuania are adjusted with international legal acts it is possible to state, that Geodesy first cycle study programme fits for preparation of specialists with qualification of VI level. Their work could be characterized as complex, performed individually dealing with variety of tasks and in need to be adjusted to constant changes. Such specialists need to have sufficiently developed skills of self-education.
4. The review team advises the management of the program to perform a thorough scrutiny of the courses in the program part under general university subject, dismissing some natural science courses, and introducing more social science courses. The criteria for including fundamental courses should be that the specific learning outcomes of the fundamental courses compares to explicitly stated, needed prerequisites for the core courses of the Geodesy study program.	Rapidly developing new improved methods of topographic maps creation require students to get acquainted well in advance with new technologies and software then is possible trough current study program. Taking into account the conclusions of the evaluation by the external experts, responses from the social partners and students, the following changes were made in 2015: the Chemistry course FMCHB11204 was replaced with the course APGDB15006 Optical Geodetic Instruments. The study programme was supplemented with the course APGDB15001 Digital Technologies of Topography and Cadastre. Course APPEB11195 Renewing Energy Technologies was replaced with APGDB15002 Engineering Geodesy 1, while APGDB14002 Engineering Geodesy was replaced with APGDB15003 Engineering Geodesy 2. The course APASB11115 Technologies of Waste Management and Re-use was removed. This enabled to extend the following courses: APGDB15004 Applied Geodesy (Specialization of Geodesy and cadastre), APGDB15005 Cadastral Measurements of Constructions (Specialization of Real Estate Cadastre).
5. A need for deeper treatment of legal aspects was manifestly established and should be accommodated for.	Legal questions are studied during the following study courses: Cadastre and Administration of Real Estate, Land Management and Administration, Formation, Register and Hypothec of Real Estate, Law, Complex Project of Territory Mapping, Complex Project (Real Estate Formation)
6. The review team strongly advises to improve the process of quality assurance of the Geodesy study program. This regards the design of procedures, but especially the readability and availability of the various pieces of information. For example, a matrix	Matrix of the relations between learning outcomes of the program and subjects (courses) was created. It was used for updating expected learning outcomes and for new study courses creation.

Conclusion of the previous evaluation	Achievements
of the relations between learning outcomes of the program and subjects (courses) must be established. Support in this endeavour through professional expertise might be considered.	
7. The review team advises that the core lecturers of the program and the (academic) leadership of the department develop a strategic approach with a coherent vision on the development of this academic and professional field. This should serve as a framework for a more structured program development. The pressure for change is strong and continuous in this domain.	Approved monitoring indicators of development strategy of 2014-2020 (Senate resolution No.4-3 of September 10, 2013) (http://www.vgtu.lt/media/files/1/pletros-strategija.pdf). For better VGTU study and/or research departments involvement into solution of strategy tasks, better visions of the departments development compatibility "Description procedure of VGTU study and/or research departments strategic planning" was approved (May 6, 2014, RI No.413) where activity effectiveness criteria are foreseen. Activity plans for 2014-2016 of university studies and/or research departments were prepared and approved by councils of the departments.
8. The review team strongly advises to review the assessment process and attitude to check whether the assessment of students work is sufficiently critical.	Notes and remarks of external audit were taken into account. Assessment of students' final thesis before and after external evaluation differs: the excelent-10 points evaluation is 7 % less (before – 35%, now – 28%), very good -9 point – 6 % less, good-8 points –8 % more, highly satisfactory-7 points – 4 % more, satisfactory-6 points – 2 % more.

The strengths, weaknesses and improvements of the study programme management

Strengths	Weaknesses	Improvements
• Advanced and constantly updated system for the student surveys. • 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.	• There is a lack of systematisation in conducting surveys of teachers, graduates and the social partners. • There is no database on the graduates' employment. • Students lack skills in leadership and project management.	• Developing common, systematized university-wide questionnaires for teachers, graduates and the social 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.