STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

KAUNO TECHNOLOGIJOS UNIVERSITETO

STUDIJŲ PROGRAMOS Informacijos ir informacinių technologijų sauga (621E10003)
VERTINIMO IŠVADOS

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EVALUATION REPORT

OF *Information and Information Technology Security* (621E10003)

STUDY PROGRAMME

at *KAUNAS UNIVERSITY OF TECHNOLOGY*

Grupės vadovas: Team leader:	Prof. dr. Roland N. Ibbett
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Išvados parengtos anglų kalba
Report language - English

Vilnius
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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	Informacijos ir informacinių technologijų sauga
Valstybinis kodas	621E10003
Studijų sritis	Technologijos mokslų studijų sritis
Studijų kryptis	Informatikos inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2 metai)
Studijų programos apimtis kreditais	120 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Informatikos inžinerijos magistras
Studijų programos įregistravimo data	

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INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	Information and Information Technology Security
State code	612H61002
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	

Studijų kokybės vertinimo centras

CONTENTS

I. INTRODUCTION

The procedures of the external evaluation of the Kaunas University of Technology (hereafter, KTU) Information and Information Technology Security masters study programme were initiated by the Centre for Quality Assessment in Higher Education of Lithuania nominating the external evaluation peer group formed by the head, Professor Roland Ibbett (Emeritus Professor of Computer Science, University of Edinburgh, Scotland and Chair of the Accreditation Committee of the European Quality Assurance Network for Informatics Education (EQANIE)), Professor Jürgen Dorn (Vienna University of Technology, Vienna, Austria), Professor José Luiz Fiadeiro (Royal Holloway University of London, England), Simonas Razminas (Organisation Coach, UAB AdForm, Lithuania), employer representative and Paulius Varonenka (Vilnius University, Lithuania), student representative. For the evaluation the following documents have been considered: Law on Higher Education and Research of Republic of Lithuania; Procedure of the External Evaluation and Accreditation of Study Programmes; Methodology for Evaluation of Higher Education Study Programmes; General Requirements of the First Degree and Integrated Study Programmes.

The basis for the evaluation of the study programme is the Self-Evaluation Report (hereafter, SER), prepared in 2013, its annexes and the site visit of the expert group to KTU on 13 May 2014. The visit incorporated all required meetings with different groups: the administrative staff of the KTU, staff in the Faculty of Informatics responsible for preparing the self-evaluation documents, teaching staff, students of all years of study, graduates and employers. The expert group evaluated various support services (classrooms, laboratories, library, computer facilities), examined students' final works, and various other materials. After the expert group discussions and additional preparations of conclusions and remarks, introductory general conclusions of the visit were presented. After the visit, the group met to discuss and agree the content of the report, which represents the expert team's consensual views.

KTU traces its origins back to 1922 as part of the University of Lithuania, later Vytautas Magnus University. Following various re-organisations, the Kaunas Polytechnic Institute was formed in 1950 and, in 1990, KPI became the Kaunas University of Technology. KTU is organised into 12 Faculties, together with a number of institutes, service departments and administrative offices. The Faculty of Informatics is made up of five departments: Applied Informatics, Computer Science, Information Systems, Multimedia Engineering and Software Engineering.

The MSc in Information and Information Technology Security is organised by the Department of Computer Science in close cooperation with the Real Time Computer Systems Centre. Contributions to the programme also come from the Faculties of Fundamental Sciences and Telecommunications & Electronics and from the (service) Department of Information Technologies. The aim of the programme is to prepare highly qualified Information Technology specialists able to evaluate, plan, design, implement and manage secure information systems.

The Faculty has been teaching Information Security since 2008, originally as a specialisation in the more general Information Technologies degree. The MSc in Information and Information Technology Security was established as a separate programme in 2011 and has accepted over 20 students each year since then.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

The 2-year/120 ECTS master study programme on Information and Information Technology Security is motivated by the world-wide growth of computer security incidents. Evidence is given in the SER by referencing international documents proving the necessity. Furthermore, Lithuanian and European laws on security are used to motivate the need for such specialists. The aims and the expected learning outcomes are unique in Lithuanian higher education so far as the Panel is aware and the outcomes are urgently required both in public administration and in industry. During the visit the social partners strongly supported this need and wished to encourage the Department to increase student numbers.

The aim of the study is to educate students who are able to analyse, design and develop solutions in the field of Information and Information Technology Security. It is expected that students joining the programme will have as prerequisites those competences that are typically gained in an informatics bachelor programme. The aims are very ambitious, since IT security is a rapidly changing field and staff will need to ensure that they stay at the forefront of research and development.

The aims are achieved by 36 learning outcomes divided into four groups "Conceptual Fundamentals of Informatics", "Analysis, Design and Implementation", "Technology and Methodology" and "Professional Competence". The description of the learning outcomes is compatible with Euro-Inf framework and self-consistent. In a matrix, the learning outcomes are assigned consistently to courses of the study plan. The intended learning outcomes are

appropriate for a second cycle degree by demanding a deepened knowledge in a specialized area and by critical awareness of research and practice at the forefront of this area.

The study programme is published in the Web in Lithuanian and English language. Students have further access through an internal information system.

All applicable Lithuanian laws were regarded. The name of the study programme is compatible with the aims and content of the study.

2. Curriculum design

This is an innovative and timely master programme that responds to the increasing need for IT professionals with a specialisation in Information Security. Combined with a flexible, blended mode of delivery, the programme is proving to be extremely successful for recently graduated IT professionals.

This degree programme is designed to run over four semesters, i.e. two academic years, and consists of 120 ECTS (each semester consisting of 30 credits), which complies with the Bologna requirements for the second cycle of higher-education qualifications. As such, students who successfully complete the programme are awarded a master's degree in Information and Information Technology Security.

The credits are divided as follows: 66 credits of core taught courses (each course carrying six credits), an optional course worth six credits, 18 credits are for the research project (divided into three modules), and 30 for the final degree project. A well-structured process has been put in place around the final degree project, which is seen as the culmination of the programme. During the first three semesters, students prepare for the final project in dedicated modules. Students must select the topic for their final project in the first semester but there is flexibility for that topic to evolve as the student acquires more background in information security.

Each semester is organised so as to offer a natural progression of specialisation and technological content. The two traditional foundational subjects for Information Security (cryptography and protocols) are duly covered in the programme: cryptography in a dedicated course, protocols spread over several courses. One aspect that the Department might wish to consider is the possibility of offering an overarching "security protocols" course instead of spreading these protocols across several courses. Another is to make explicit the pre-requisites in mathematics for the course on Cryptography; the current syllabus is very ambitious in the amount of material that it proposes to cover, which would seem to be beyond the abilities of

students without a significant mathematical background. The Panel is aware that students are being recruited from bachelors programmes that do provide that background. However, the Panel also considers that there is scope for the Department to attract students from a wider pool of universities, for which it recommends that the Department should make clear what subjects applicants should have studied, rather than relying on national curricula requirements.

In general, the contents are up-to-date and offer students a reasonable breadth of the area, with several topical subjects (for example, Ethical Hacking) that will surely capture the interest of the students and offer them a good preparation for their professional careers. The fact that professionals are invited to deliver some lectures is also commendable. However, the Panel has some concerns in relation to the lack of a wider coverage of topics such as botnets, internet-specific technologies, vulnerabilities and several forms of attacks in the curriculum. Some of the social partners met by the Panel during the visit also expressed a wish to see data analytics skills taught in the programme. More generally, the Panel considers that the Department needs to put in place a more robust process of consultation to keep the curriculum current in what is a very fast moving area, to consider the possibility of introducing more optional courses, and to widen staff recruitment beyond its traditional pool to attract specialists who can strengthen the programme and ensure its vitality. Generally speaking the panel was assured that the topics are being taught but in such a fast moving field it is important that the course documentation is kept up to date

3. Staff

The Information and IT Security programme is delivered by 16 staff: 4 professors, 10 associate professors and 2 lecturers, all of whom have scientific (doctoral) degrees and more than meet the legal requirements for a Masters programme. According to the SER, staff from the Faculties of Informatics, Fundamental Sciences and Telecommunications & Electronics, and from the Department of Information Services (a Corporate Services department of the University) contribute to the programme. The Panel would have liked to have seen more detailed information about staff affiliations and was concerned that it was not possible to find staff lists for the Departments on the University website. During the visit the Panel was assured that a new version of the website, currently under development, would include lists of staff for all departments.

The SER Staff Recruitment section discusses recruitment of existing staff to the programme but says nothing about how staff are recruited to the Faculty. It is noticeable that very few of the staff have degrees from anywhere other than KTU. During the visit the Panel

was assured that all vacant positions are offered publicly but were told that not only is there a shortage of suitably qualified informatics staff generally in Lithuania but also that most applicants tend to prefer to stay in the institution with which they are familiar. In relation to the 5-year re-certification of staff, the Panel was assured that staff were always diligent to ensure that they would satisfy the re-certification requirements.

The numbers and qualifications and experience of the staff involved in teaching on the programme are more than adequate to ensure that the intended learning outcomes of the programme can be achieved by the students, but the Panel wanted to be assured that the overall staff/student ratio in the Faculty was adequate to allow the programme to be delivered satisfactorily alongside other programmes. During the visit the Panel was informed that there are currently 85 academic staff in the Faculty, 1000 undergraduates and 200 Masters students, giving an overall staff/student ratio of 1:14, which is entirely satisfactory. The SER states that some lectures are provided by short-term visiting teachers from enterprises, social and academic partners. During the visit the Panel was told that these lectures are intended to reinforce the course material and to reassure students that what are learning will be of relevance during their subsequent careers.

There is a considerable emphasis on research in the Department, both individual and collaborative; during 2008-13, more than half of the staff participated in externally funded projects (7 national and 5 international). Furthermore the presence of 30 PhD students in the Faculty contributes to a good research culture. All members of staff have good publication records, though only a few have research publications in journals and conferences outside Lithuania. The Panel was assured that there were adequate funds to allow staff to attend international conferences.

The age distribution of the teaching staff (averaging at 48.25) shows six people in the age range 30-40, two in the range 40-50, four aged 50-60 and four 60-70, so there is a good mix of younger and more experienced staff. Their teaching experience ranges from 3 to 35 years, though almost all of this has been at KTU. Although many staff list pedagogical material that they have produced in the professional advancement section of their CVs, only five members of staff list recent involvement in professional advancement activities outside of Lithuania, with a further six listing such activities within Lithuania. The SER shows that a number of guest teachers from abroad have visited the Faculty in recent years, though numbers have varied from year to year and with only 1 visitor in 2012. The Panel believes that it would be helpful for more

staff to be involved in activities that bring them into contact with staff in other institutions, especially through two-way international exchanges.

4. Facilities and learning resources

In most cases, the premises and equipment are in quite good condition. All classrooms have full access for people with disabilities. The classrooms and facilities are located in 3 different buildings. The number of buildings creates some inconvenience for students in finding classrooms, especially with missing or hard-to-notice signposting. However, the fact that all 3 buildings are located on the same campus mitigates the situation. During the visit the Panel was informed that the research facilities and laboratories that are currently based in the Faculty building will be moved to a new building, whilst the study classrooms will remain in the Faculty building. This will have some impact of the time and distance students will need to travel between buildings but the Panel was assured that most of the new facilities will be freely accessible, and that students will be able to use them when required.

Open areas in corridors are clearly short of chairs and power supply sockets, which are essential since most of the students bring their own equipment, WiFi seems to be present. There is limited availability of recreation zones for personal or group work. The panel recommends that more open area seating be provided for students with proper conditions to use their own equipment by, for example, installing more power supply sockets.

Most of the servers are located in a specialised server room with proper conditions, although during the visit there was no-one available who could confirm that, in the event of a disaster, (fire, flood, etc), a disaster recovery plan is in place or who would be able to execute it in case of an accident. Backups are stored in another place, but that would be not enough to avoid noticeable impact to the online system used to organise and manage the study programme, as well as access to the online material or live broadcasting of lectures.

As mentioned above, most of the classes are in very good shape, especially those that have been upgraded most recently with the latest equipment, e.g. using EU structural funds. However, the Panel was informed that a life-cycle 6 years was intended for the workstations in some classrooms, which is too long for most information technology studies and also confirmed by the level of satisfaction with the equipment among students. The furniture and working places in laboratories and classrooms lack mobility that would enable proper group work conditions. On the other hand, there is at least one small classroom that is available for group work.

The specialised laboratories are accessible from outside the University via VPN, thus supporting the model of blended studies for students. Students were also satisfied with the option to install software on their own machines and with availability of licences.

The Information and IT Security programme is special in that students must keep up-to-date with the latest threats and attacks during and after their studies. Therefore, the material must be up-to-date and accessible to students. According to the SER, the recommended references for study modules are not available to students in most cases, even though the teaching staff claimed that they update material according to recommendations, around 20% per year. In addition, the students claimed that parts of the material should be updated. Students were not aware of best practices (e.g. Source Control) or the most popular attacks (therefore they are not able to prevent them). Also, they seem to be not involved in any industrial events or local communities (e.g. ISACA Lietuva) activity.

5. Study process and student assessment

Admission to the Information and Information Technology Security (next IITS) programme is carried out following the Rules of Admission to KTU; the admission procedure is conducted by the Admission Commission at Faculty level, approved by Order of the Rector. The admission rules are published on both the University and the Faculty of Informatics website. The requirements for admission to IITS are logical, because the IITS programme is part of physical sciences, so students having a bachelor degree in a physical or technological science will already have demonstrated the skills needed to write a thesis.

The competition grade is composed of the weighted average of the first-cycle grade multiplied by coefficient 0.8, and the grade of research activity on ten-point scale multiplied by coefficient 0.2. Expert evaluation of research activity is performed by the Selective Admission Commission according to the documents presented. The ranked order of entrants is publicly available.

To support the blended learning mode of study, lectures are recorded using video conference programme and broadcast via the Web. Consultations with staff can also take place via video software programs. Laboratory work, practical tasks and student evaluations are performed on the premises of the University, which implies adequate study organisation. An exam is available for students who have fulfilled all individual tasks of the semester. An appropriate academic workload is ensured by the Vice-Dean during a four-week examination session.

The number of students admitted is stable (15 - 26 students), and although this might imply that there is no competition for admission to the IITS study programme, only a small number of students drop out, normally during the first year, implying that students who are admitted are well prepared and understand their needs. Most of the students already have jobs, around 90% in the IT sector, and although most are not currently working in security, they are intending to pursue careers in high-technology enterprises where security will be important.

Students have opportunities to participate in student mobility programmes though the rate of participation is rather low because the majority of students have jobs. The Faculty arranges an information seminar for students interested in ERASMUS studies once a year. Moreover, additional seminars, where students share their experience of foreign higher education institutions, are also organised by the Department. The aim it to encourage students to participate in such programmes by explaining how they could help the students with their careers and how their skills could be improved by practice obtained abroad.

IITS students have full academic support. All academic information is published on the KTU website. During the first lecture, the learning aims and career possibilities are explained. Students have consultations with teachers, which may be performed face-to-face, by e-mail, or by telephone. Annual "Career Days" events are organised to introduce job and practice positions.

It is mentioned in the SER that students can get scholarships as social support and the students were aware that they exist.

The system of assessment of students' performance is clear, adequate and publicly available. During the meeting students agreed that the staff introduce the requirements for every study programme at the beginning of each semester. A Methodological Guidelines for Final Degree Projects document is prepared for students which contains information about the definition of the subject, formal requirements, preparation, defence procedure and method of assessment. In particular, the Panel commends the inclusion in the Qualification Commission of a high qualification specialist from outside the University.

Students can participate in departmental research, however, this requires special IT skills and is not popular among Master degree students, mainly because, as noted above, most of the students already have jobs.

6. Programme management

The Programme is managed according to the methods, regulations and structures adopted by KTU in compliance with key policies of the European Union for quality assurance in higher education. The process of quality assessment and change is organised hierarchically at the

level of the Programme, the Department of Computer Science, the Faculty of Informatics and higher instances of the KTU responsible for Quality control.

The core organisational unit is the Study Programme Committee (SPC), which sits at faculty level and comprises the coordinators of the different programmes, one student representative delegated by the student union of the faculty, and one business/industry representative. The remit of the SPC is quite broad, with faculty-wide responsibilities, from making proposals for the creation of new programmes or specialisations of existing programmes (or their termination), to the update or creation of study courses, and down to planning/commissioning/approval of textbooks.

In relation to involving students in the quality assurance process, electronic surveys are organised at university level, which students are invited to complete for each subject at the end of each semester. According to the students whom the Panel met during the visit, the results of those surveys and of any actions taken as a consequence are not readily available to them. Student engagement with the surveys appears to be low, which hinders the collection of information that is representative enough to inform quality-related decision processes. To make the collection of information more effective, the Faculty organises round table meetings with student representatives and some teachers at Faculty level. However, the Department relies essentially on students to report when something goes wrong or corrective actions are not taken. The Panel would like to recommend that the Department put in place a more structured form of interaction with students, for example via a small committee consisting of key staff (e.g., the Programme Coordinator, the Head of Department, a librarian, a systems manager, but not teachers in general) and elected representatives of the student cohorts that would meet two or three times per semester to review any issues that students perceive to require action to be taken or any actions taken since previous meetings; ideally, the committee would be chaired by a student so as to encourage student involvement; minutes and a list of actions/outcomes should be published on Moodle so that it is available to all staff and students of the Department.

Social partners and graduates (alumni) are also involved in the quality management processes at Faculty level. In relation to employers, the Self-Evaluation Report mentions that professionals give feedback on the level of student preparation and the need for new competences, and that they analyse changes to the programmes. However, the meetings held during the visit of the Panel suggest that relationships with social partners and graduates are essentially ad-hoc and on a personal basis, often on the initiative of individual social partners. The Panel perceives that it would be in the best interest of the Department that meetings be

organised where staff, social partners and graduates can engage in collective discussions around key topics; this would have the advantage of confronting different points of view and engage all stakeholders more effectively. Therefore, the Panel would like to recommend that the Department put in place a more structured form of interaction with social partners and graduates, for example via an Industrial Advisory Board that could meet at least once a year, with an agenda, minutes and list of actions/outcomes that would be made available to all.

An additional element of quality control that the Panel would like to recommend the Department to put in place is peer-observation of teaching, exam/coursework setting and marking. Such forms of peer-observation are very useful for spreading good practice, ensuring consistency of standards and criteria, and helping new members of staff develop or hone their teaching skills.

Mechanisms are in place at Faculty level to monitor student performance during each semester, which is based on intermediate grades that students obtain in coursework or laboratory work. However, the Panel regrets that those mechanisms are, at present, restricted to monitoring scholarships, and recommends that the Department makes use of that data for pastoral purposes, identifying students who may need assistance with their studies.

III. RECOMMENDATIONS

1. The Panel recommends that in order to attract students with bachelor degrees from other universities, the Department should do more to advertise the specialist nature of the programme and to make clear what subjects applicants should have studied at Bachelor level, rather than relying on national curricula requirements.
2. The Panel recommends that teaching staff should update material based on technology and cybercrime evolution rather than just general guidelines.
3. The Panel is concerned that texts for some courses appear not to be available to students and therefore recommends that the Department regularly reviews the lists of recommended texts and liaises with the library to ensure that the recommended texts are available. The Panel also recommends that teaching staff guide students on best practices with supporting material or references during teamwork, both technical and managerial (regarding teamwork itself).
4. The Panel believes that the Department would benefit from an increased level of international contact with teachers in universities outside Lithuania.

5. The Panel recommends that the Department make students more aware of research in the Department, of entrepreneurialism and of industrial user group events.

6. The Panel recommends that the Faculty should press the University to install more seating and power supply outlets in open areas to provide students with proper conditions to use their own computers. There also needs to be greater availability of rooms in which students can meet to carry out group practicals.

7. The panel recommends that the Faculty should move towards consistent use of virtual environments to support the blended learning mode of delivery, and suggests that, given the high proportion of students who use this facility, it could reduce the number of physical workstations available on campus. However, to ensure continuity in the blended learning facilities in the event of an unforseen catastrophy affecting the server computers that support them, the Faculty should ensure that it has a proper disaster recovery plan in place.

8. The Panel was pleased to find that there are mechanisms in place to monitor student performance during each semester but notes that the system is largely used for monitoring scholarships and would like to recommend it to be used also in a more pastoral role.

9. The Panel recommends that the Department considers introducing a system of peer observation of teaching, exam/coursework setting and marking, both as a developmental process and a way of spreading good practice and ensuring consistency of standards and criteria.

10. The Panel recommends that the Department should introduce more structured forms of interaction with students, student representatives, social partners and graduates, so that opinions gathered can be more representative and records can be kept for future reference, both of suggestions made and responses to them.

IV. SUMMARY

The Information and Information Technology Security (IITS) 2-year master study programme is motivated by the world-wide growth of computer security incidents. IITS is an innovative and timely programme that responds to the increasing need for IT professionals with a specialisation in Information Security. Combined with a flexible, blended mode of delivery, the programme is proving to be extremely successful for recently graduated IT professionals.

The aim of the programme is to educate students who are able to analyse, design and develop solutions in the field of Information and Information Technology Security. This is a very ambitious aim since the IT security area is a fast changing field where it will be difficult for staff to stay at the forefront of research and development. The intended learning outcomes are typical for a second cycle degree by demanding deep knowledge in a specialised area and by the critical awareness at the forefront of this area.

A well-structured process has been put in place around the final degree project, which is seen as the culmination of the programme. During the first three semesters, students prepare for the final project in dedicated modules. Students must select the topic for their final project in the first semester but there is flexibility for that topic to evolve as the students acquire more background in information security.

Each semester is organised so as to offer a natural progression of specialisation and technological content. The two traditional foundational subjects for Information Security (cryptography and protocols) are duly covered in the programme: cryptography in a dedicated course whilst protocols are spread over several courses. The Panel offers a number of suggestions and recommendations concerning curriculum content, the depth of some material and the distribution of material across courses. More generally, the Panel considers that the Department needs to put in place a more robust process of consultation to keep the curriculum current in what is a very fast moving area, to consider the possibility of introducing more optional courses, and to widen staff recruitment beyond its traditional pool to attract specialists who can strengthen the programme and ensure its vitality.

The programme is organised by the Department of Computer Science but staff teaching on the programme are drawn from a number of faculties and departments. In terms of age distribution there is a good mix of younger and more experienced staff. Their numbers, qualifications and experience are more than adequate to ensure that the intended learning outcomes of the programme can be achieved by the students. There is a considerable emphasis on research in the Department, both individual and collaborative; during 2008-13, more than half of the staff participated in externally funded projects. Furthermore the presence of 30 PhD

students in the Faculty contributes to a good research culture. All members of staff have good publication records, though only a few have research publications in journals and conferences outside Lithuania. The Panel believes that it would be helpful for more staff to be involved in activities that bring them into contact with staff in other institutions, especially through two-way international exchanges.

The student admission requirements are clear and well understood by the students. Most of the students already have jobs, so the innovative blended learning form of the programme allows students to study remotely. Lectures are recorded using a video conference programme and broadcast via the Web. Laboratory work, practical tasks and student evaluations are performed on the premises of the University. Staff are available for consultation face-to-face, by video link, by email or by telephone. IITS students thus have good academic support, as well as adequate social support, careers advice, etc. However, students did not seem to be aware of industrial events or the activities of local technical communities. Students have opportunities to participate in student mobility programmes, though the rate of participation in mobility programmes is rather low, mainly because the majority of students have jobs.

Students are well aware of how their performance will be assessed. The criteria are clear, adequate and publicly available, especially regarding the thesis. A Methodological Guidelines for Final Degree Projects document is prepared for students which contains information about the definition of the subject, formal requirements, preparation, defence procedure and method of assessment. Commendably, the assessors include a specialist not employed by KTU.

The Faculty of Informatics provides facilities for study programmes in three buildings located on the same campus, with a fourth about to be included. Most of the classrooms are in very good condition, especially those that have been upgraded most recently with the latest equipment.

Most of the students use their own computers when the attend the University, but the provision of seating and power sockets in open areas is inadequate. Similarly, there is a lack of appropriate space for students to undertake group work. There are some interesting specialised laboratories that support this programme. These laboratories are accessible from outside the University via VPN, thus supporting the model of blended studies for students. Students also have the option to install software on their own machines.

The IITS programme is special in a way that students must keep up-to-date with the latest threats and attacks during and after their studies. The Panel was therefore concerned that recommended texts and reference material did not appear to be accessible to students.

The Programme is appropriately managed at Departmental level and the process of quality assessment and change is integrated with the University's processes through a hierarchically system that includes the Programme, the Department of Computer Science, the Faculty of Informatics and University level committees. The core organisational unit is the Study Programme Committee (SPC), which sits at faculty level and comprises the coordinators of the different programmes, one student representative delegated by the student union of the faculty, and one business/industry representative.

Students are involved in the quality-assurance process through electronic surveys organised at university level, though the results of those surveys and of any actions taken as a consequence do not seem to be readily available to students. The Faculty also organises round table discussions between students and staff, though these are rather informal. The Panel believes that a more structured form of interaction with students would be helpful.

Social partners and Faculty alumni are also involved in the quality management and programme development at Faculty level, though this involvement is informal in nature, so again the Panel believes that a more structured form of interaction would be helpful.

The performance of scholarship students is monitored at Faculty during each semester, based on intermediate grades that students obtain in coursework or laboratory work. The Panel believes that the Department should make use of this data for pastoral purposes, identifying students who may need assistance with their studies.

V. GENERAL ASSESSMENT

The study programme *Information and Information Technology Security* (state code – 621E10003) at Kaunas University of Technology 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	3
3.	Staff	3
4.	Material resources	3
5.	Study process and assessment (student admission, study process student support, achievement assessment)	4
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.

Grupės vadovas:
Team leader:
Prof. dr. Roland N. Ibbett

Grupės nariai:
Team members:
Prof. dr. Jurgen Dorn

Prof. dr. Jose Luiz Fiadeiro

Simonas Razminas

Paulius Varonenka

Studijų kokybės vertinimo centras

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V. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijų universiteto studijų programa *Informacijos ir informacinių technologijų sauga* (valstybinis kodas – 621E10003) vertinama **teigiamai**.

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

Dviejų metų trukmės magistrantūros studijų programos *Informacijos ir informacinių technologijų sauga* atsiradimą paskatino su kompiuterine sauga susiję incidentai. Ši programa yra novatoriška ir laiku, atliepianti IT specialistų, kurių specializacija – informacinė sauga, paklausą. Ši programa, dar ir dėl lankstaus, mišraus jos dėstymo būdo, buvo ypač naudinga neseniai ją baigusiems IT specialistams.

Programos tikslas – išmokyti studentus analizuoti, planuoti ir ieškoti sprendimų informacinių technologijų saugos srityje. Šis tikslas labai pretenzingas, nes IT sauga yra greitai kintanti sritis, ir dėstytojams bus sunku *neatsilikti* mokslinių tyrimų bei technologijų plėtros srityje. Numatomi studijų rezultatai – tipiški antrosios pakopos programoms tuo, kad reikalaujama gilių specializacijos srities žinių ir kritinio šios srities naujovių vertinimo.

Studijų kokybės vertinimo centras

Taikoma gerai struktūruota baigiamojo darbo, kuris ginamas programos pabaigoje, procedūra. Pirmuosius tris semestrus studentai ruošiasi baigiamajam darbui studijuodami jam skirtus modulius. Baigiamojo darbo temą studentai privalo pasirinkti pirmąjį semestrą, bet leidžiamas tam tikras lankstumas temos plėtojimo prasme, kad studentai įgytų daugiau žinių apie informacijos saugą.

Kiekvienas semestras planuojamas taip, kad specializacijos ir technologijų turinys būtų pateiktas nuosekliai. Ši programa tinkamai aprėpia du tradicinius pamatinius informacinės saugos dalykus – kriptografiją ir protokolus: kriptografija (*Kriptografinės sistemos*) dėstoma kaip atskiras studijų dalykas, o protokolai įtraukti į kelis dalykus. Ekspertų grupė pateikia keletą pasiūlymų ir rekomendacijų dėl studijų turinio, kai kurios medžiagos gilumo ir medžiagos paskirstymo dalykuose. Apskritai, ekspertų grupė mano, kad Katedra turi įdiegti greitesnę konsultavimosi (*informacijos ieškojimo*) procedūrą, kad būtų nuolat atnaujinamos tos programos (*curriculum*) sritys, kurios labai greitai kinta, apsvarstyti galimybę įtraukti daugiau pasirenkamųjų dalykų ir išplėsti tradicinę darbuotojų atranką pritraukiant daugiau specialistų, kurie gali sustiprinti šią programą ir užtikrinti jos gyvybingumą.

Šios programos įgyvendinimą organizuoja Kompiuterijos mokslų katedra, bet vykdo įvairių fakultetų ir katedrų dėstytojai. Kalbant apie dėstytojų amžių, jaunesnių ir labiau patyrusių dėstytojų santykis yra geras. Dėstytojų skaičius, kvalifikacija ir patirtis daugiau nei pakankama numatomiems studijų rezultatams užtikrinti. Katedra daug dėmesio skiria individualiems ir kolektyviniams moksliniams tyrimams; 2008–2013 m. daugiau kaip pusė dėstytojų dalyvavo iš išorės (*ne KTU*) finansuojamuose projektuose. Be to, 30 fakulteto doktorantūros studentų prisideda prie mokslinių tyrimų kultūros plėtros. Visi dėstytojai yra paskelbę nemažai publikacijų, bet tik keli iš jų yra paskelbę mokslinius straipsnius užsienio žurnaluose arba skaitę pranešimus konferencijose užsienyje. Ekspertų grupė mano, kad būtų naudinga, jei dėstytojai labiau įsitrauktų į veiklą, kuri suteiktų jiems galimybę užmegzti ryšius su kitų aukštųjų mokyklų dėstytojais, ypač dalyvauti abipusiuose tarptautiniuose mainuose.

Studentų priėmimo reikalavimai aiškūs ir studentams suprantami. Daugelis studentų jau dirba, o pažangi mišrių studijų programa suteikia jiems galimybę mokytis nuotoliniu būdu. Paskaitos įrašomos naudojant vaizdo konferencijos programą ir transliuojamos per žiniatinklį. Laboratorinis darbas, praktinės užduotys atliekamos ir studentai vertinami Universiteto patalpose. Su dėstytojais galima konsultuotis akis į akį, vaizdo ryšiu, elektroniniu paštu arba telefonu. Taigi studijų programos *Informacijos ir informacinių technologijų sauga* studentams suteikiama gera akademinė ir pakankama socialinė pagalba, duodama patarimų karjeros klausimais ir t. t. Tačiau nepanašu, kad studentai būtų susipažinę su pramonininkų renginiais ar

vietos technikos bendruomenių veikla. Studentams turi galimybę dalyvauti studentų judumo programose, nors dalyvavimo šiose programose lygis gana žemas, iš esmės dėl to, kad didžioji studentų dalis dirba.

Studentai gerai žino, kaip bus vertinami jų mokymosi rezultatai. Vertinimo kriterijai, ypač baigiamųjų darbų, yra aiškūs, tinkami ir viešai skelbiami. Yra parengtos baigiamųjų darbų metodinės rekomendacijos, kuriose nurodyta informacija apie temos apibrėžimą, oficialūs reikalavimai, pasirengimo baigiamajam darbui ir jo gynimo procedūra ir vertinimo metodas. Pagirtina, kad vertintojai įtrauktų KTU nedirbantį specialistą.

Informatikos fakultetas turi studijoms skirtas patalpas, kurios yra trijuose to pačioje studentų miestelio teritorijoje esančiuose pastatuose, ir dar numatomas ketvirtas pastatas. Daugelio auditorijų būklė labai gera, ypač tų, kuriose neseniai įdiegta moderniausia įranga.

Daugelis studentų Universitete naudojasi savais kompiuteriais, tik trūksta sėdimų vietų ir elektros lizdų) atviroje erdvėje. Taip pat mažai vietos studentų grupiniam darbui. Yra kelios įdomios specializuotos laboratorijos, padedančios įgyvendinti šią programą. Šios laboratorijos dėl virtualaus privataus tinklo yra prieinamos nebūnant Universitete; šis tinklas – tai dar viena mišraus studijų modelio galimybė. Studentai turi dar vieną galimybę – įdiegti programinę įrangą savo automobiliuose.

Studijų programa *Informacijos ir informacinių technologijų sauga* yra ypatinga tuo, kad studentai visada – studijuodami ir baigę studijas – turi žinoti apie naujausias elektronines atakas ir galimas jų sukėlimo grėsmes. Todėl ekspertai yra susirūpinę dėl to, kad universiteto studentams, atrodo, nepateikiami rekomenduojami tekstai ir informacinė medžiaga.

Šiai programai tinkamai vadovauja Katedra, o jos kokybės užtikrinimo procesas ir pakeitimai yra integruoti į Universiteto procesus pagal hierarchinę sistemą, kuri apima programą, Kompiuterių katedrą, Informatikos fakultetą ir Universiteto komitetus. Pagrindinis organizacinis vienetas – Studijų programų komitetas (SPK), kuris posėdžiauja fakultete ir kurį sudaro įvairių programų koordinatoriai, vienas Fakulteto studentų sąjungos deleguotas studentų atstovas ir vienas verslo / pramonės atstovas.

Studentai kokybės užtikrinimo procese dalyvauja universiteto lygiu organizuojant elektronines apklausas, nors nepanašu, kad studentams būtų lengvai prieinama informacija apie tų apklausų rezultatus ir po to taikytas priemones. Fakultete dar organizuojamos „apskritojo stalo" diskusijos, kuriose dalyvauja studentai ir dėstytojai, bet jos gana neoficialios. Ekspertų grupė mano, kad būtų naudingiau, jei bendravimas su studentais būtų oficialesnis.

Socialiniai partneriai ir buvę Fakulteto studentai taip pat dalyvauja kokybės vadybos ir programos tobulinimo procesuose Fakulteto lygmeniu, nors šio dalyvavimo pobūdis taip pat neoficialus, taigi ir vėl ekspertai mano, kad būtų naudingiau formalizuoti bendravimą.

Fakultete kiekvieną semestrą kontroliuojamas stipendijas gaunančių studentų mokslo rezultatai, atsižvelgiant į tarpinius studentų įvertinimus už kursinį arba laboratorinį darbą. Ekspertai mano, kad Katedra turėtų pasinaudoti šiais duomenimis mokomaisiais tikslai, nustatydama studentus, kuriems gali prireikti pagalbos studijuojant.

III. REKOMENDACIJOS

1. Ekspertų grupė rekomenduoja, kad Katedra, siekdama pritraukti kitų universitetų bakalauro laipsnį turinčių studentų, daugiau reklamuotų šios programos ypatumus ir aiškiau nurodytų, kokius dalykus stojantieji turi būti mokęsi siekdami bakalauro laipsnio, o ne remtis nacionalinių mokymo programų (*curricula*) reikalavimais.

2. Ekspertų grupė rekomenduoja, kad dėstytojai atnaujintų medžiagą labiau remdamiesi technologinių ir elektroninių nusikaltimų evoliucija, o ne tik bendrosiomis gairėmis.

3. Ekspertai susirūpinę, kad studentams neprieinami kai kurių dalykų tekstai, todėl rekomenduoja Katedrai nuolat tikslinti rekomenduojamos literatūros sąrašus ir palaikyti ryšį su biblioteka, siekiant užtikrinti, kad tie tekstai būtų prieinami. Ekspertai dar rekomenduoja, kad dėstytojai vadovautų studentų darbui grupėse remdamiesi gerąja patirtimi, pateikdami medžiagą ar informaciją, techninę ir vadybinę (skirtą grupės darbui).

4. Ekspertų grupė mano, kad Katedrai būtų naudinga labiau plėtoti tarptautinius ryšius su užsienio šalių universitetų dėstytojais.

5. Ekspertų grupė rekomenduoja Katedrai geriau supažindinti studentus su joje atliekamais moksliniais tyrimais, verslumu ir pramonės vartotojų grupių renginiais.

6. Ekspertų grupė rekomenduoja Fakultetui primygtinai reikalauti, kad Universitetas įrengtų daugiau sėdimų vietų ir elektros lizdų atvirose erdvėse, taip užtikrindamas studentams tinkamas sąlygas naudotis savais kompiuteriais. Be to, reikia daugiau patalpų, kuriose studentai galėtų atlikti praktinį darbą grupėje.

7. Ekspertų grupė rekomenduoja, kad Fakultetas pradėtų pastoviai naudoti virtualią aplinką, taip užtikrindamas mišrų studijavimo būdą, ir siūlo sumažinti universiteto teritorijoje esančių darbo (su kompiuteriu) vietų skaičių atsižvelgiant į tai, kokia studentų dalis naudojasi šia priemone. Tačiau tam, kad mišrių mokymosi priemonių darbas nenutrūktų

kilus nenumatytoms katastrofoms, kurios gali paveikti tas priemones aptarnaujančius kompiuterius, Fakultetas turėtų būtinai parengti tinkamą veiklos atkūrimo po nelaimės planą.

8. Ekspertų grupei patiko tai, kad yra įgyvendinami studentų mokymosi rezultatų stebėjimo kiekvieną semestrą mechanizmai, bet ji pažymi, kad ši sistema iš esmės taikoma siekiant kontroliuoti stipendijas, tad rekomenduotų jai suteikti ir mokomąjį tikslą.

9. Ekspertai rekomenduoja Katedrai įdiegti tarpusavio stebėjimo sistemą, kai dėstytojai stebi vieni kitų mokymo, egzaminų ir (arba) kursinio darbo sudarymo bei įvertinimo procesą; tai būtų ir tobulinimo proceso dalis, ir būdas skleisti gerąją patirtį bei užtikrinti standartų ir kriterijų darnumą.

10. Ekspertų grupė rekomenduoja, kad Katedra taikytų labiau sistemiškas bendravimo su studentais, studentų atstovais, socialiniais partneriais ir absolventais formas, kad gautos nuomonės būtų labiau atstovaujamosios (reprezentatyvios); be to, siekiant išsaugoti informaciją (apie pateiktus pasiūlymus ir atsaką į juos) ateičiai, gali būti daromi įrašai.

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