



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO

**STUDIJŲ PROGRAMOS**

*GEODEZIJA (valstybinis kodas – 612H14001)*

**VERTINIMO IŠVADOS**

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**EVALUATION REPORT**

*OF GEODESY (state code – 612H14001)*

**STUDY PROGRAMME**

At VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

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## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Geodezija</i>
Valstybinis kodas	612H14001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Bendroji inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė (4)
Studijų programos apimtis kreditais	240
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Matavimų inžinerijos bakalauras
Studijų programos įregistravimo data	2013 m. liepos 1 d.

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## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Geodesy</i>
State code	612H14001
Study area	Technological Sciences
Study field	General Engineering
Type of the study programme	University studies
Study cycle	First
Study mode (length in years)	Full-time (4)
Volume of the study programme in credits	240
Degree and (or) professional qualifications awarded	Bachelor of Measurement Engineering
Date of registration of the study programme	1 July, 2013

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The Centre for Quality Assessment in Higher Education

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## I. INTRODUCTION

### 1.1. *Background of the evaluation process*

The evaluation of on-going study programmes is based on the **Methodology for evaluation of Higher Education study programmes**, approved by Order No 1-01-162 of 20 December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC).

The evaluation is intended to help higher education institutions to constantly improve their study programmes and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: *1) self-evaluation and self-evaluation report prepared by Higher Education Institution (hereafter – HEI); 2) visit of the review team at the higher education institution; 3) production of the evaluation report by the review team and its publication; 4) follow-up activities.*

On the basis of external evaluation report of the study programme SKVC takes a decision to accredit the study programme either for 6 years or for 3 years. If the programme evaluation is negative such a programme is not accredited.

The programme is **accredited for 6 years** if all evaluation areas are evaluated as “very good” (4 points) or “good” (3 points).

The programme is **accredited for 3 years** if none of the areas was evaluated as “unsatisfactory” (1 point) and at least one evaluation area was evaluated as “satisfactory” (2 points).

The programme **is not accredited** if at least one of evaluation areas was evaluated as “unsatisfactory” (1 point).

### 1.2. *General*

The Application documentation submitted by the HEI follows the outline recommended by SKVC. Along with the self-evaluation report and annexes, the following additional documents have been provided by the HEI before, during and/or after the site-visit:

No.	Name of the document
1	Relation Matrix of study subjects and program results
2	Plan of the full-time Bachelor's degree studies
3	Compatibility of the study results, with type and cycle
4	Course descriptors

### ***1.3. Background of the HEI/Faculty/Study field/ Additional information***

Vilnius Gediminas Technical University (hereafter - VGTU) is a state higher education institution with a history tracing back to 1956, when the Branch of Kaunas Polytechnic Institute was established in Vilnius. In 1969 it started functioning as an independent higher technical school and was reorganized into Vilnius Technical University in 1990.

VGTU consists of faculties, departments, scientific and study laboratories, scientific and academic institutes and centres. It is one of the biggest universities in Lithuania and strives to become the leader in technology and engineering studies in the Baltic States. VGTU is an active member in many international organisations and participates regularly in a variety of scientific research and educational international programmes.

The Department of Geodesy and Cadastre has been publishing a periodical scientific journal since 1963. Studies in Geodesy were delivered since 1969. The Institute of Geodesy has been functioning at VGTU since 1992.

The Geodesy study programme comprise full-time studies during 4 years, comparing to 240 ECTS and it is designed with a structure based on the European directives for Higher Education (Bologna Process). Graduates are awarded a Bachelor's Degree in Measurement Engineering. 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.

In Lithuania there is no similar type of university studies in the field of general engineering granting graduates the Bachelor degree in measurement engineering. Non-university studies are significantly different from the Geodesy study programme offered at the VGTU in terms of the contents of studies, learning outcomes and the amount of credits (Table 2.1 page 10 of SER). Non-university studies offer the "Professional Bachelor's degree"; those graduates are mainly educated for practical work instead of scientific work. They usually study for three years only with 180 ECTS. If they want to enter the Master studies at VGTU, they would have to complete a supplement study for one year.

The last assessment of the programme was carried out by an external international expert team and took place in 2013. This is the second external evaluation of the programme.

### ***1.4. The Review Team***

The review team was assembled in accordance with the *Expert Selection Procedure*, approved by Order No 1-55 of 19 March 2007 of the Director of the Centre for Quality Assessment in Higher

Education, as amended on 11 November 2011. The Review Visit to HEI was conducted by the team on 2<sup>nd</sup> May, 2016.

1. Prof. Dr. Bernd Teichert (team leader), former professor at the University of Applied Sciences, Dresden, Department of Surveying and Cartography; Research assistant (Physical Geodesy) at the Technical University of Berlin, Germany.
2. Assoc. Prof. Peregrina Eloina Coll Aliaga, associate Professor in the Cartographic Engineering, Geodesy and Photogrammetry Department, Politechnic University of Valencia, Spain.
3. Ms Vytautė Juodkienė, Lecturer at Department of Geodesy at Kaunas College, Lithuania.
4. Mr. Audrius Petkevičius, CEO of LLC „Urbanistika“, Lithuania.
5. Ms. Neringa Vaiciunaite, PhD student of Materials Engineering at Kaunas University of Technology, Lithuania.

## **II. PROGRAMME ANALYSIS**

### **2.1. Programme aims and learning outcomes**

The reasonably defined aim of the Geodesy study programme 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. Graduates can work in the state and private enterprises involved in Geographic Information Systems (hereafter - GIS) technologies to solve tasks related to geodesy, cartography, real estate cadastre and registering or continue their education in the second cycle studies at this Department.

Aims and learning outcomes of the programme are based on the labour market needs, both, students and social partners confirmed this during on site visit. The detailed description of the goals and study results of the Geodesy study programme is presented on the VGTU website and on the website for the applicants. Both of these two web pages are available in English. Furthermore, websites are frequently visited by high schools' pupils, students and social partners, thus the goals and the study results can be easily accessed (page 7 of SER).

The learning outcomes of the study program are well defined. According to the recommendation of previous external evaluation in 2013, learning outcomes were recently updated following EUR-ACE framework standards with 6 learning outcome groups for the accreditation of engineering programme: Knowledge, Investigations, Engineering analysis, Engineering design, Engineering practice and Personal and social skills (according to documents, mentioned in 1.2. part).

One of the most important evidences for reaching the learning outcomes is the quality of final theses. The final theses are completed in the last semester with the public defence of the work at the commission for awarding the qualification degrees. Many students write their final theses on topics related to the activities of the Institute of Geodesy. This is in accordance with the students and the alumni's as well. The topics of the bachelors' degree theses meet the expectations of the reviewing team, evaluation team agreed on theses assessment. All the presented final theses were written in Lithuanian with short English summary, foreign literature has been used.

The reviewing of the study results is annually supervised by the Committee of the Geodesy study programme and the Study Committee of the Faculty of Environmental Engineering (page 7 of SER). Social partners and students are also involved in the reviewing process as members of both committees. Feedback comes from graduates, employers and geodetic associations; student surveys are carried out as well.

The name of the programme, its learning outcomes, content and the qualifications offered are compatible with other Universities in Europe. An agreement with Riga Technical University for the joint Master's degree study programme was signed in 2014. According to the agreement, both universities will establish a joint Master degree. The common study programme will be entitled "Innovative Solutions in Geomatics" and will be taught in English.

## **2.2. Curriculum design**

According to the SER, the curriculum design complies with the national legislation for the bachelor programmes. More specifically, the total volume of the academic and individual work hours of the study subjects and the respective volume of the individual study subjects conform to the legal acts of the University Academic Regulations as well as the valid legislation acts of the Republic of Lithuania (Table 3.1, page 12 of SER). The information provided in this table shows: the field of study courses contain 189 credits and the general university courses 15 credits, specialization courses 33 credits, practices 18 credits, final thesis 15 credits and 8 credits for elective courses. The duration of the studies is 4 years (240 credits) with two specializations of the study programme: Geodesy and Real Estate Cadastre. The former specialization contains in general all fields of real surveying and the second one is specialized for working with land management services and real estate agencies. These specializations are very common within European Universities and according to social partners; both specializations are needed in the labour market of Lithuania and other countries in Europe.

The detailed descriptions of the study subjects are presented in Annex 8.1 and it shows, that the Geodesy study programme comprises courses distributed continuously and logically during semesters; they are not repetitive. Subjects are well described in the study cards (Annex 8.1). On top of these study cards one can find relevant basic course information, followed by further information (title, study cycle, study programme, assessment criteria for the student's achievements, and recommended literature, etc.). The content of the subjects seems to be consistent with the type and level of the studies.

According to the answers of the students, alumni's and social partners, there are some lectures which are missing or should be given more compliance, like: Remote sensing and GIS, lectures of data modelling and modern programming languages should be extended. Students also want the teaching of general subjects closer related to the nature courses. According to the updated Annex 8.1 all these objections are more or less solved. The scope of the programme will be sufficient to ensure the learning outcomes (Chapter 3, Annex 3.2).

The content of the programme has been created on a sufficiently high level. Because of recommendations from the external experts, students and employers, the programme reflects the latest achievements in science and technologies. Although the curriculum design seems to be good, students and social partners offer to introduce to the programme more practice and also longer practice sessions. Alumni have suggested teaching students more practical subjects and they do need more software developers especially with the knowledge of modern programming languages. Social partners also expressed the need of more knowledge in 3D scanning and data processing methods and also some more skills in practice. In order to compensate the study time, Electronics lectures could be shortened (mentioned by students and alumni's.) According to the Head of Department, the amount of study subject's hours has been revised during the programme renewal. Since year 2016 teacher's academic hours were reduced and students' practical work and independent working hours were increased. It also was decided to carry out geodetic practice for 2 weeks and professional practice from 8 to 12 weeks. A new Laser scanning study subject was also included to the study programme.

### **2.3. Teaching staff**

The staff providing the study programme meets the legal requirements. Teaching staff fulfils the legal requirements, 68% of them have PhD. On average, 5 professors, 28 associate professors, 14 lecturers and 3 assistants deliver lectures to students in the Geodesy study programme (SER, page 15-16). 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 (page 12 of SER).

Also the distribution of the teachers 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%), (page 15 of SER).

The qualifications of the teaching staff are illustrated by their wide research activities, presented in CVs (Annex 8.3.). 84% of the courses in the study programme are taught by teachers with academic degree. 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% - 16-20 years, 7% - 21-25 years, 7% - 26-30 years, and the remaining 4% have scientific experience of more than 31 years.

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. (SER, Chapter 4. Annex 4.1.) Thus the adequate number of the teaching staff to ensure learning outcomes is hereby verified.

The overall variation of teachers and students number in this study programme is shown in Fig. 4.1 (page 16 of SER) for the last three years. It looks very positive for the students. Within the last three years the number of students went from 166 over 111 to 86, whereas the number of teachers was decreasing (from 54 over 50 to 38). Therefore the better teachers/students ratio (from 0.33 over 0.45 to 0.44) in the Geodesy study programme strengthens the special abilities and obtainable knowledge of the students.

The workload of teachers could not exactly be evaluated because all professors and associate professors are involved in 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). It seems that the academic workload is very high and therefore there is not much time for more research.

Table 4.1 (page 14-15 of SER) shows the structure of the academic staff by their age and occupied positions during the academic year 2014/2015. 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. Thus the turnover of the teaching staff is ensured.

The department supports the professional development of the teaching staff by organising courses, seminars, and other similar events. From the information provided in the SER it comes out, within the last 3 years 9 teachers have participated under Erasmus and other exchange programmes, as well as to participate in the organizational meetings of the international research projects; 30 teachers were involved in the traineeship programmes with an average duration of 2 months. Anyhow, the international mobility of the teachers is not very high; more international study trips should be carried out. The number of incoming teachers could also be improved.

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 (page 17 of SER). Therefore, in the course of preparing their lectures, the teachers constantly improve, update and complement the contents of their subjects; it was confirmed by students. Each year, VGTU organizes courses for development of the andragogic competence for the teachers. During the analysed period, 5 teachers of the study programme improved their teaching skills by participating in these courses.

The level of the language skills of the teachers is improved by developing the international contacts and participating in the international projects, by publishing their research results in the international scientific journals. Within the group of professors and associate professors there are 20 publications in 2015 in English but not necessarily in international magazines (see CVs).

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 are 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 (Chapter 2. Annex 2. Table 2.3) 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. This is a rather negative ascertainment of any University and the Department should really work intensively on a reestablishment of the doctoral studies. According to the Dean of the faculty this problem will be solved within the next year. Currently, graduates of Geodesy and Cartography study programme have the opportunity to choose other branch doctoral studies being carried out in VGTU, KTU and ASU. In the near future they plan to establish joint doctorates with Universities in Poland and Latvia.

## **2.4. Facilities and learning resources**

According to the information provided by the SER and the on-site visit the auditoriums, laboratories and computer rooms (equipped with all the necessary licensed software) are adequate in number, size and quality and fully meet the study requirements.

The Department has the necessary modern equipment, which is actively used for academic and research purposes. Besides their own equipment they are using for teaching purposes the equipment belonging to the Institute of Geodesy and to the Civil Engineering Research Centre Laboratory of Geodesy. It could be mentioned that the Department has - besides the normal ones - some very specialised instruments which one cannot find on every university, e. g.: a set of magneto metric 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. This kind of equipment is especially suitable for interesting research projects and PhD studies. On the roof of the main building VGTU has a permanent GPS station within the Lithuanian and the European network.

The lack of financing limits the possibilities to update the instrumental basis. Business partners do support the Department with most modern equipment (e.g. Drones) in order to get well-prepared students for the labour market. Software from the Open Source Community is only available for GIS, namely QGIS; much more could be implemented and used, e.g. digital Photogrammetry and a GIS server for large data. According to the Head of the Department there will be new software for GIS, Photogrammetry and Remote Sensing in the next academic year.

Students are very happy about their study practice. There is a flexible schedule and the necessary equipment is sufficient. 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). 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 (page 22-23 of SER). 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.

The university makes availability for students to use the central VGTU library, which is among the most modern libraries in Lithuania, and subsidiary libraries in the Faculties. From the on-site visit it has been seen that the library provides a rich variety of books, textbooks, periodical publications and databases and the electronic catalogues that are also accessible from home. For example the library offers electronic access to some major scientific data bases like Springer Link. The number of printed books and periodicals is satisfactory. The virtual long-distance studying system Moodle is also used ([moodle.vgtu.lt](http://moodle.vgtu.lt)).

### ***2.5. Study process and student's performance assessment***

The admission requirements to the programme are clearly explained. 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). On the grounds of the presented data, it is clear that students with sufficiently high competitive scores were admitted to the Geodesy study programme in the course of 2013-2015. Students should meet the well listed criteria (listed in page 22 of SER, table 6.1). During the last three years the recruitment of students has increased slightly (according to SER page 23, table 6.2). Also, the drop off rate is very low. 92% of students (according to SER page 24, table 6.4) have successfully graduated the programme in 2015. The rate of graduates has increased from 66% to 92% during last three years.

The study process in the course of semester is supervised by the head of the department. The students are satisfied with study process and their study programme in general. Also, they are satisfied with coordination of practical work and possibilities to work and study at the same time, and perform practice in the enterprise. They feel happy about laboratories, computer classes, online study resources and flexible schedule of lectures. In general, they would like to have more practice in the enterprises as they feel that they lack practical skills. According to the meeting with students it seems that they are have the opportunity to participate in research projects actively, but they are not involved enough.

Students have possibilities to participate in student mobility programmes, but their participation rate could be even bigger. 6-7 students of Geodesy study programme leave to study abroad under Erasmus programme every year. The majority of students under Erasmus programme leave to study in Denmark, Spain, Portugal, etc. Most frequently students go for practice in Spain, Germany, Poland, Latvia, Estonia, California Polytechnic State University (USA) international summer school.

The social support for students is well ensured. Individual study programmes can be organized for the disabled students, active sportsmen or foreign students if necessary. Student groups are appointed with teachers – tutors. Students said that they can reach their teacher easily and be consulted about study issues. Also, they are presented with opportunities by Career Office of VGTU. There are different kinds of scholarships – the social and personal types. Students engaged in part-time studies and/or practice under Erasmus or other university exchange programmes are granted motivation scholarship. However, according students' opinion, the scholarship does not motivate them enough and only a few of them gets a scholarship.

The assessment system of students' performance is clear and well explained. Students' knowledge is assessed according to the ten points assessment scale and the criteria proportionate assessment system. The teacher informs students about evaluation criteria and indicates how the level of knowledge will be determined. VGTU handles the issue of academic dishonesty very well by checking students' works by plagiarism system and obliging students to sign declaration of honesty.

Professional activities of the majority of graduates meet the programme providers' expectations. 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 Republic of Lithuania, UAB Aerial Geodesy Institute, UAB Cad, F Projektservisas and other. Social partners are satisfied with students' knowledge, but they would like to have longer practice works. There is no database on the graduates' employment, but there are plans to VGTU Career Directorate to start collecting detailed data about the graduates' employment period, jobs, etc. (SER, page 37).

## ***2.6. Programme management***

The responsibilities for the implementation of the study programme are clearly described and appropriately allocated. According to information provided by SER the Study Programme Committee (it was approved in 2015) is supervising and updating the Geodesy study programme in accordance to the VGTU Study Programmes Committee's regulations. The Committee is chaired by the head of the Department of Geodesy and Cadastre (hereafter – GKK). There are two student representatives and a social partner in the Committee. It performs several functions; e. g., identifying drawbacks and initiating their removal; organizing surveys from students, faculty teachers, alumni and employers on issues of the quality of the study programme; analysing the results of the surveys and publicizing them at the University, its departments and faculties and finally it is organizing a proper presentation of the study programme on the University website (page 30 of SER). Overall, the monitoring programme seems to be good, whereas the employers wanted to be more involved in the whole system.

According to information provided by SER relevant issues of the studies are discussed at the GKK meetings. Proposals concerning the contents of the subjects and their implementation are submitted to the leaders of the study programme and to the study committee. Regular meetings with students are organized as well (page 30 of SER).

Student surveys regarding the subjects and teachers, their teaching methods and contents of the courses are carried out at least once per semester. Meetings with social partners are organized as well to discuss the quality of the studies, theoretical and practical qualifications of the students (page 30 of SER). Students are participating in improvement of their study programme and give a feedback to administration. They feel that changes are made according to their suggestions. Students confirmed it but employers did not really agree because a more active participation of the employers in the programme design and in the proposal of final projects would be more beneficial for the employability of the graduates.

The system of internal quality assurance is based on the Standards and guidelines for quality assurance in the European Higher Education Area (ESG). National and international requirements are integrated in the VGTU documents for the quality management system. The project entitled "Implementation of the Internal Study Quality Management System" for the whole University has been implemented but it will be further developed (page 31 of SER).

To improve the quality of the programme the student's feedback regarding the subjects taught, their teacher's performance and other information about the university are used. Similarly the opinions of the social partners are also taken in consideration. 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 site, and part is shared during meetings with students, social partners and employers (page 31 of SER).

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 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. All the advices had been discussed, analysed and many changes of the study programme were implemented successfully (page 31 of SER). According to the discussions with students, alumni's and social partners, they all had been involved in the evaluation and improvement processes.

The review team advises the management of the programme to improve two important changes. Firstly, the number of outgoing Erasmus students is not sufficiently and the number of foreign incoming and outgoing teachers is very low. The department should look for international students and introduce teaching courses in English as well. Secondly, the overall marketing activities like distribution of printing information leaflets and the participation in international educational fairs should be improved and increased. Visits to high-schools where the programme could be explained, might benefit the enrolment of new students in the future. To achieve all these requirements, a very good communication with students, teachers and social partners is necessary. Fortunately this was confirmed during the visit.

### **III. RECOMMENDATIONS**

1. Establish the doctoral studies as soon as possible. Since 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.
2. Publishing in peer reviewed international journals is strongly encouraged.
3. Staff and student mobility should be increased (e. g. Erasmus).
4. Intensify advertising the study programme in order to increase the number of students (go to schools, open-door day, girls day, etc.).
5. There are some lectures missing or should be given more compliance: Remote sensing and GIS lectures about data modelling and more modern programming languages.



#### **IV. EXAMPLES OF EXCELLENCE (GOOD PRACTICE)\***

The Geodesy department is a Member of the EUREF Permanent Network (EPN)<sup>1</sup> and the local Lithuanian network with a permanent GPS station is on the top of the building.

European Terrestrial Reference System 89 (ETRS89) is used as the standard precise GPS coordinate system throughout Europe. Supported by EuroGeographics and endorsed by the EU, this reference system forms the backbone for all geographic and geodynamic projects on the European territory both on a national as on an international level.

The Department also organize an international geodesy conference every 4 years and publish a journal.

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<sup>1</sup> EPN is a European Network of more than 200 continuously operating GNSS reference stations with precisely known coordinates referenced to the ETRS89. EPN is the key instrument in the maintenance of ETRS89 geodetic datum. The EPN stations collect continuously the observation data from high accuracy GPS/GLONASS receivers. [<http://www.epncb.oma.be/>]

## **V. SUMMARY**

The programme aims and learning outcomes of the Geodesy study programme of the first cycle granting bachelor's degree of Measurement Engineering are in accordance with national and international regulations. They are consistent and they cover all important areas of the Geodesy field for a Bachelor degree. Detailed description of the goals and study results of the Geodesy study programme is presented on the VGTU website and on the website for the applicants. For the reviewing of the study results feedback is coming from graduates, employers and geodetic associations. The name of the programme, its learning outcomes, content and the qualifications offered are compatible with other Universities in Europe.

The curriculum design is well balanced and covers the most important areas of the field and the credits and their respective distribution is fully in accordance with the regulations. The study subjects comprise courses distributed continuously and logically during semesters. The content of the subjects seems to be consistent with the type and level of the studies. There are some lectures missing or should be given more compliance, like: Remote sensing and GIS, lectures of data modelling and modern programming languages should be extended. Students and social partners also expressed the need to have more practice and also longer practice sessions whereas electronics lectures could be shortened.

The staff meets the legal and qualification requirements and the adequate number of the teachers ensure learning outcomes and the turnover of the teaching staff. The relatively good teachers/students ratio strengthens the special abilities and obtainable knowledge of the students but, it seems that teachers' academic workload is very high and therefore there is not much time for more research. Professional development of the teaching staff is organized by the Department. Teachers of the Geodesy study programme participate in the local and international research projects. Although teachers participate in mobility programmes, their mobility should be increased (e. g. Erasmus). 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. This is a rather negative ascertainment of any University and the Department should really work intensively on a reestablishment of the doctoral studies.

The facilities and learning resources are adequate in number, size and quality and fully meet the study requirements. All necessary modern equipment is mainly available. The Department has some specialised instruments which one cannot find at every University. This kind of equipment is especially suitable for interesting research projects and PhD studies. Unfortunately there is a lack of financing limits, so the possibilities to update the instrumental basis could be improved. However,

business partners do support the Department with most modern equipment (e.g. Drones) in order to get well-prepared students for the labour market. Students are very happy about their study practice. There is a flexible schedule and there are always enough instruments available. The university makes availability for students to use the central VGTU library and subsidiary libraries in the Faculties. The library provides a rich variety of books, textbooks, periodical publications and databases and the electronic catalogues that are also accessible from home. The virtual long-distance studying system Moodle is also used.

The admission requirements to the programme are clearly explained. The rate of graduates has increased from 66% to 92% during last three years. The students are satisfied with study process and their study programme in general. They would like to have more practice in the enterprises. Also, students feel that they lack of practical skills and they are not participating in research project actively. Students participate in student mobility programmes rather less actively. The assessment system of students' performance is clear and well explained. Professional activities of the majority of graduates meet the programme providers' expectations.

Responsibilities for the implementation of the study programme are clearly described and appropriately allocated. The Study Programme Committee is supervising and updating the Geodesy study programme in accordance to the VGTU Study Programmes Committee's regulations. Overall, the monitoring programme seems to be good, whereas the employers wanted to be more involved in the whole system. Information regarding plans of improvement of the study quality and learning outcomes is publicly available to the university academic society, social partners and employers. It is proposed by the reviewing team to improve and increase the overall marketing activities like distribution of printing information leaflets and the participation in international educational fairs. Visits to high-schools where the programme could be explained, might benefit the enrolment of new students in the future.

## VI. GENERAL ASSESSMENT

The study programme *Geodesy* (state code – 612H14001) at Vilnius Gediminas Technical University is given **positive** evaluation.

*Study programme assessment in points by evaluation areas.*

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	4
2.	Curriculum design	3
3.	Teaching staff	3
4.	Facilities and learning resources	4
5.	Study process and students' performance assessment	3
6.	Programme management	3
	<b>Total:</b>	<b>20</b>

\*1 (unsatisfactory) - there are essential shortcomings that must be eliminated;

2 (satisfactory) - meets the established minimum requirements, needs improvement;

3 (good) - the field develops systematically, has distinctive features;

4 (very good) - the field is exceptionally good.

Grupės vadovas: Team leader:	Prof. Dr. Bernd Teichert
Grupės nariai: Team members:	Assoc. Prof. Eloina Coll Aliaga
	Ms Vytautė Juodkienė
	Mr Audrius Petkevičius
	Ms Neringa Vaičiūnaitė

**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO PIRMOSIOS PAKOPOS  
STUDIJŲ PROGRAMOS *GEODEZIJA* (VALSTYBINIS KODAS – 612H14001)  
2016-07-19 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-173 IŠRAŠAS**

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**V. APIBENDRINAMASIS ĮVERTINIMAS**

Vilniaus Gedimino technikos universiteto studijų programa *Geodezija* (valstybinis kodas – 612H14001) vertinama **teigiamai**.

<b>Eil. Nr.</b>	<b>Vertinimo sritis</b>	<b>Srities įvertinimas, balais*</b>
1.	Programos tikslai ir numatomi studijų rezultatai	4
2.	Programos sandara	3
3.	Personalas	3
4.	Materialieji ištekliai	4
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	<b>Iš viso:</b>	<b>20</b>

\* 1 – Nepatenkinamai (yra esminių trūkumų, kuriuos būtina pašalinti)

2 – Patenkinamai (tenkina minimalius reikalavimus, reikia tobulinti)

3 – Gerai (sistemiškai plėtojama sritis, turi savitų bruožų)

4 – Labai gerai (sritis yra išskirtinė)

&lt;...&gt;

**IV. SANTRAUKA**

Pirmosios pakopos studijų programos *Geodezija*, suteikiančios matavimų inžinerijos bakalauro laipsnį, tikslai ir numatomi studijų rezultatai atitinka nacionalinius bei tarptautinius reglamentus. Jie yra darnūs ir apima visas svarbias geodezijos sritis, būdingas bakalauro studijoms. Išsamus studijų programos *Geodezija* tikslų ir numatomų studijų rezultatų aprašas pateiktas VGTU interneto svetainėje ir stojantiesiems skirtoje svetainėje. Studijų rezultatų tikrinimo tikslais absolventai, darbdaviai ir geodezininkų asociacijos teikia grįžtamąjį ryšį. Programos pavadinimas, numatomi studijų rezultatai, programos turinys ir suteikiama kvalifikacija dera su kitų Europos universitetų studijų programomis.

Programos sandara subalansuota ir apima pačias svarbiausias šios krypties sritis; kreditai ir jų paskirstymas visiškai atitinka teisės aktus. Studijų dalykai yra nuosekliai paskirstyti per visus semestrus. Dalykų turinys, atrodo, atitinka studijų rūšį ir pakopą. Kai kurių studijų dalykų trūksta arba į jų poreikį galėtų būti labiau atsižvelgta, pvz., *Nuotolinis matavimas* ir *Geografinės*

*informacinės sistemos (GIS)*, o paskaitos apie duomenų modeliavimą bei modernaus programavimo kalbas turėtų būti išplėstos. Studentai ir socialiniai partneriai dar išreiškė pageidavimą, kad praktikos būtų daugiau ir kad praktiniai užsiėmimai truktų ilgiau, o elektronikos paskaitas reikėtų sutrumpinti.

Dėstytojai atitinka teisės aktų ir kvalifikacijos reikalavimus, o pakankamas jų skaičius užtikrina numatomų studijų rezultatų įgyvendinimą ir dėstytojų kaitą. Palyginti geras dėstytojų ir studentų santykis padeda stiprinti studentų specialiuosius gebėjimus ir perduoti jiems žinias. Bet dėstytojų akademinis krūvis, atrodo, yra labai didelis, todėl nedaug laiko lieka moksliniams tyrimams. Dėstytojų profesinį tobulinimą organizuoja Geodezijos ir kadastro katedra. Studijų programos *Geodezija* dėstytojai dalyvauja vietos ir tarptautiniuose mokslinių tyrimų projektuose. Nors dėstytojai ir dalyvauja judumo programose, jų judumas turi būti didinamas (pvz., pagal *Erasmus*). Universitetas neteko teisės vykdyti matavimų inžinerijos srities doktorantūros studijas, nebeliko doktorantūros studentų, todėl, savaime suprantama, mažės tyrėjų skaičius. Tai gana neigiamas įvertinimas bet kuriam universitetui, ir katedra tikrai turėtų intensyviai dirbti, kad doktorantūros studijos būtų atgaivintos.

Materialieji ištekliai yra tinkami ir jų pakanka; jie atitinka visus teisės aktų reikalavimus. Iš esmės yra visa reikalinga šiuolaikinė įranga. Katedra turi kai kuriuos specialius instrumentus, kuriuos yra ne kiekviename universitete galima rasti. Šios rūšies instrumentai ypač tinka įdomiems mokslinių tyrimų projektams ir doktorantūros studijoms. Deja, dėl riboto finansavimo galimybės atnaujinti instrumentus yra nedidelės – jos galėtų būti gerinamos. Tačiau verslo partneriai remia Katedrą moderniausia įranga (pvz., dronais), kad gautų gerai darbo rinkai parengtus studentus. Studentams labai patinka jų studijų praktika. Taikomas lankstus tvarkaraštis, visada pakanka instrumentų. Universitetas suteikia studentams galimybę naudotis centrine VGTU biblioteka ir fakultetų bibliotekomis. Bibliotekoje gausu įvairių knygų, vadovėlių, periodinių leidinių, duomenų bazių ir elektroninių katalogų, kuriais galima naudotis būnant namuose. Be to, naudojama virtuali nuotolinio mokymosi sistema *Moodle*.

Priėmimo į šią studijų programą reikalavimai aiškiai apibrėžti. Absolventų procentas per pastaruosius trejus metus padidėjo nuo 66 proc. iki 92 proc. Studentai yra patenkinti studijų eiga ir šia studijų programa apskritai. Jie norėtų turėti daugiau praktikos įmonėse. Be to, studentai jaučia, kad jiems trūksta praktinių įgūdžių, jie nedalyvauja aktyviai mokslinių tyrimų projektuose. Dar mažiau jų dalyvauja studentų judumo programose. Studijų rezultatų vertinimo sistema skaidri ir gerai apibrėžta. Daugelio absolventų profesinė veikla atitinka programos teikėjų lūkesčius.

Atsakomybė už šios studijų programos įgyvendinimą aiškiai aprašyta ir tinkamai paskirstyta. Šios studijų programos komitetas prižiūri ir atnaujina studijų programą *Geodezija* laikydamasi VGTU studijų programų komiteto nuostatų. Apskritai, stebėsenos programa, atrodo, yra gera, o darbdaviai išreiškė norą daugiau dalyvauti visoje kokybės užtikrinimo sistemoje. Informacija apie planus tobulinti studijų programą ir jos studijų rezultatus yra viešai prieinami universiteto akademinėi visuomenei, socialiniams partneriams ir darbdaviams. Vertinimo grupė siūlo tobulinti ir plėsti bendrą rinkodaros veiklą (pavyzdžiui, spausdintų informacinių lapelių platinimas, dalyvavimas tarptautinėse edukacinėse parodose). Galėtų būti organizuojami vizitai į vidurines mokyklas, kur studijų programa būtų pristatoma; jie padėtų ateityje pritraukti naujų studentų.

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### **III. REKOMENDACIJOS**

1. Kuo greičiau organizuoti doktorantūros studijas. Kadangi universitetas prarado teisę vykdyti doktorantūros studijas matavimų inžinerijos srityje, nebeliko studentų doktorantų, todėl savime suprantama, kad mažės tyrėjų skaičius.
2. Primygtinai rekomenduojama skelbti publikacijas tarptautiniuose recenzuojamuose žurnaluose.
3. Reikėtų didinti dėstytojų ir studentų judumą (pvz., pagal *Erasmus* programą).
4. Aktyviau reklamuoti šią studijų programą reklamavimą siekiant pritraukti daugiau studentų (eiti į mokyklas, organizuoti atvirų durų dienas, merginų dienas ir t. t.).
5. Kai kurių studijų dalykų trūksta arba į jų poreikį galėtų būti labiau atsižvelgta, pvz., *Nuotolinis matavimas* ir Geografinės informacinės sistemos (*GIS*), o paskaitos apie duomenų modeliavimą bei modernaus programavimo kalbas turėtų būti išplėtos.

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