STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus Gedimino technikos universiteto
STUDIJŲ PROGRAMOS „INŽINERINĖS INFORMATIKOS“ *(valstybinis kodas – 612I13002)*
VERTINIMO IŠVADOS

EVALUATION REPORT
OF *"ENGINEERING INFORMATCS"* (*state code - 612I13002*)
STUDY PROGRAMME
at Vilnius Gediminas Technical University

Review' team:

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3. **Prof. Frode Eika Sandnes,** *academic,*
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Išvados parengtos anglų kalba
Report language – English

Vilnius

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	**Inžinerinė informatika**
Valstybinis kodas	612I13002
Studijų sritis	Fizinių mokslų
Studijų kryptis	Informatika
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė, 4 metai
Studijų programos apimtis kreditais	240 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Informatikos bakalauras
Studijų programos įregistravimo data	Lietuvos Respublikos švietimo ir mokslo ministro 1997 m. gegužės 19 d. įsakymu Nr. 565

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	**Engineering Informatics**
State code	612I13002
Study area	Physical sciences
Study field	Informatics
Type of the study programme	University studies
Study cycle	First
Study mode (length in years)	Full-time (4 years)
Volume of the study programme in credits	240 ECTS
Degree and (or) professional qualifications awarded	Bachelor of Informatics
Date of registration of the study programme	19th of May 1997, under the order of the Minister of the Ministry of Education and science of the Republic of Lithuania No. 565

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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 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 the 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.	*Examples of final Bachelor's graduation work*

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

The subject of this evaluation was the 4-years Engineering Informatics bachelor level study programme offered by the Department of Information Technology, Faculty of Fundamental Sciences, Vilnius Gediminas Technical University (hereafter, referred to as the VGTU). It resides within the Informatics field of study.

The basis for the evaluation of this study programme is the Self-Evaluation Report (hereafter, referred to as the SER) prepared in September 2016, its annexes and the site visit of the Review Panel to VGTU on May 3rd, 2017. The visit included meetings with different groups: the administrative staff of the faculty (including the Dean), the staff responsible for preparing the self-evaluation documents, teaching staff, students, alumni and social partners. The Review Panel evaluated various support services (classrooms, laboratories, library, computer facilities), examined a sample of students' work, and various other materials.

After the Review Panel discussions and the additional preparation of conclusions and remarks, preliminary general conclusions of the visit were presented to staff of the study programme. After the visit, the Review Panel met to discuss and agree the content of their final report.

1.4. The Review Panel

The Review Panel was completed according to *Description of experts' recruitment*, approved by order No. V-41 of Acting Director of the Centre for Quality Assessment in Higher Education. The Review Visit to HEI was conducted by the team on 3rd May 2017.

1. **Prof. Jerzy Marcinkowski (team leader),** Professor in Institute of Computer Science Wrocław University, Wrocław, Poland;

2. **Prof. Sirje Virkus** –Professor in Tallinn University (TLU), School of Digital Technologies, Estonia;

3. **Prof. Frode Eika Sandnes** - Professor of Oslo and Akershus University, Colleage of Applied Sciences, Norway;

4. **Dr. Radvilė Krušinskienė** Callcredit, UAB, Platform Operations Manager, Lithuania;

5. **Mantas Jurgelaitis,** academic Assistant in Kaunas Technology University (KTU), Faculty of Informatics, Information Systems Department. Bachelor degree of *Information's systems*. Specialization in programming in Internet information system and database. Graduated 2016, Lithuania.

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

The objective of the Engineering Informatics Study Programme is to "to train a broad range of highly qualified IT professionals capable of creating, maintaining and operating modern software". This is a clear and well-defined goal. The goal is further supported by 22 learning outcomes. Each of these learning outcomes is expressed as a single and understandable statement that makes it easier for students and stakeholders to understand what the Study Programme entails. Moreover, most of these learning outcomes are concise, specific and highly relevant to Engineering Informatics such as "Knows software tools and environments" and "Ability to develop, implement and use algorithms for solution of task".

The programme objectives and learning outcomes are available in Lithuanian on the University website (https://medeine.vgtu.lt/programos/programa.jsp?fak=10&prog=30&sid=F&rus=U). However, there is a mismatch between the information published online and the information in the SER as the online version appears to describe more elaborate objectives and only lists four learning outcomes, namely learning outcomes AG1-AG4 relating to personal skills. The staff responsible for preparing the SER explained that this was due to a limitation with the content management system. Moreover, according to the SER (Section 2.1.1) the diploma supplement only include a shortened form of the learning outcomes. An example shown to the Review Panel revealed that this is because the diploma supplement template does not have sufficient space for the learning outcomes. Despite the limited space in the diploma supplement template, the University is encouraged to continue using such a comprehensive list of clear and specific learning outcomes.

According to the SER (Section 2.2.4. table 3.2.) the Study Programme has existed for more than two decades and has a demonstrated track record in terms of many applicants and high employment rates where graduates find jobs related to Engineering Informatics. This success demonstrates that the programme aims and intended learning outcomes are linked to state, societal and labour market needs. Several official projections, both nationally and globally indicate a growing need for IT-specialists. In fact, a challenge for the University is that students take employment from their second year of study adding further support for the claim that the students are attractive in the labour market. The objectives and intended learning outcomes are consistent with those found in related study programmes internationally.

The objectives and intended learning outcomes links well with professional requirement as the study programme emphasizes that students develop teamwork abilities, ethical conduct, communication skills, structured work and analytical thinking, characteristics needed in the IT profession.

The Study Programme emphasises the creation, maintenance and operation of software systems, which is highly consistent with the international norms for related study programmes. Moreover, goals and learning outcomes are well aligned with first cycle generic learning outcomes. There is a high consistency and clear connection between the name Engineering Informatics, the goal of software creation, maintenance and operation, the learning outcomes and the course content.

2.2. Curriculum design

The curriculum of this 4 years long, 240 credit points, study programme overlaps, in 85%, with another study programme offered by Department of Information Technologies, namely Information Technology Service Management (ITSM). It is unclear to the Review Panel how the University can justify naming these two provisions as separate programmes when there is this much overlap. An alternative, and perhaps less misleading organization, would be to offer one programme with 15% of elective specialisation courses.

The Study Programme meets legal requirements as it totals 234 ECTS where the allowed range is from 210 to 240 ECTS. Of these, 165 ECTS are Study Field subjects (minim 165 ECTS), 15 ECTS are set aside for general university subjects (minimum 15 ECTS) and 39 ECTS are allocated for elective subjects (maximum 60 ECTS). The minimum limit of 15 ECTS for internships is satisfied. The final thesis totals 15 ECTS (minimum 12 ECTS). The work is spread out evenly as the number of subjects range from 5-7 (maximum 7) and no academic year have more than 60 ECTS in total.

The curriculum has a balanced design as each semester comprises a mix of core informatics topics, topics related to IT in organizations and business and other. For example, in the first semester the students have 15 ECTS of core informatics topics, namely *Information Technology and Programming Introduction* and *Operating Systems*, with 3 ECTS of business related topics, namely *Business Fundamentals, Discrete Mathematics 1* and the remaining 12 ECTS comprises general courses, that is, *Fundamentals of Mathematical Analysis* and one optional language course. A similar balance can be found in the other semesters. The students can chose from several elective courses throughout the Study Programme, but not too many.

The curriculum has a sensible portion of mathematical subjects. The Review Panel understanding is that some of these subjects, especially related to continuous mathematics, were removed after the previous SKVC evaluation that took place 4 years earlier, and two courses in *Discrete Mathematics* were introduced. The Review Panel finds that this is a move in the right direction, as such courses, together with a course in *Algorithms and Data Structures* should form a mathematical/theoretical foundation for this type of study programme. Unfortunately, the literature recommended for *Discrete Mathematics* differs from what is commonly used for such courses ('Concrete Mathematics: A Foundation for Computer Science' by Graham, Knuth and Patashnik is the standard choice). Similarly, Cormen's popular and widely book is not among the books recommended for the *Algorithms and Data Structures* course. Also, some members of the Review Panel visited a lecture in *Discrete Mathematics* and found that the contents could have been covered in a more exiting manner to captivate the students 'interest and stimulate the students learning processes. It is also fair to say that both the *Discrete Mathematics* and *Algorithms and Data Structures* only cover very basic topics.

The curriculum covers a broad range of topics and there is generally little overlap. One exception may be in object orientation. There are three courses related to object orientation namely *Object-Oriented Programming, Object-Oriented Design* and *Object Oriented Programming Techniques*. The first of these covers object oriented programming from a general perspective using C++, while the last course covers more applied side of object oriented programming through GUI programming with Java. The *Object-Oriented Design* appears to look more at the principles of design. It is unlikely that students will get a sufficiently deep understanding of two relatively large programming languages such as C++ and Java in one Study Programme, and one may argue that it is better that students learn one of these languages in more depth. One may also question the use of C++ in a Study Programme aimed towards business and organizations. C++ is not commonly used in business and enterprises. Java, especially enterprise Java, does have a marked share, but several students indicated that C# would be more relevant for their future jobs. Indeed, C# is a more modern language used by many businesses and organizations.

Another criticism of three object-oriented courses is that students perhaps are less exposed to other programming paradigms such as functional programming that has had a renaissance with lambda expressions in Java8. This could be tolerable for (the parallel) ITSM programme, but students of an Engineering Informatics should be aware that the imperative/object oriented paradigm is not the only possibility.

The content of the subjects follow international conventions for informatics and computer science bachelor programmes. The learning outcomes which are formulated in a focused manner map quite clearly to the courses and the content of the courses are typical (while elementary) for what to expect at first cycle within informatics.

The course Probability Theory and Mathematical Statistics could perhaps be made more relevant to the Study Programme. A small part of the course (two hours) is set aside for "testing of parametric and non-parametric hypothesis". This important topic cannot be covered sufficiently in two hours. One recommendation is to shift focus from some of the other topics to a more applied approach with focus on hypothesis testing. Similarly "elements of linear regression and correlation analysis" is covered in two hours, which is not enough to get a useful understanding of this topic which is relevant to the Study Programme.

The Review Panel believe that the Engineering Informatics programme can indeed prepare very decent graduates for the job market. But we also understand that there are some very able students, enrolled onto the Engineering Informatics programme. It is regrettable that there is no offer for them in the curriculum – it seems that the only target the curriculum designers had on mind were average students. There are no advanced versions of electable courses and seemingly no research seminars. As the Review Panel learned the best students are encouraged to take part in the 'codeforces' competition, but their results there (see http://codeforces.com/) reflect the elementary level of the *Algorithms and Data Structures* course.

2.3. Teaching staff

According to Annex 2 to the institution's SER, the teaching staff of the programme consists of 34 teachers. Their average age is about 46, which is high compared to international standards, but seems to be below the Lithuanian academic system average.

Since the teachers who teach courses of the program under review also teach courses for other programs, it is only possible to estimate the students/teachers ratio. As the Review Panel learned during its visit to VGTU, there are about 25 academic staff members and about 250 students in the Department of Information Technologies. Some of the staff members teach also courses for programmes run by other departments (about 25% of the teaching time of the staff goes outside the department) and some of the courses (about 30%) of the programmes run by Department of Information Technologies are outsourced to other departments. This leads to the estimate that the

students/teacher ratio for the programmes run by Department of Information Technologies is less than 10, which is correct. The staff turnover is low.

The Review Panel learned, during meetings with the Dean, and with the teaching staff, that the average teaching load of the staff is about 10 hours a week. This appears too much. A heavy teaching load gives less time to conduct research. Moreover, this heavy teaching load combined with less than 10 students per teacher signal poor management.

A total of 23 of the programme teachers hold PhD degrees and the statutory condition that "more than half of the teaching staff of a university must be scientists" are easily satisfied. Eight of the teachers hold PhD degrees in computer science/informatics and three in closely related areas (mathematics, applied mathematics). The remaining 14 PhDs are in other fields, mainly social sciences and humanities (and also civil engineering).

Taking this all into account the Evaluation Panel concludes that the **number of teaching staff is adequate to ensure learning outcomes of this programme** but without much redundancy.

Research activity not only is legally required from the University but also is postulated by the Mission Statement of Vilnius Gediminas Technical University (http://www.vgtu.lt/about-university/mission-vision-objectives-/4127):

> „The university's vision is to be a prestigious Lithuanian institution of higher education, the scientific and studies level of which conform to the best European technical universities' level.“

Of the 209 publications listed in the CV annex to the SER, 90 publications, or 43%, can be classified as directly relevant to the Study Programme dealing with issues related to optimization, enterprise systems, security, HCI, etc. This is an adequate quantity considering the reporting spans several years. The remaining 119 publications (57%) represent research not related to the Study field, that is, economics, philosophy, physics, mathematics, etc. However, the University should be commended on the fact that most of the staff are actively contributing by authoring research publications, being relevant to the Study Programme or not.

In terms of quality the Panel counted that a total 107 of the publications appear in journals, of which a majority of 70 publications appear in national journals and 47 publications in international journals. Informatics engineering is a highly international field and therefore to publish as much as 60% of the work in national journals may not sufficiently stimulate quality, development and innovation. The Panel therefore recommend that the staff associated with the Study Programme

shifts the focus from national to international journal publication. Note that the Panel was unable to check for possible duplicates and the publication counts may be too high.

A total of 31 publications have been published in national conference proceedings and 56 publications have appeared in international conference proceedings. We can thus conclude that the staff have an adequate international orientation in its research orientation.

When analysing the reputation of the international publication channels related to the Study Programme the Panel is unable to identify any top-tier or world-class leading venues. A few of the publications appear in proceedings published by Springer, Elsevier, IEEE and ACM which is considered relevant in computer science and the University is commended for this effort. It is the Panel's view that too many of the works are published in lesser-known venues. It seems to be an international consensus that IEEE and ACM are particularly desirable publishers and the University is encouraged to stimulate more participation in IEEE and ACM sponsored venues to strengthen the international research profile. However, the quality even within ACM and IEEE varies greatly and tools such as CORE can be a useful tool in to help make strategic choices regarding reputable publishing venues of impact. In fact, the University points out that 24 of the publication venues are listed in CORE. These publications constitute approximately 11% of the total publication output This equates approximately 0.14 CORE publication per staff member per year (34 teachers, five-year reporting period). The University is commended for the quality of these results although they are few. The University is encouraged to work towards increasing the number of such high-quality publications. One could argue that is may be better with more quality and less quantity. Note that it is not clear whether these CORE publications listed by the University apply to the staff associated with the Informatics Engineering Study Programme or the Information Technology Service Management Study Programme.

Teachers are being evaluated every 5 years, according to the criteria set by the University, which include research assessment and based on the number of publications. There is also a motivation system in place which rewards teachers for publishing. The Evaluation Panel believe that this evaluation/motivation system is unfortunate as it discourages an activity that gives impact in computer science. Individual researchers should be assessed based on their real research, not only publication quantity. Otherwise the incentive promotes researchers to look for opportunities to publish weak papers in write-only venues. One possible solution could be to introduce a local incentive system tailored for the needs of this Study Programme.

However, since research skills are not among the main learning outcomes of the programme, the Review Panel have reasons to believe (based on the opinions of the social partners, alumni and

students, and also on the good quality of the Bachelor theses) that the **teaching staff members have satisfactory knowledge of the subjects taught and satisfactory teaching competences to ensure learning outcomes** of the programme.

2.4. Facilities and learning resources

The Review Panel was given a tour of the facilities and learning resources. All classrooms were fully functional, had projectors for presentations as well as interactive boards and met the requirements for a learning environment. There are six computer laboratories which house 153 personal computers and 4 classrooms containing up to 200 seats. Facilities are entirely sufficient to meet the needs of students on the programme. Internet connection is sufficient and EDUROAM wireless network is accessible throughout the premises. Technical and hygienic conditions in the laboratories and classrooms are comfortable, although some computer classes had high doorsteps making accessibility difficult. All the premises correspond to the modern requirements of work safety and hygiene.

Classrooms have access to generic software and teachers can access subject discipline software. Students are provided with a set of academic licenses for software and have access to a virtual environment, which hosts several academic software packages such as Matlab, Microsoft Office and CAD tools.

The staff members seem to utilize the available learning resources (library, laboratories, learning spaces, etc.) very well. The premises/facilities include a very good e-learning unit, both providing resources that enhance the teaching/learning experience.

Students of the Programme have the possibility to use the services of VGTU library, as well as reading rooms in the faculty spaces. Reading rooms house at least one physical copy of the book, and the rest are available at the main library building. Most materials are also accessible online - electronic copies are provided. Teaching materials (textbooks, books, periodical publications, databases), generally, are accessible.

The Library is comfortable, easy to use and modern. There are independent work rooms, all rooms and conference halls have modern equipment. The library is open on work days until 9 p.m., on Saturdays – until 5 p.m., during examination sessions the Library working hours may be extended. Some reading rooms are available at all times.

The library collections contain about half a million items and provide access to 30 databases, in addition to other open access resources, is provided for staff and students. Following previous evaluation recommendation IEEE digital library license was procured.

Overall, the premises for studies, buildings, classrooms, laboratories, library and the teaching and learning equipment are adequate in terms of quantity, size and quality and provide satisfactory access to people with disabilities. For future development the University could consider establishing specialized new computer laboratories with cutting-edge equipment, for example virtual and augmented reality devices, 3D-printers, updated parallel computers (e.g. GPUs), high-quality eye-trackers to inspire and attract high calibre students. Such investments would help the University achieve a top evaluation score and a competitive edge in Lithuania.

2.5. Study process and students' performance assessment

Admission rules and procedures are well defined, explained and available on the VGTU website which serves as an informational portal and a guide for newcomers. The admission requirements are in compliance with the studies regulations of VGTU. The admission is carried out via the general admission. The general admission is organized and carried out by Lithuanian Higher Education Institutions Association for Organization of General Admission (LAMA BPO), authorized by the Ministry of Science and Education of the Republic of Lithuania. The application procedure is described in detail in the self-evaluation report. According to the SER the Study Programme attracts a satisfactory number of applicants. The number of applicants has been from 374-665 and the number of admitted students has been from 16 to 42 during the last years (in 2011-2015) [SER, table 6.2]. The number of school-leavers, who have submitted their applications to Engineering Informatics study programme during the first stage of admission in 2011-2015 analysis, shows the school graduates' stable interest in the study programme [SER, table 6.3].

According to the opinions the Review Panel could hear during our meeting with the students, the study process is well organized. Each semester students study 5-7 study subjects, the volume of which is from 3 to 6 ECTS credits, thus the workload for each semester is equally distributed and is 30 ECTS credits. The duration of one semester is 20 weeks. During the autumn semester, 15 weeks are intended for lectures, 1 week is intended for independent work, and 4 weeks are intended for examination session. During the spring semesters, either 12 or 15 weeks are intended for lectures, thus students get from 2 to 5 weeks when there are no lectures and students may concentrate on either practical training or the preparation of the final bachelor's thesis. Seven course projects and one complex project are planned in the study programme [SER, paragraphs 109, 110]. Engineering

Informatics study programme provides students a possibility to choose the model of studies according to their needs. This may be implemented by a student by choosing study subjects from the list of alternatives and choosing the optional study subjects. There are five alternative options [SER, paragraphs 111]. Students told the Review Panel that their total workload is reasonable. The study process is supported by the virtual learning environment Moodle. Academic staff uploads the study subject modules materials (slide shows of the lectures, methodical materials, descriptions of the laboratory works) on the Moodle. The individual work of students is sufficiently mentored and the academic staff is always available for consultations according to the students' interviews. In general, students and alumni were overwhelming positive about their learning experience (teaching methods, learning activities, assessments) and support from staff. According to SER [paragraph 47] various methods are applied during the period of studies: demonstration, discussions, group work, seminars, analysis of practical examples, self-control tests, home works etc. The Review Panel was also able to visit some classes in order to get a better view of the teaching and learning process; the impression was that mainly traditional teaching methods were used in the study process. The Review Panel got an impression that the responsibility of the curriculum design and the study process lies on the Study Programme Management Committee (SPMC) and the academic staff is not entirely involved in this process. **All teachers teaching in the programme should be more involved in the curriculum and study process design and development process in order to continuously improve teaching and learning quality.** In particular, it is important that all teachers involved in the programme collaborate to the programme's success: the programme should be more than the sum of its parts. Students also claim to know what is expected from them for each course, for each assessment, for the whole programme. Students confirmed that their opinions are taken into account according to their feedback in the development of the study programme. The Review Panel was shown several examples of Bachelor Thesis. The contents of these examples were often too descriptive and the presentation and referencing style of the theses was not always appropriate, but the overall level was, in the opinion of the Review Panel, above the acceptability bar. At the same time the grades of those theses were relatively high – out of the 12 theses seven were graded with 10, two with 9 and three with 8 (annex 9.3). It seems that the grades are not really used to carry information about the quality of the theses.

According to SER (Subsection 6.3) the students of Engineering Informatics are invited to participate in VGTU artistic and applied scientific activities. They volunteer in conferences organized by VGTU Department of Information Technologies and FFS; also, they participate in individual and team Mathematics and Programming Olympiads. Since 2014, the students of Engineering Informatics study programme annually participate in international team programming

olympiad ACM ICPC [paragraph 125]. However, there was a lack of clear evidence and concrete examples that students are encouraged to take part in scientific, artistic or applied science activities. The Review Panel therefore recommend the university should encourage greater interactions between students and academics to support an increase in research or applied science activities. This is especially important as, as we understand, good candidates are admitted to this study programme, and they should be given an opportunity to progress beyond the minimal level required by the curriculum. One can think that there is a resource here which is wasted by the University, possibly partially to the lack of research activity of the staff themselves. The Review Panel learned, during one of the meetings, that the best (and interested) students are encouraged to take part in the codeforces competition (http://codeforces.com/), but the results, as one can see, are not too impressive.

Students are provided with an opportunity to leave for studies abroad for the duration of one semester or for internship. VGTU has signed agreements for both teacher and students exchange under the ERASMUS programme. Under this programme, there was 1 outgoing student of Engineering Informatics in the period from 2011 to 2015. A very small Engineering Informatics international mobility is influenced by students' reluctance to leave for a foreign country due to their obligations in Lithuania. However, after meeting with the students the Review Panel members noted that the students were not well informed about the student mobility programmes. The Review Panel would therefore recommend that programme teams promote the mobility opportunities more widely and take steps to encourage greater participation in mobility activities. This could be achieved through advising of the benefits of the programmes and how the experience will help students' careers though the development of improved language skills, exposure to other societies and cultures and the enhancement of social skills.

According to what the Review Panel learned from the students and alumni the university ensures proper academic and social support and student support system is functioning well. Students are provided with all the needed information: they can obtain information about on-going processes in the university, about the study programme, career opportunities, cultural activities, etc. online (webpage, Moodle) or during various consultations. Such consultations are of various levels: consultations on study process organization and procedure, as well as consultations on individual study subjects (modules), consulting on issues related to research or final theses. During the first week in September, meetings with the Faculty dean, vice-deans, heads of departments, academic group supervisors, Students' Representation are organized. During the meetings, students are briefed on various studies related issues. On specific studies organization issues students are consulted by the head and teachers of the department, the dean of the faculty, vice-deans, administration, Studijų kokybės vertinimo centras

representatives of Students' Representation, who help solve problems [SER, paragraph 120]. VGTU Students' Representation and a separate FFS SR (voluntary, non-for-profit social organization) are providing social support to students. The Students' Representation provides students with all the relevant information of production of Lithuanian student's identity card, cultural activities, implementation of educational civil projects, international exchange programmes, etc. [SER, paragraph 123]. The students' academic and social activities were supported by the Library, Mentor Programme, Career Services, etc. The University also offers a wide range of activity groups. These activity groups include sports clubs and tourism club. There are also extracurricular options such as chorus, theatre, and dance. Currently, VGTU has more than 70 clubs and societies. University students and alumni can actualize their potential in folk dancing, choral singing, tourism, sports, photography and other fields. Especially outstanding among arts groups are the mixed academic choir "Gabija" and the folk dance ensemble "Vingis".

Students confirmed that they receive clear specifications, grading criteria and timely feedback. Students expressed no concerns regarding the fairness and accuracy of grading. The assessment procedure is fully described in SER [paragraphs 126-132]. Criteria for student achievement are announced at the beginning of the semester, and teachers introduce students to the assessment criteria during the first lessons. The university also organizes student feedback surveys and according to the students' interviews the suggestions are taken into account in the study process or in the curriculum development. During the meetings with Faculty management and student representatives the Review Panel was provided with evidence on regularly gathered feedback. Students expressed their appreciation that the Dean office always responded quickly and took initiatives to implement changes.

The Review Panel believes that professional activities and competencies of the majority of programme graduates correspond to the expectations of programme operators and employers. The graduates easily find work in the job market and several students of the study programme also work during their studies. According to the opinions expressed by the social partners, the employers are satisfied with the graduates of the Engineering Informatics Study Programme.

It is obvious that the VGTU Engineering Informatics study programme is in a considerable demand. There is a high demand for highly qualified informatics engineering specialists in the Lithuanian job market. According to the SER (Section 6.3) the Study Programme also attracts a high number of applicants and graduates easily find jobs related to Engineering Informatics. According to the interviews with the employers and social partners the study programme is valued in Lithuanian

labour market. Therefore, the Review Panel can confirm that the study programme corresponds to the state economic, social and cultural and future development needs.

According to the students a fair learning environment is ensured and students are provided opportunities to make complaints and lodge appeals if necessary.

2.6. Programme management

Programme management and programme quality assurance responsibilities are shared by the Senate, Rectorate, Dean Office, Department and Study Programmes Committee[1] levels. The workflow attracting various stakeholders including alumni, students, teachers along with social partners are described in the SER (Section 7.1). The data provided by the University gives confidence that possibilities of local/minor improvements of the programme are assessed on a regular basis.

During the meetings with Faculty staff and student representatives the Review Panel were provided with evidences on regular, in particular yearly, assessment of the programme quality and feedback gathered; also students confirmed on several occasions their appreciation of the Dean office on quick and effective measures changing teaching staff based on their feedback. The fact gives credit for Dean Office as being actively involved in programme management.

During the meeting with the teaching staff the Review Panel got an impression that the water-fall methodology is applied in assuring study programme quality. On several occasions teachers described that their contribution to changes in the study programme are limited only to the changes requested by Study Programmes Committee and only with respect to their teaching subject. This raises a serious concern about the Study Programme Committee not empowering or engaging with teachers with regards to overall study programme quality issues. The proposal would be to review study programme management process to engage teachers such that they contribute to study programme amendments and to ensure that the teachers‘ input to other teachers‘ subjects are heard and evaluated as well.

It is worth mentioning the fact that the SER (section 156) lists internal acts issued by the HEI to assure the quality of the study programme. However, the Review Panel failed to find any evidence

[1]The Review Panel were told that, while it follows from the University level regulations that there should be a Study Programme Committee formed for each study programme taught by any department, it was decided by the Department of Information Technologies to have just one joint committee for all the study programmes coordinated by the Department, with the Department head as the chair of this committee. This is, in the Review Panels view, a sensible way to manage quality of teaching in the situation where one department runs many study programmes.

on actual study programme improvements resulted by study programme becoming compliant with these internal regulations or as an outcome of continuous study programme improvement process. The improvements listed in Table 7.9 highlights only changes embedded due to previous external assessment results. This raises a concern that internal study programme management process is not embedded or does not provide expected results. One might think this could be attributed to either indifference of the HEI to the quality of the study programme or the process not functioning as described.

The overall perception of the Review Panel is that the management procedures are efficient enough to introduce small improvements of the study programme and to resolve the situations when some of the stakeholders (namely, students) express their dissatisfaction. There is no mechanism however that could ensure quality in the situation when there is no stakeholder in place to demand quality. One example of a consequence of this shortcoming is a lack of research in Informatics, discussed earlier in this Report.

The information about the study programme is relevant to its content, accessible on the VGTU website in both Lithuanian and English. Results of the study programme are valued in the Lithuanian labour market by many business stakeholders. Stakeholders on several occasions explained their contribution in shaping study programme content. This gives confidence that HEI liaisons with business stakeholders and works to ensure labour market needs.

III. RECOMMENDATIONS

1. The construction with two separate study programmes (EI and ITSM) having 85% overlap should be reconsidered. It is unclear to the Review Panel how the University can justify naming these two provisions as separate programmes when there is this much overlap. An alternative, and perhaps less misleading organization, would be to offer one programme with 15% of elective specialisation courses.

2. If the mission of VGTU, as an institution where international level research is conducted, is to be fulfilled, the teaching load of the staff needs to be reduced. There is no objective reason for the staff members to teach for 10 hours a week, or more, in an institution which teaches 10 students per each teacher.

3. The University should encourage the staff to publish more in international venues of high impact and reputation.

4. The University could consider investing in specialized new computer laboratories with cutting-edge equipment to inspire and attract high calibre students and to maintain a competitive edge in Lithuania.

5. Best and most interested students should be given an opportunity to progress beyond the lines defined by the curriculum. The most talented and interested should have a chance to take part in real research.

6. Erasmus mobility of students should be promoted. The current level of students' mobility is unacceptable, especially in the situation where also the academic staff is internationally self-isolated.

7. Grades should carry information and really reflect the quality of students' work. This is especially important in the context of the final theses.

8. Students should be exposed to other programming paradigms, including functional programming so that they were aware that the imperative/object oriented paradigm is not the only possibility.

9. All teachers teaching in the programme should be more involved in the curriculum and study process design and development process in order to continuously improve teaching and learning quality.

IV. SUMMARY

The Engineering Informatics bachelor level study programme has been offered by Department of Information Technology, Faculty of Fundamental Sciences, VGTU for more than two decades and it has always been attracting many applicants. Most of the graduates find relevant employment before or after they complete their studies and, as the Review Panel learned from the social partners of the programme, the industry is happy with them. This success demonstrates that the programme aims and intended learning outcomes are linked to state, societal and labour market needs. The curriculum, while maybe not as exciting as it could be, is in principle correct, and it has benefited from the changes introduced after the previous evaluation, when many classical mathematical subjects were removed and replaced by subjects more appropriate in the context of computer science studies, like Discrete Mathematics and Algorithms and Data Structures. There is also a separate study programme (ITSM) taught by the same institution, having 85% overlap with the Engineering Informatics programme. It is unclear to the Review Panel why the University could not offer one single programme with 15% of elective specialisation courses instead of the two.

A large proportion of the teaching staff holds a Ph.D. The percentage is much higher than the minimum requirement and is likely to ensure that the Study Programme is taught according to high academic standards. The staff is also actively publishing research relevant to the study programme. However, a majority of the publications appear in lesser-known national venues with limited visibility and impact.

There are no obvious shortcomings regarding the study process. The level of the bachelor theses is, in opinion of the Review Panel, acceptable, though the marks not always correctly reflect the quality of the theses. The facilities and learning resources support the learning outcomes adequately.

Overall, the programme does decent job preparing workforce for the local job market. But it attracts good candidates, who could possibly achieve more than that. And their talents seem to be wasted, at least to some extent.

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V. GENERAL ASSESSMENT

The study programme *Engineering Informatics* (state code – 612I13002) 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	3
2.	Curriculum design	3
3.	Teaching staff	2
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	2
6.	Programme management	2
	Total:	**15**

*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:	Jerzy Marcinkowski
Grupės nariai: Team members:	Sirje Virkus
	Frode Eika Sandnes
	Radvilė Krušinskienė
	Mantas Jurgelaitis

VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO PIRMOSIOS PAKOPOS STUDIJŲ PROGRAMOS *INŽINERINĖ INFORMATIKA* (VALSTYBINIS KODAS – 612I13002) 2018-01-26 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-9 IŠRAŠAS

<...>

V. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus Gedimino technikos universiteto studijų programa *Inžinerinė informatika* (valstybinis kodas – 612I13002) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	3
2.	Programos sandara	3
3.	Personalas	2
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	2
6.	Programos vadyba	2
	Iš viso:	**15**

* 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)

<...>

IV. SANTRAUKA

Inžinerinės informatikos bakalauro studijų programą daugiau nei du dešimtmečius vykdo VGTU Fundamentaliųjų mokslų fakulteto Informacinių technologijų katedra. Ši programa visada pritraukia studijuoti daug kandidatų. Dauguma absolventų randa su profesija susijusį darbą prieš baigdami studijas arba jas pabaigę. Kaip Vertinimo grupę informavo socialiniai partneriai, pramonė jais patenkinta. Tai rodo, kad programos tikslai ir numatyti studijų rezultatai yra susiję su valstybės, visuomenės ir darbo rinkos poreikiais. Programos sandara, gal ir nelabai sudominanti, bet iš esmės tinkama, programai buvo naudingi po ankstesnio vertinimo atlikti pakeitimai, kai buvo panaikinta daug klasikinės matematikos dalykų, o vietoj jų įvesta labiau tinkamų kompiuterijos mokslų dalykų, pvz., diskrečiosios matematikos, algoritmų ir duomenų struktūrų dalykai. Ta pati institucija taip pat vykdo atskirą studijų programą (ITPV), kurios 85 proc. dalykų yra tokie pat, kaip inžinerinės Studijų kokybės vertinimo centras

informatikos programos. Ekspertams neaišku, kodėl universitetas negali vykdyti vienos studijų programos vietoj dviejų, kurioje būtų 15 proc. pasirenkamųjų specializacijos dalykų.

Akivaizdžių studijų proceso trūkumų nenustatyta. Vertinimo grupės manymu, bakalauro baigiamųjų darbų lygis yra priimtinas, nors balai ne visada tinkamai atspindi baigiamojo darbo kokybę. Universiteto materialieji ištekliai yra vieni geriausių Lietuvoje.

Kalbant apie programos vadybą, Informacinių technologijų katedra nusprendė, kad visoms studijų programoms bus įsteigtas vienas jungtinis komitetas, kurio darbą koordinuos katedra, o komitetui vadovaus katedros vedėjas. Ekspertų nuomone, tai protingas būdas valdyti dėstymo kokybę, kai katedra vykdo daug studijų programų. Vadybos procedūros yra gana veiksmingos, galinčios pakoreguoti studijų programas ir spręsti situacijas, kai socialiniai dalininkai (būtent studentai) išreiškia nepasitenkinimą.

Tačiau kur kas daugiau būtų galima tikėtis iš studijų programos, pritraukiančios labai gerus kandidatus į vieną iš pirmaujančių Lietuvos universitetų, kurio misijoje, teigiama, kad tai „prestižinė Lietuvos aukštoji mokykla, kurios mokslo ir studijų lygis atitinka geriausių Europos technikos universitetų lygį“. Nėra jokio mechanizmo, kuris galėtų užtikrinti kokybės lygį tada, kai nėra jokio socialinio dalininko, kuris tos kokybės lygio pareikalautų. Studijų programos dėstytojai nedalyvauja moksliniuose informatikos / kompiuterinių mokslų tyrimuose. Taigi jie tarptautiniu lygiu yra izoliuoti. Šios situacijos nepataisys netinkamai universiteto taikoma skatinamoji sistema, kai dėstytojams atlyginama už straipsnių ar pranešimų skelbimą vietos leidiniuose ar konferencijų metu, kurių tarptautiniu mastu neįmanoma pamatyti bendroje mokslinių idėjų mainų platformoje. Dėl to universitetas negali nieko pasiūlyti studentams, išskyrus tai, kas numatyta studijų programoje, todėl geriausi studentai neturi realios progos atskleisti savo galimybių. Kadangi akademinis personalas yra izoliuotas, studentų judumas būtų ypač svarbus, nes tai suteiktų studentams galimybę pamatyti universitetą, kuriame atliekami realūs moksliniai tyrimai. Deja, toks judumas beveik nevykdomas.

Apskritai, ši programa pakankamai pajėgi gerai paruošti studentus vietinei darbo rinkai. Ji pritraukia gerų kandidatų, kurie greičiausiai galėtų pasiekti daugiau, tačiau jų talentas švaistomas, bent iš dalies.

III. REKOMENDACIJOS

1. Rekomenduojama iš naujo apsvarstyti, ar verta vykdyti dvi atskiras studijų programas (Inžinerinė informatika ir Informacinių technologijų paslaugų valdymas), kurių 85 proc. turinio sutampa. Vertinimo grupei nėra aišku, kaip universitetas gali pagrįsti, kodėl šioms dviem specializacijoms suteikė atskirų studijų programų pavadinimus, kai jose tiek daug pasikartojimų. Matyt, būtų galima vykdyti vieną programą, kurioje būtų sudaroma galimybė pasirinkti 15 proc. pasirenkamųjų specializacijos dalykų.
2. Jeigu VGTU, kaip institucijos, kurioje vykdomi tarptautiniai moksliniai tyrimai, misija bus įvykdyta, personalo dėstymo krūvis turi būti sumažintas. Nėra jokios objektyvios priežasties, kodėl personalo nariai turėtų dėstyti 10 ar daugiau valandų per savaitę tokioje institucijoje, kurioje kiekvienam dėstytojui tenka 10 studentų.
3. Reikėtų pertvarkyti VGTU dėstytojų personalo mokslinės veiklos vertinimą. Derėtų įvesti tinkamas skatinimo schemas, skatinti atlikti vertingus mokslinius tyrimus, o atlygis turėtų būti mokamas ne už puslapių skaičių, o už kokybę. Niekam neturėtų būti atlyginama už straipsnių skelbimą leidiniuose, kurie tik prisideda prie VGTU tarptautinės atskirties, įskaitant leidinius, kuriuos universitetas leidžia bendrai su kitomis institucijomis. Taip pat reikia suprasti, kad kai kuriose srityse, įskaitant kompiuterių mokslą ir informatiką, „cituojamumo rodiklis““ ne visada įrodo aukštą kokybę.
4. Geriausiems ir labiausiai susidomėjusiems studentams reikėtų suteikti galimybę daryti pažangą už nustatytos studijų programos ribų. Talentingiausiems ir daugiausiai susidomėjimo demonstruojantiems studentams vertėtų leisti dalyvauti realiuose moksliniuose tyrimuose.
5. Reikėtų skatinti studentus dalyvauti „Erasmus“ judumo programose. Dabartinis studentų judumo lygis nėra priimtinas, ypač tada, kai ir akademinis personalas yra pakankamai save izoliuojantis tarptautiniu lygiu.
6. Balai turėtų būti informatyvūs ir iš esmės atspindėti studentų darbo kokybę. Tai ypač svarbu kalbant apie baigiamuosius darbus.
7. Studentus reikėtų supažindinti su kitomis programavimo paradigmomis, įskaitant funkcinį programavimą, kad jie žinotų, jog imperatyvi / objektinė paradigma nėra vienintelė galimybė.
8. Visi programoje dėstantys dėstytojai turėtų įsitraukti į programos turinį ir studijų proceso kūrimą bei vystymo procesą tam, kad būtų nuolat tobulinama dėstymo bei mokymosi kokybė.

Paslaugos teikėjas patvirtina, jog yra susipažinęs su Lietuvos Respublikos baudžiamojo kodekso 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė, parašas)