



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

VILNIAUS GEDIMINO TECHNIKOS
UNIVERSITETO

**STUDIJŲ PROGRAMOS *INFORMACIJOS IR
INFORMACINIŲ TECHNOLOGIJŲ SAUGA*
(621E14007)**

VERTINIMO IŠVADOS

**EVALUATION REPORT
OF *INFORMATION AND INFORMATION
TECHNOLOGIES SECURITY (621E14007)***

STUDY PROGRAMME

at **VILNIUS GEDIMINAS TECHNICAL
UNIVERSITY**

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Išvados parengtos anglų kalba
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Vilnius
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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Informacijos ir informacinių technologijų sauga</i>
Valstybinis kodas	621E14007
Studijų sritis	Technologijos mokslai
Studijų kryptis	Informatikos inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2 m.)
Studijų programos apimtis kreditais	120 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Informatikos inžinerijos magistras
Studijų programos įregistravimo data	Lietuvos Respublikos švietimo ir mokslo ministro 2011 m. birželio 15 d. įsakymu Nr. SR-2691

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Information and Information Technologies Security</i>
State code	621E14007
Study area	Technological Sciences
Study field	Informatics Engineering
Kind of the study programme	University studies
Study cycle	Second
Study mode (length in years)	Full-time (2 years)
Volume of the study programme in credits	120 ECTS
Degree and (or) professional qualifications awarded	Master of Informatics Engineering
Date of registration of the study programme	15 of June 2011, under the order of the Minister of the Ministry for Education and Science of the Republic of Lithuania No. SR-2691

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The Centre for Quality Assessment in Higher Education

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I. INTRODUCTION

The procedures of the external evaluation of the Vilnius Gediminas Technical University (hereafter, VGTU or the University) *Information and Information Technologies Security* (state code 621E14007) Master study programme were initiated by the Centre for Quality Assessment in Higher Education of Lithuania nominating the review panel formed by the head, Peeter Normak (Professor of Informatics, Institute of Informatics, Tallinn University, Estonia), Kari-Jouko Rähkä (Professor of Computer Science, School of Information Sciences, University of Tampere, Finland), Elmar Cochlovius (Professor, Department of Computer Science, Furtwangen University, Germany), Juozas Breivė (Information Systems Administrator, Western Shipyard Group, Klaipėda, Lithuania), employer representative, and Algirdas Kursevičius (Kaunas University of Technology, Lithuania), student representative.

For the evaluation the following documents have been considered:

1. Law on Higher Education and Research of Republic of Lithuania;
2. Procedure of the External Evaluation and Accreditation of Study Programmes;
3. General Requirements of Master Degree Study Programmes;
4. Methodology for Evaluation of Higher Education Study Programmes.

The basis for the evaluation of the study programme is the Self-evaluation Report (hereafter, the SER), prepared in 2013, its annexes, the relevant legal acts, and the site visit of the review panel to VGTU on 20 March 2014. The visit incorporated all required meetings with different groups: the administrative staff of the VGTU, staff of the Department of Information Systems, responsible for preparing the self-evaluation documents, teaching staff, students of all years of study, graduates and employers. The review panel evaluated various support services (classrooms, laboratories, library, computer facilities), examined students' graduation theses and various other materials. After the review panel discussions and additional preparations of conclusions and remarks, introductory general conclusions of the visit were presented. After the visit, the panel met to discuss and agree the content of the report, which represents the review panel consensual views.

VGTU is a public university that was founded in 1956 and that has ten faculties, which in turn contain autonomous academic units – departments. The *Information and Information Technologies Security* is a two-year second cycle (Master level) study programme that was started in 2011 and is currently coordinated by the Department of Information Systems. This department belongs to the Faculty of Fundamental Sciences.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

The overall aim of the programme *Information and Information Technologies Security* is to prepare second cycle graduates who shall fill the current and future demands of the Lithuanian labour market for IT-security experts. In the SER is highlighted the expanding role of information systems technology in general and IT-security in particular in the context of the global transformation of today's society into an information society. It is pointed out that a lack of information confidentiality, integrity and authenticity is a major road blocker to accomplish this goal both in the public and the private sector. The SER refers to a number of Lithuanian plans and proposals that underline the increasing demand for IT specialists. It may be justified to conclude that also IT-security experts will enjoy a growing demand. Note: a survey with Lithuanian IT companies has been conducted on it; however, information in the SER should be provided in a more detailed way.

Based on the overall aim, the SER identifies four *specific* intended learning outcomes of the programme which are basically in line with the JQI Dublin Descriptors for second cycle study programmes. Compared to the Bachelor degree, the research aspect and the originality of the solutions developed by a Master graduate have to be emphasized and regarding *Information and Information Technologies Security* study programme this is done in a sufficient extent – abilities to carry out research form a whole section (out of five sections) of the programme intended learning outcomes.

As it was mentioned, the intended learning outcomes are grouped into the sections, which are: “Knowledge and its application”, “Abilities to carry out research”, “Special Abilities”, “Social Abilities” and “Personal Abilities”. These intended learning outcomes are very clearly formulated and consistently provided in the SER and publicly available on the webpage of the study programme.

In general the programme aims and intended learning outcomes are consistent. Successfully achieving all of the intended learning outcomes during a period of four semesters, while earning a total of 120 ECTS, shall form a solid basis of competences for a second cycle degree of applied informatics. In Appendix 2 of the SER a table clearly illustrates the correlation between the programme aims, intended learning outcomes and study subjects. However, the review panel noticed that the group of “Personal Abilities” intended learning outcomes will be achieved by Studijų kokybės vertinimo centras

each of the study subject. This is not very helpful and defeats the purpose of specific intended learning outcomes and a detailed focus of each study subject.

Review panel also noticed that while one of the major social abilities, referred to in the intended learning outcomes, is being able to work in a group, the table in Appendix 2 of the SER only refers to two study subjects (Information Security Management and Software Security), which teach this particular social competence. This might be challenging, as none of the descriptions of these study subjects refers to any specific team projects or dedicated group assignments. This does not seem to be conclusive enough.

The panel also raised a question about the appropriateness of the name of the study programme that does not match with the most often used terminology at the moment – *cyber security*. However, the academic staff members preferred the existing name, as it was explained during the meeting.

2. Curriculum design

The study programme consists of 120 ECTS over the two years (60 ECTS on each year). This includes 72 ECTS for study field subjects, another 9 ECTS for obligatory subjects, and 39 thesis related credits. 4 to 5 subjects are taught per semester. The final work of a student shall consist of planning and executing an experiment and a written thesis. Thus the curriculum meets the legal requirements set in the Order of the Minister for Education and Science of the Republic of Lithuania “General Requirements for Master Degree Study Programmes”.

In the SER is stated: “Subjects are divided in such a way that having studied one subject makes it possible to study other subjects.” It would be reasonable to make such interrelationships between study subjects visible in the documentation as well. The programme has a specific, narrow focus, and therefore it is understandable that the same themes (e.g. web security) come up on several study subjects. The same teachers seem to be involved in their teaching, so this should help to guarantee that there is no undue overlap in the topics. Making the interrelationships explicit would also make the programme structure clearer both to current and potential students.

There is also some formal confusion concerning the elective study subjects. In the SER is noted: “In the first term, Master’s degree students will be able to freely choose a study modules from the ones that are taught in the university and have a corresponding number of credits, in the third – one of the elective modules,”, but this does not match the description in Appendix 3 of the SER and on the website:

<https://medeine.vgtu.lt/programos/programa.jsp?fak=10&prog=120&sid=F&rus=U&klb=en>,

where is mentioned that the elective study subject is offered in the second semester and the free choice study subject in the third semester.

The focused theme of the programme makes it possible to have a very comprehensive and up-to-date curriculum. It is not common to find the same breadth and depth of study subjects on information security in Master's programmes – it covers all major aspects in IT-security and reflects the latest achievements in science and technology. In Lithuania there is only one comparable programme at Kaunas University of Technology, which makes the curriculum of the VGTU study programme exceptional.

The review panel noticed that some students find the early focus on theoretical study subjects in the programme quite hard, but at the same time those who are motivated are satisfied with the study subjects and teaching offered. Also it is noticeable that practical assignments and case studies are used in the teaching process and, in the review panel's point of view, those could be used even more as the teaching methods. Regarding social partners' opinion on the curriculum, they emphasized that the programme could in the future allow specializations to some most wide spread IT security professions. Additionally the review panel would like to note further topics, which might be relevant for future employers in the field of IT-security – cloud computing and legal aspects, such as national/international data security acts and different approaches to copyright regulations. The study subject Virtual Infrastructure Security covers the virtualization product VMware, but does not seem to cover cloud security in depth. The study subject Cybercrime and Computer Forensics does briefly cover some legal aspects, but a more thorough treatment might be more adequate to this important subject. However, the review panel would like to pay attention that despite of the few defined areas, which could and should be perceived as a direction for further improvement, the study programme in overall is on a very high level.

3. Staff

The study programme *Information and Information Technologies Security* is delivered by 2 Professors, 2 Associate Professors, 3 lecturers and 2 PhD students, i.e. 9 in total. Noticeable that only 4 of them have scientific (doctoral) degrees. However, 2 persons are pursuing their PhD degree, which might compensate the existing shortcoming at this point to some extent. Also the attention should be paid that 2 persons listed in Annex 5 of the SER: "Data on Teaching Staff" are not mentioned on the publicly accessible webpage of the Department of Information Systems. This should be fixed.

While the total number of students has increased from 7 in 2011/12 up to 25 in 2013/14, the size of the teaching staff has remained approximately constant. This increases the student/lecturer ratio from 0.78 to 2.78. It is understandable that the 2011/12 period has to be regarded as a ramp-up period, but precautions should be taken to prevent the student/lecturer ratio from similarly rapid increasing in the future. The share of study subjects (including thesis, in ECTS) taught by Professors forms 43% of studies. 75% of study subjects are taught by lecturers with scientific degree. Currently 2 Professors (in total 4 PhDs) are involved in teaching on the programme. However, the potential for further increasing the share of lecturers with a doctoral degree is high – the Department of Information Systems hosts 5 Professors and 10 PhDs. Moreover, 2 out of 5 lecturers contributing to the study programme without the PhD are doctoral students.

One important indicator of a close interaction between students and staff is the ratio of student theses/supervising lecturer. The SER mentions a ratio of 3-4, which is formally correct: altogether 5 teachers supervised 17 students in 2011/2012 and 2012/2013 academic years. However, a closer look reveals that one of the lecturers has supervised 10 theses alone. Although this person – Associate Professor Nikolaj Goranin – is a top expert in the area, has good and ongoing industry experience and is highly valued by the students, nevertheless it would be beneficial to increase the number of supervising Professors in the programme to limit the risk of overloading one person.

Formal note: names of the study subjects which are being referenced in the CVs of the teaching staff do not always match with the titles listed in the study plan as provided in the Annex 3 of the SER. For example, Jonas Juknius teaches the study subject Ethical Hacking and Vulnerability Detection Technologies which is listed as Security Checks and Ethical Hacking Technologies in his CV. To avoid confusion and misunderstandings this should be corrected in the next version of the programme documentation or staff CVs.

The distribution of age and the staff turnover do not seem to cause any issues. 56% of the teaching personnel are in the age range 31-41. There are two PhD students younger than 30 years. In the best case, these candidates could be motivated to continue to work in the department and become staff members. On the other end, the two Professors combined with other teachers together provide a substantial body of pedagogical experience to the students.

Remarkable that some of the teachers have a reasonable track record of high-quality scientific publications including some well-known international titles (“Chaos, Solitons and Fractals”, “Mechanical Systems and Signal Processing”, “Journal of Electroceramics”). Also, there are

several projects mentioned in the CVs, where staff members have contributed to. This illustrates the significant role of research in the activities of the department. However, not all of the projects and publications seem to directly relate to the field of IT security, for example, in some publications and projects the orientation is towards adult education or piezoelectric actuators.

Regarding lecturers' academic exchange, there have been two departing and one arriving lecturer in a period 2011-2013. The international exposure of the staff members could be improved by increasing this number. However, due to the small number of teaching staff, this might be challenging to organize. Inviting external experts, e.g. social partners, to deliver selected lectures, offer student projects or internships might be one approach to address this issue.

4. Facilities and learning resources

The classrooms are adequate in their size, modern and up-to-date – well equipped with a modern technology, recently renovated and equipped with wireless Internet connections and electricity sockets, which allow students to use their own devices in the study process. The premises meet prescribed hygienic requirements and norms, and are well accessible to disabled people.

VGTU is a member of the Microsoft MSDN Academic Alliance, IBM Academic Initiative and Oracle academic programmes and is therefore provided with an unlimited free of charge software and training materials of these companies. For modernizing laboratory equipment, EU Structural Funds are used.

The library is updated twice a year, according to the literature lists provided by the lecturers. Access to electronic resources is possible both from the university network, and from outside by using VPN and single sign-on. However, the share of magazines and books in IT security is relatively modest. The students also do not have direct access to the most comprehensive resources – ACM Digital Library, IEEE Computer Society Digital Library. Both issues should be reconsidered and fixed.

5. Study process and student assessment

Admission to the studies is on a competitive basis; eligible are Bachelor graduates of the study fields of informatics, informatics engineering, mathematics, physics, electronics or telecommunication engineering. Preferred are students who have studied an engineering subjects directly related to the aims of the study programme. Candidates who do not match the requirements have to study the subjects individually and take exams prior to the beginning of Master degree studies. The number of admitted students has been increased from 12 (2011) to 16

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(2013). The competitive score of admitted students spans from the lowest 8.91 to the highest 12.45, with the average of about 10.4. The dropout rate is rather high, especially during the first year. For example, only 7 students out of 12 admitted in 2011 continued their studies after the first study year. The main reasons for leaving the studies are: intensive work in companies, changes in personal life, difficult financial state and lack of motivation. The latter – low motivation – is, according to the student representatives, partly due to the fact that there has not been formed a firm academic community around the programme yet. Taking into account the high quality of the study programme and the need of the programme graduates in a labour market, the number of priority applications – between 24 and 44 – is unreasonably small. This should be considered as an indication of insufficient marketing of the study programme.

The structure of the studies harmonises with the formal requirements: the total workload of a student is supposed to be 3200 hours, including 360 hours (11,3%) for lectures, 270 hours (8,4%) for the other type of classrooms studies, 192 hours (6%) for classroom consultations, 1338 hours (41,8%) for independent work, 240 hours (7,5%) for final thesis related study subjects and 800 hours (25%) for the final thesis. However, supervision and scaffolding of students' independent work should be strengthened: the 6 students who met the review panel members devote to independent work in average only 8 hours a week. This is about half of what the programme foresees.

Faculty of Fundamental Sciences has signed an agreement for ERASMUS programme with 56 Europe and 6 Turkish universities. However, only one student from the programme has used this opportunity. The main reasons of low mobility are that the students are employed, bound by certain family commitments or financial restrictions.

The students are encouraged to conduct research and present the results on the Lithuanian Young Scientists' Conference "Science – Future of Lithuania" organised by the Faculty of Fundamental Sciences. The articles are published in the conference proceedings and the best of them are also published in the "Electronics and Electrical Engineering" volume of the "Science – Future of Lithuania" journal.

As to the academic support, the most important information is provided on the university's website (<http://mano.vgtu.lt>). Every teacher has regular consulting hours (2 hours twice a week). The students expressed their satisfaction concerning the counselling opportunities. Regarding social support, the university offers adequate psychological, health and cultural support.

However, the students were concerned about the conditions in dormitories. The university should take serious actions to improve these conditions.

The assessment system of students' performance seems to be clear and adequate. Both individual and group assignments are used in the study process. The requirements students should fulfil are thoroughly explained by the teachers at the beginning of a study subject; the students review panel met were quite satisfied with the current assessment system.

6. Programme management

The structure of the programme management is clearly presented in the SER, including different stakeholders participation in improvement of the programme quality. However, the SER does not contain the information with the names of people who act in various management roles, which causes some difficulties in getting an overall view. The attention also should be paid that regarding the academic staff, the management responsibilities seem to be distributed quite narrowly. The high workload and dependence on few key people could be a potential risk, despite of the fact that currently study programme is managed effectively.

Surveys to collect feedback from students are organized regularly twice a year. Feedback is discussed in various forums, including (in summarized form) the Study Programme Committee. Although the feedback results are made public, and discussed in Rector's office and in academic divisions, the students mentioned during the meeting with the review panel that they are lacking of information about the results of their provided feedback. A formal procedure should be developed for informing students on the actions taken (or not taken) based on their feedback.

The Study Programme Committee together with the teaching staff has been very successful to attract a wide scope of social partners including experts from the public and private sector, as well as ranging from small start-up companies to larger international corporations. It is suggested by review panel seeking to keep the study programme up-to-date and relevant for future employers to fully and proactively utilize the resources provided by the social partners. Even with the limited capacity of the teaching staff, extra effort might be required to integrate valuable contributions and proposals of the social partners into the study programme. Remarkable that the employers during the meeting with review panel pointed out that they are very satisfied about the quality of the study programme, though they also provided suggestion that the programme could be offered in a distant mode as well, giving study opportunities to the interested learners in other regions.

III. RECOMMENDATIONS

1. Supervision of the final theses is to a great extent on the shoulders of a single teacher. Although he is doing a commendable job, it is strongly recommended to involve more teachers in teaching and supervision of final theses and ***distribute supervision more evenly*** among the teaching staff to keep the workload of teachers in a better balance.
2. ***Involve the social partners*** more in academic activities for discussing case studies, conducting seminars, providing internships, supervising the theses and upgrading the laboratories.
3. Prioritize the development of ***teamwork and communication skills*** of the students. Mitigating IT-security related risks presume communication and cooperation with the professional community. These competences should be developed throughout the whole study, using different methods and tools (project work, presentations, discussions etc).
4. Strengthen the aspects of ***cloud computing*** in the programme. Cloud computing already became a mainstream and therefore its security should be discussed widely. Currently cloud computing is slightly discussed in one (optional) study subject only.
5. Ensure access to students and academic staff to more comprehensive ***electronic library resources*** in ICT (ACM Digital Library, IEEE Computer Society Digital Library).
6. Strengthen supervision and scaffolding of ***students' independent work***, to ensure the amount of students' work prescribed by the programme.
7. While the need for IT-security experts is undisputable the review panel is concerned about the small number of applicants and the high dropout rate that might compromise the sustainability of the programme. ***Increase considerably the marketing efforts*** and improve the communication amongst internal and external Bachelor graduates – potential students; particularly important is to make a proper use of the University website and various social media tools.
8. Consider the possibility to ***offer the programme in distance mode***, as well as to allow remote participation and consequently to serve other regions needs. However, this can be done only after students' supervision is properly arranged.
9. The programme has a good potential to become an exemplary one. The administration of the Faculty of Fundamental Sciences is recommended to ***provide every support*** to the Department of Information Systems in enhancing and implementation of the programme.

IV. SUMMARY

The aim of *Information and Information Technology Security* study programme is to prepare second cycle graduates who possess modern methods and principles of information technology security assurance, specialized knowledge in the field of information security, and who are able to solve relevant technical and managerial problems. The programme was developed in cooperation with Kaunas University of Technology and was supported by the European Union Lifelong Learning programme.

The programme complies fully with the international standards, and was also very well adopted by the students. The biggest problem is related to the academic staff: although the formal quality requirements are fulfilled, the teaching load between the staff members is distributed quite unevenly. Alone the fact that a single person supervises more than 50% of final Master theses makes the sustainability of the programme vulnerable. On the other hand, having a competent “engine” of the programme with good industry experience is already an asset.

The Department of Information Systems – the coordinator of the programme – has a wide scope of social partners, and cooperation with some of them is wide-ranging. However, the potential of social partners can be better utilized – the employers expressed their willingness to cooperate more closely with the university.

The staff for delivery of the programme is in general adequately qualified; there are some PhD students involved in the teaching. This certainly contributes in a long term forming a sustainable academic staff. Strengthening academic staff would allow to increase the number of students and offer the programme also in distance learning or a part-time mode. The latter option should be seriously considered because the graduates are needed in all over the country.

Regarding the study process and student assessment, the priority should be given to the measures that will decrease the dropout rate. Efforts should be made for communicating the programme outside the university, for bringing the knowledge about the high quality study programme to a possibly wide audience in order to attract the most motivated students.

V. GENERAL ASSESSMENT

The study programme *Information and Information Technologies Security* (state code – 621E14007) at Vilnius Gediminas Technical University is given **positive** evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	4
2.	Curriculum design	4
3.	Staff	3
4.	Material resources	3
5.	Study process and assessment (student admission, study process student support, achievement assessment)	3
6.	Programme management (programme administration, internal quality assurance)	3
	Total:	20

*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.

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**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO ANTROSIOS PAKOPOS
STUDIJŲ PROGRAMOS *INFORMACIJOS IR INFORMACINIŲ TECHNOLOGIJŲ
SAUGA* (VALSTYBINIS KODAS – 621E14007) 2014-05-16 EKSPERTINIO VERTINIMO
IŠVADŲ NR. SV4-241 IŠRAŠAS**

<...>

V. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus Gedimino technikos universiteto studijų programa *Informacijos ir informacinių technologijų sauga* (valstybinis kodas – 621E14007) vertinama **teigiamai**.

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

* 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

Informacijos ir informacinių technologijų saugos studijų programos tikslas – rengti antrosios pakopos absolventus, kurie turėtų žinių apie informacinių technologijų saugos užtikrinimo metodus bei principus, specializuotų žinių informacijos saugumo srityje ir kurie galėtų spręsti atitinkamas technines ir vadybines problemas. Programa buvo sukurta bendradarbiaujant su Kauno technologijos universitetu, taip pat buvo remtasi Europos Sąjungos mokymosi visą gyvenimą programa.

Programa visiškai atitinka tarptautinius standartus, ją taip pat labai gerai vertina studentai. Didžiausia programos silpnybė yra susijusi su akademinio personalu: nors formalūs personalo kvalifikacijai keliami reikalavimai yra tenkinami, dėstymo krūvis yra paskirstytas gana netolygiai. Faktas, kad vienas asmuo vadovauja daugiau nei 50 proc. baigiamųjų magistro darbų, kelia grėsmę tolesniam sėkmingam

programos vykdymui. Kita vertus, kompetentingas programos „variklis“, turintis praktinės patirties pramonėje, yra vertybė.

Informacinių sistemų katedra, koordinuojanti programos vykdymą, palaiko ryšį su pakankamai dideliu skaičiumi socialinių partnerių. Visgi socialinių partnerių potencialas galėtų būti išnaudojamas dar labiau – darbdaviai išreiškė pageidavimą glaudžiau bendradarbiauti su universitetu.

Studijų programos dėstytojai yra aukštos kvalifikacijos; programoje taip pat dėsto keletas doktorantų. Tai ilgalaikėje perspektyvoje turėtų padėti formuoti tvarų akademinį personalą. Akademinio personalo stiprinimas leistų padidinti studentų skaičių ir suteiktų galimybę programą vykdyti nuotoliniu būdu arba iššėstine forma. Pastarąją galimybę reikėtų atidžiai apsvarstyti, nes tokio pobūdžio specialistai yra reikalingi visoje šalyje.

Kalbant apie studijų eigą ir studentų vertinimą, pirmenybė turėtų būti teikiama priemonėms, kurios padėtų sumažinti studentų nubyrežimo rodiklius. Reikėtų imtis aktyvių priemonių ir teikti informaciją apie studijų programą už universiteto ribų, taip suteikiant žinių apie aukštos kokybės studijų programą kuo platesnei auditorijai ir pritraukiant labiausiai motyvuotus studentus.

III. REKOMENDACIJOS

1. Daugumos studentų baigiamiesiems darbams vadovauja vienas dėstytojas. Nors jo indėlis į studijų programą pagirtinas, tačiau ekspertų grupė rekomenduoja įtraukti daugiau akademinio personalo į programos dėstymą, o taip pat ir vadovavimą studentų baigiamiesiems darbams. *Vadovavimo studentų baigiamiesiems darbams krūvį reikėtų paskirstyti tolygiau*, siekiant dėstytojų darbo krūvio balanso.
2. Labiau *įtraukti socialinius partnerius* į akademinę veiklą, kaip pavyzdį šiuo atveju galima būtų paminėti, jų dalyvavimą atvejo analizės aptarimuose, seminarų vedimą, organizuojamas stažuotes, vadovavimą baigiamiesiems studentų darbams ir laboratorijų atnaujinimą.
3. Prioritetą skirti studentų *komandinio darbo ir komunikavimo įgūdžių* ugdymui. Siekiant sumažinti su IT saugumu susijusią riziką, būtina bendrauti ir bendradarbiauti su profesine bendruomene. Šios kompetencijos turėtų būti ugdomos visų studijų metu, taikant įvairius metodus ir priemones (darbą projektuose, pristatymus, diskusijas ir pan.).

4. Stiprinti *debesų kompiuterijos* aspektus programoje. Debesų kompiuterija jau tapo vyraujančia tendencija, todėl jos saugai turėtų būti skiriama daug dėmesio. Šiuo metu debesų kompiuterija yra tik tam tikru mastu aptariama viename (pasirenkamajame) studijų dalyke.
5. Studentams ir akademiniam personalui turėtų būti užtikrinama galimybė turėti prieigą prie visapusių *elektroninių bibliotekos išteklių*, susijusių su ICT (ACM skaitmeninė biblioteka, IEEE Kompiuterių visuomenės skaitmeninė biblioteka).
6. Daugiau dėmesio skirti studentų savarankiško darbo priežiūrai, siekiant užtikrinti programoje nustatytas studentų darbo apimtis.
7. Nors IT saugumo ekspertų poreikis yra neginčijamas, ekspertų grupei nerimą kelia nedidelis stojančiųjų skaičius ir dideli studentų nubyrėjimo rodikliai, kurie gali turėti įtakos tolesniam sėkmingam studijų programos vykdymui. **Būtina daugiau dėmesio skirti aktyvioms rinkodaros priemonėms** ir pagerinti komunikaciją tarp „vidaus“ bei „išorės“ bakalaurų, t. y. tarp potencialių studentų; taip pat ypatingai svarbu tinkamai pasinaudoti universiteto tinklalapiu ir įvairiomis socialinėmis žiniasklaidos priemonėmis.
8. Apsvarstyti galimybę *programą vykdyti nuotoliniu būdu*, taip tenkinant ir kitų regionų poreikius. Vis dėlto tai reikėtų daryti tik po to, kai yra užtikrinama tinkama studentų priežiūra.
9. Programa turi nemažai potencialo tapti pavyzdine. Fundamentinių mokslų fakulteto administracijai rekomenduojama *teikti reikiamą paramą* Informacinių sistemų katedrai vykdančią ir tobulinančią studijų programą.

<...>

Paslaugos teikėjas patvirtina, jog yra susipažinęs su Lietuvos Respublikos baudžiamojo kodekso¹ 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

¹ Žin., 2002, Nr.37-1341.