STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

VILNIAUS UNIVERSITETO *INFORMATIKOS* STUDIJŲ PROGRAMOS (621I10001) VERTINIMO IŠVADOS

EVALUATION REPORT OF *INFORMATICS* (621I10001) STUDY PROGRAMME at VILNIUS UNIVERSITY

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Išvados parengtos anglų kalba
Report language - English

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	***Informatika***
Valstybinis kodas	621I10001
Studijų sritis	Fizinių mokslų studijų sritis
Studijų kryptis	Informatika
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2m.)
Studijų programos apimtis kreditais	120ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Informatikos magistras
Studijų programos įregistravimo data	Lietuvos Respublikos švietimo ir mokslo ministro 1997 m. gegužės 19 d. įsakymu Nr. 565

INFORMATION ON EVALUATED STUDY PROGRAMME

Titleof the study programme	***Informatics***
State code	621I10001
Study area	Physical Sciences
Study field	Informatics
Kindof the study programme	University Studies
Study cycle	Second
Study mode (length in years)	Full-time (2years)
Volumeof the study programme in credits	120ECTS
Degree and (or) professional qualifications awarded	Masterof Informatics
Date of registration of the study programme	19of May1997, under the order of the Minister of the Ministry of Education and Science of the Republic of Lithuania No.565

CONTENTS

I. INTRODUCTION

The subject of this evaluation is a second cycle curriculum in Informatics taught in the Department of Computer Science, Faculty of Mathematics and Informatics, Vilnius University. It is one of eight Masters study programmes offered by this Faculty (this number including two other curricula in IT/ Computer Sciences – *Computer Modelling* and *Software Engineering)*.
The curriculum is 4 semesters (2 years, 120 ECTS credit points). The degree awarded is "Master of Informatics". Only the full-time mode of studies is offered.
The previous external assessment of this study programme, by an international group of experts, took place in 2006. The result of the assesment was positive, and the reviewing panel concluded that they "did not explore any major problems in the study program".

The current procedure of the external evaluation of Vilnius University second cycle (MA) study programme Informatics was initiated by the Centre for Quality Assessment in Higher Education of Lithuania which selected and appointed the external evaluation Review Panel consisting of the head, professor Jukka Paakki (University of Helsinki, Finland), professor Rolf Backofen (University of Freiburg, Germany), professor Jerzy Marcinkowski (University of Wrocław, Poland), Vida Juozapavičienė (employer representative – social partner, Lithuania), and Lukas Jokūbas Jakubauskas (student representative – Lithuania).
For the evaluation, the following documents have been taken into account:
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 the Second Degree Programmes;
4. Methodology for Evaluation of Higher Education Study Programmes.

The basis for the evaluation of the study programme is the Self-Evaluation Report (referred to as the SER) prepared in 2013, its annexes and the site visit of the Review Panel to Vilnius University on November 27th, 2013. The visit included meetings with different groups: the administrative staff of the faculty, the staff responsible for preparing the self-evaluation documents, teaching staff, students 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. We also visited

some actual classes. At the end of the visit preliminary general conclusions of the visit were presented to the Head of Department teaching the study programme.
The Reviewing Panel was truly impressed by the fact that no translator was needed during the visit. All the meetings were held in English and all the staff we met and all students we had an opportunity to talk to were fluent in English. After the visit, the Review Panel met to discuss and agree the content of their final report, which represents the agreed views of the Review Team.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

The understanding the Review Panel have after reading the SER, analysing the study programme and after talking to the people responsible for the programme and to the teaching staff is that the philosophy of the study programme is consistent with the tradition of computer science studies offered worldwide by mathematical computer science departments, with strong emphasis on fundamental theoretical subject and on understanding of the basic concepts, and – in consequence – with technology subjects receiving relatively less time than it would be normal in the tradition of technical studies. This model has proved to produce graduates who are attractive for the labour market, able to follow the fast evolution of technologies and capable not only to produce code but also to think and solve problems.

One of the options the graduates of similar curricula usually consider is academic career, and the schools which offer such curricula often perceive themselves, and are perceived by others, as elite universities, which not only produce professionals for the industry, but also the new generation of teaching staff for other higher education institutions. The programme that is subject of this evaluation is not an exception with this respect: both the department leaders and the teaching staff of the program, as well as (at least some of) the social partners told the Reviewing Panel that this is the programme the brightest young people in Lithuania should take if they are feel they are interested in mathematical way of thinking and motivated by computer science applications.
This view is (at least partially) reflected in the way the aims and learning outcomes of the programme are officially defined in the curriculum, which states that the aim of the program is "*to prepare highly qualified IT specialists, able to carry out independent research work, continue Doctoral studies in*

Lithuanian and foreign universities as well as capable of developing software development and maintenance projects and successfully compete for IT jobs both in Lithuanian and foreign companies."

The learning outcomes are defined in a slightly less generic way and include three "General competences" and five "Subject competences". The "Subject competences" are in the areas of information management and processing, software engineering, objective and web technologies, human factors and artificial intelligence and data storage. Both the learning outcomes from the group of "General competences" (which are the ability to do research and solve problems) and the ones from the group of "Subject competences" relate to skills which are demanded at the labor market. The five subject competences cover the areas with possibly highest demand for qualified workforce. This view of the Reviewing Panel is shared by all the stakeholders we were talking to, in particular by the social partners.

What is however worrying is that it is sometimes hard to see how the learning outcomes of this programme are different from the learning outcomes of the *Informatics* undergraduate (BA) programme, offered by the same Faculty (it is worth adding here that, as we learned, the candidates for the Master's programme under evaluation are mainly recruited from the graduates of this BA programme, which means that they are assumed to have the skills described by the Master's learning outcomes already on the input of the programme). For example, the subject competences 7.1 and 7.2 of the program under evaluation, which concern the area Human factors and artificial intelligence, are:

use software designing principles making human-computer system work smooth, create and apply modern user graphic interface tools in interactive systems in different contexts. Understand and create artificial intelligence models and apply them in intelligent search, diagnostics, classification, planning and other tasks.

while the subject competences 11.1 and 11.2 of the undergraduate programme are :

To use software designing principles in order to ensure harmonious human-computer system work, to apply modern user graphics (window) interface in interactive systems in various contexts. To identify the main artificial intelligence models and to apply them in solving intellectual search, diagnostics, classification, planning and other problems;

Similarly, the subject competences 5.1 and 5.2 of the curriculum under evaluation, which concern the area of software engineering, are:

carry out the analysis, projection and testing of the requirements of software engineering, for a certain situation, select the most appropriate methodology of software engineering development, take part in project management

and process improvement. Model the architectures of the software engineering with regard to the various functional and other requirements;

While the subject competences 8.1 and 8.2 of the undergraduate programme are:

To analyse software development activities and principles of their improvement, to apply proper maintenance methods ensuring the quality of software product being created. Perform a software system to be developed requirements analysis, to plan, specify and represent the project by UML notations.

In view of the aforementioned similarities, it is not completely clear for the Reviewing Panel, whether the curriculum under evaluation guarantees significantly higher level of competences than those obtained by completing first degree studies *(General Requirements for Master degree study programmes states, III. 16).* On the other hand, clearly the outcomes of the MA programme are not all subsumed by the outcomes of the BA programme.

Information about the programme is available on the website of the Department of Computer Science.

2. Curriculum design

The curriculum consists of 4 mandatory courses (which are **Artificial Neural Networks, Data Mining, Advanced Topics in Discrete Structures** and **Software Engineering**), 5 electable courses, and 3 units of ‘‘Research work“, of ‘‘Professional practice“and of masters’ thesis. All the courses are in computer science, which is the main study field. The electable courses jointly constitude 25% of the curriculum (measured by the ECTS points). With this respect the curriculum meets legal requirements.

The general principles of the curriculum are very much correct: the courses are supposed to broaden the horizons of the student, and the purpose of "Research work“, which is coordinated with the Master's thesis, is to deepen his knowledge. During the first two semesters of the "Research work“the students read papers in the area of their future thesis, and after the second semester they submit a survey paper of the literature. This was indeed the feeling of the Reviewing Panel that this process is well organized and the theses are well researched, in the sense that the list of references is always long and rich, and the papers cited are new and relevant.

There are however three issues that need to be seen as problematic:

1. There is no doubt whatsoever that not all the declared learning outcomes are always achieved**.** This is since the courses in **Artificial Neural Networks** and **Data Mining** only cover the learning outcomes 4.2 *“process data applying statistical data analysis, knowledge extraction, information*

theory, neural network creation and modern artificial intelligence methods." and 7.2 "*understand and create artificial intelligence models and apply them in intelligent search, diagnostics, classification, planning and other tasks*", while the course **Software Engineering** concerns only the learning outcome 5.1 "*carry out the analysis, projection and testing of the requirements of software engineering, for a certain situation, select the most appropriate methodology of software engineering development, take part in project management and process improvement"*, and 5.2 "*model the architectures of the software engineering with regard to the various functional and other requirements"*.

The fourth obligatory course **Advanced Topics in Discrete Structures** does not seem to concern any "Subject competences" at all. This implies that the possibility to achieve the outcomes described by "Subject competences" 6. "*Objective and Web Technologies"* and 8. *"Data storage"* does depend on the individual decisions of students choosing their elective courses. Let us remind here that out of the 5 "Subject competences" listed as learning outcomes, there are only three that are not just repetitions of competences the students are assumed to achieve already at the BA level of studies, and out of the three there are two that will not necessarily be achieved anyway.

It is actually not necessarily bad that the learning outcomes depend on the individual decisions of students' choosing their elective courses. One cannot realistically hope to teach five disjoint areas of computer science in any depth during two semester studies (the 3rd semester is mainly the "professional practice", the 4th semester is masters thesis only). But this reality should be reflected in the description of the learning outcomes. Besides, and this is an issue by itself, as the Reviewing Panel was told by the students, and by the alumni, the list of the electable courses is not seen by the Department as obligatory for them. Not each year are all the courses actually taught, and even if they are indeed taught it often happens that only a limited number of students can take a given course. This is unacceptable, as a study plan should be seen as a contract between the student and the Department, and the list of offered courses should be seen as a part of this contract.

2. The relation between the programme and the undergraduate (Bachelor) curriculum in "***Informatics***" taught at the same Department needs to be clarified. Not only is some of the learning outcomes overlap, but there also a lot of overlap between the courses scheduled for the graduate and for the undergraduate programs. For example:

– the syllabus of the course in Advanced Course in Coding Theory covers, among others, the following topics:

The essentials of coding theory: definitions, basic assumptions, weight and distance, maximum likelihood decoding, error-correcting codes; bounds for codes; linear codes: definitions, generating matrices, encoding, parity-check matrices, dual codes, cosets, decoding, standard decoding array; cyclic codes: definitions, generator polynomials, Convolutional codes: definitions, encoding, decoding, examples.

The topics jointly represent about 70% of the syllabus and are all present also in the syllabus of the course Coding Theory taught as a part of the BA *Informatics* curriculum. Also the learning outcomes of the both courses are identical.

– the syllabus of the course in **Methods of Cryptography** covers, among others, the following topics:

The aims of cryptographic data protection: confidentiality, authenticity of the data and sources, non-repudiation. Cryptosystem. Security criteria. The algorithms and protocols. Symmetric key cryptography. The design principles of the block ciphers: Feistel scheme, substitution-permutation network. The symmetric key encryption standards (DES, AES), other widely used ciphers. Modes of operation. Methods of cryptanalysis. Construction of the stream ciphers. Stream ciphers used in practice. Methods of cryptanalysis Hash functions. Construction principles. MD, SHA hash functions, Usage of hash functions for data integrity and authentication. Message authentication codes. Mathematical foundations of public key cryptography. Structures and algorithms of number theory: computation with given modulus, Fermat theorem, Chinese remainder theorem, quadratic congruences, discrete logarithms, factorization of integers. Public key cryptography: encryption and digital signature schemes. Knapsack, RSA, Rabin, ElGamal cryptosystems, cryptanalysis of special cases. Digital signature schemes: RSA, ElGamal, DSS, Rabin. Security issues. Secret sharing protocols: Shamir, Asmoth-Bloom secret sharing with thresholds, secret sharing for access structures. Applications in encryption and digital signing schemes. Zero knowledge proofs and their applications. Advanced cryptographic protocols: digital money, electronic voting and auctions.

The topics jointly represent about 75% of the syllabus and are all present also in the syllabus of the course Cryptography and Information Security taught as a part of the BA ***Informatics*** curriculum. Also the learning outcomes of both courses are mostly overlapping.

The syllabus of the course in Advanced Topics in Discrete Structures is in more than 50% a repetition of topics present in syllabi of courses taught as a part of the BA ***Informatics*** curriculum, mainly of the course Automata and Formal Languages**.** Also **the course in Intellectual Systems is, in its** important parts, a repetition of the course Mathematical Logic taught as a part of the BA ***Informatics*** curriculum.

It needs to be added here that the Reviewing Panel see the syllabus of the Intellectual Systems course as controversial by itself, and cannot see how the topics it covers are supposed to contribute to any of the learning outcomes of the programme.

In view of the above examples the Reviewing Panel concludes that the condition III 18. (..) *The syllabus of a course may not be a repetition of the first degree syllabus* is only partially satisfied (General Requirements for Master degree programmes).

3. While the two flaws of the curriculum which are described above are relatively easy to correct, the third one is in a sense more critical. The Reviewing Panel has been presented no evidence whether, and to what extent, the outcomes described by the "General competences" are achieved. The competences: *1. Carry out research* and *2. Solve problems* are the most important ones in this curriculum -- particularly in view of one of the programme aims, which is to prepare people who are "*able to carry out independent research work, continue Doctoral studies in Lithuanian and foreign universities"* and in view of the perceived mission of the programme being educating the research elite.

And if the outcomes *1* and *2* were indeed achieved then (at least some percentage of) the students should be willing to continue as scientists and able to publish the results of their findings (one should not forget here that the curriculum under evaluation is a graduate one, and its second year is actually the students' sixth year at the university). But we were told by the students that hardly any of them plan to stay in the academia and we are only aware of one publication authored by a student (or resulting from a masters thesis), and even this publication is not really in a top class venue.

The Reviewing Panel can see three sources of the problem, first of which is to some extent independent of the Department:

A. The students do work. This hardly should be a reason to complain, as they already work in their profession, which in a sense confirms that the education they receive is a success. But, while it is possible to reconcile work with some learning, and passing exams, it is only very rarely possible to work in an IT company and participate in research at the same time. And clearly, the temptation of a very decent salary that the industry offers to students is for the University hard to compete with.

B. The general culture of teaching in the Department does not seem to promote student's own intellectual activity. The only way to achieve the competence "S*olve problems*" is by solving problems. And, as far as the Reviewing Panel observed while visiting some of the classes, both taught at the BA

level and on the MA level, even the classes which are "exercises" (which means they are not "lectures" and are taught in small groups) are in fact lectures. This means that the best opportunity the school has to confront students, on a regular basis, with little tasks to solve, is probably missed. Moreover, the competence of "solving problems" needs to be learned as early as possible. It is wrong to think that it can be added as an outcome of a Master's curriculum. This means that this issue, while having important consequences for the achievability of the Master's curriculum learning outcomes, belongs really to the BA curriculum assessment. That is why the Reviewing Panel comments more on it in the report on the BA "***Informatics***" programme taught by the same Department.

C. The level of research activity in the department is not high enough to provide students with motivation for research. The only way to learn doing research is by being a member of a group of people who themselves find research exiting. The Reviewing Panel got an impression that there are, among the students, at least some who could possibly be attracted to science if the environment was inviting enough. This feeling is based on the enthusiasm the students showed while talking about the intellectual challenges they had faced during some of the courses (in Randomized Algorithms and in Heuristic Algorithms for NP-complete Problems).

3. Staff

Appendix IV to the SER names 17 teachers who teach the curriculum under evaluation. This number is clearly enough to teach all the courses and supervise all the masters' theses, especially in the recent years, when the number of students is lower than before. All the teachers except for three hold a PhD degree. This means that the statutory requirements concerning the teaching staff are satisfied.

It is worth mentioning that the Faculty seems to defy, at least to some extent, the typical in Eastern Europe culture of academic inbreeding: the teachers have degrees not only from their home institution but also from some others – Moscow, Kaunas and Limoges/France. Also one of the teachers who does not have a PhD received his undergraduate degree in a respectable laboratory in France.

As far as the Reviewing Panel was able to understand the rules, the younger teaching staff members are employed for a 5 years period. Then they can apply for a position again, in an open competition. A teacher who wins a competition for a professors position for the third time is tenured. But still, even the tenured teachers are evaluated each 5 years. This system is not bad, except that even teachers who never get promoted to the professor position should have a chance for a stabilization after some point. Concerning the evaluation, the basis for it is the number of publications listed by the ISI Web of

Science index. This last regulation is independent on the Faculty of Mathematics and Informatics, and is very unfortunate for many reasons. First of all the number of publications hardly can be seen as a proxy of the quality of research. Secondly, it should be understood, both by the University and by the people who are in charge of the higher education in Lithuania, that (i) the ISI Web of Science index is losing – due to impact factors inflating – its usefulness as a tool to measure scientific achievements, and (ii) it is not, and never was, a correct tool to measure scientific achievements in the broad area of computer science, as many of the most prestigious venues of publication in this area are not indexed by Web of Science At the moment when this Report is being written the best proxy for scientific value of a publication venue in computer science is the service Microsoft Academic Search.

Significantly less then half of the staff members are active researchers (the remaining usually do publish, but only in local venues or in WSEAS journals, which are considered by international research community as low esteem). Some of the staff members who can be considered active researchers do not do research in computer science. It is clear that the Department does not have sufficient research potential to attract students and involve them in research. In consequence, very few students are planning an academic career. Another critical issue is the aging of staff. The average professional experience of staff members is 28 years. There are only two teachers who are 40 years old or younger, none of them having a PhD. The median age is 56 years. The average research record of the staff is not bad, but there are two highly cited researchers which mainly contribute to this average and they are both about 70 years old (and nobody under 50 is really internationally known and cited). It seems that none of the older scientists seems to have managed to build a group around him. So the outlook is really worrying. But nothing seems to be done. No active policy to support younger teachers in their research careers was spotted by the Reviewing Panel. Just the opposite – financial incentives are created which encourage younger teachers to teach too much rather than do research.

4. Facilities and learning resources

The buildings of the faculty are adequate for that programme. Renovations have been done in one building, and a new building is planned for the near future.

The faculty is well equipped with computing resources. Recently (2 years ago) a supercomputer with 2000 cores and 600 TB of disk space was bought. This is currently the largest supercomputer in Lithuania. The Reviewing Panel was informed that up to 40% of computing power is sold to companies, which implies that 60% is left for university projects. The faculty invests 200.000 LTL for

replacement of equipment every year. The buildings are also well equipped with wireless communication. Furthermore, the students have access to computing services from the faculty. 250MB space seems to be appropriate for each student. Also on the positive side the renovation of several computer rooms (8 new computer classes and 3 to be renovated soon) can be mentioned. The facilities for disabled people should be improved if possible.

The department has two locations with two buildings next to each other in Naugarduko Str. 24 and Šaltinių Str. 1a, and another location in Didlaukio Str. 47. The two locations are reachable by public transport, which however takes some time. The Reviewing Panel estimate this to be roughly 30-40 minutes. However, it can be stated positively that the timetable is organized such that student usually do not need to travel between the two locations on the same day. The same is true for teachers, if they have a course in one location, they will not have lectures in the other locations. The students reassured the Review Panel that there is no problem with the timetable.

The faculty invests between 17.000 and 28.000 LTL per year for the library. The library is well equipped with current computer science literature, albeit there also seem to be some concentration on lecture handbooks. For example, up to 270 copies of some books written by lecturers from the faculty are found in the library. It can also be positively remarked that the library has access to ACM/IEEE digital library, which gives the students the possibility to read many current computer science papers and journals on-line. Students report that most of the material they need are accessible on-line.

5. Study process and student assessment

Admission to the *"Informatics"* Master's study programme is according to the guidelines of Vilnius University. The applicants are required to have finished a first cycle programme of any university study field. In order to prove their ability to study, the applicants need to pass an entrance exam. The Reviewing Panel saw the exam form and think that the exam is not too hard (this view is shared by the Master's programme students) , but some of the questions concern topics which are taught as a part of the BA "*Informatics"* programme taught by the same Department but are normally not considered a core of computer science studies. Such questions clearly favour the local candidates.

The Reviewing Panel did not see any problems concerning the organization of the study process, except for the fact that not all the courses listed in the study program as electable are taught each year, which is unacceptable, because the list of electables is part of the study programme and as such it constitutes a contract between students and the Department.

One of the peculiarities of the programme is that all the classes begin after 2 pm, so that they can be attended also by students who already work. The Reviewing Panel has mixed feelings about that.

According to the SER, only about one student a year participates in students mobility programme. This is very low number, but apparently nothing can be done about that - most students say that – being aware of the possibilities offered by Erasmus – they are not planning to go anywhere, because they already have jobs in Vilnius.

The assessment rules are very precise and are part of the syllabi of the courses. It is remarkable that some of the social partners say that, when inviting students for a job interview, they take into account the student's marks. This is very important, because it means that the marks indeed carry some information. It is also remarkable how much the graduates of the programme (or even the students) are wanted by the employers (this is what the Reviewing Panel concluded after meeting the social partners).

University provides the following social support options for the students: incentive scholarship for particularly good study results, social scholarship for students from the needy families or living alone, persons receiving social allowance; students with 45% and lower level of disability; or those below 25 years of age who were granted care or both parents (or one of the parents) are dead. One-time social scholarships are given to students in cases of death of a family member, natural or other disaster, disease or similar case, and also one-time target scholarship is granted to the students who have achieved good results in sports, cultural and research / public activity.

Disabled students can receive social allowance, and they can study according to individual plans. All the students have a right to get accommodation in Students' Residence. Student Representation Office is involved in numerous activities and invites students to take part in cultural and sports programmes.

6. Programme management

The Informatics MA study programme is administered by the Study Programme Committee which includes teachers of the Faculty, as well as social partners and students' representative. The current members of the Study Committee are: assoc. prof. Vladas Tumasonis (chairman), members: prof. Remigijus Leipus, prof. Mindaugas Bloznelis, prof. Romas Baronas, representative of *UAB Baltic Amadeus* Arvydas Bartkevičius (social partner).

The feeling is that – despite the fact that the Chair of the Study Programme Committee is not the Head of the Department, still the Study Programme Committee has available all the tools needed to assure high quality of teaching. It follows however from the discussions we had that the Committee does not

meet on a regular basis and is not too active. The Reviewing Panel were told that "teachers who want to change something in the syllabus of their course only need to notify the Committee, which approves everything without even meeting, because the teachers are trusted".

Students' feedback is collected, using an online system. The teachers say that in average between 15% and 20% of students of each course give them any feedback (usually only in numerical form, with no text included). Since each student has in average about 5 or 6 courses each semester this is coherent with what the Reviewing Panel heard from the students – that a student who wants to see his marks in the system has to give feedback for at least one course he took in the last semester and that hardly anybody does anything more than that. The feeling among students is that the feedback system cannot be trusted as an efficient tool of improvement.

Concerning the involvement of the external stakeholders in the curriculum development, the opinions the Reviewing Panel heard from the social partners were mixed. We had a feeling that some of the social partners would like to see more software engineering courses included in the curriculum and that they are disappointed that their opinion is not taken into account by the Department. But, on the other hand, there were also social partners who expressed a belief that the choice the Department made – namely to have a more mathematically oriented computer science curriculum rather that a software engineering one, serves the needs of the students well and is correct. The Reviewing Panel, while remaining critical about many particular design choices, in general shares the point of view and believes that the role of the social partners in this curriculum is just correct – they are listened to, but it is the University that makes the decisions.

In general, the feeling of the Reviewing Panel is that the quality of management is a weak point of this study programme. Neither seems the leaders of the Department to be worried about the issues that the Reviewing Panel see as worrying (for example the research activity of a younger teachers) nor seem they to believe that improvement is within reach. Many times we heard the Department leaders saying that "this cannot be done within the means we have".

III. RECOMMENDATIONS

1. The Department that implements the study programme under evaluation should either redefine its mission, and in particular should give up the goal of teaching future researchers, or should do everything possible to very significantly increase the research activity in computer science.
In the latter case, at least one active research group must exist in order to motivate students and to introduce them to research. Such a group probably cannot be built, in a predictable time horizon, solely from the current staff and students. So the University should do everything it takes to hire a researcher with a decent research record, and able to create a group around him.
2. More active forms of teaching should be introduced, both as part of the first cycle studies and Master's studies. The culture of teaching almost solely by lecturing should be given up.
3. The obvious flaws should be removed from the curriculum. The learning outcomes need to be redefined, so that they do not repeat the BA studies outcomes and are reachable. The syllabi should be rewritten, so that the courses are not just repetitions of courses taught at the first cycle studies. The usefulness of some individual courses needs to be reconsidered.
4. The programme management needs to be much more active and enthusiastic. The people who run the programme need to believe that improvement is possible and success is achievable.
5. When assessing the Staff, the Review Panel believes that the ISI Web of Science list should not be taken into account, since it is not a correct proxy of a quality of a publication venue in computer science. If there is a need of a "parametric" assessment then the ranking lists provided by Microsoft Academic Search are a much more useful tool at the moment.

IV. SUMMARY

The philosophy of the Master's study programme in *Informatics*, implemented in the Department of Computer Science, Faculty of Mathematics and Informatics, Vilnius University, is consistent with the tradition of computer science studies offered by mathematical departments, with strong emphasis on fundamental theoretical subject and on understanding of the basic concepts, and – in consequence – with technology subjects receiving less time than it would be normal in the tradition of technical studies. This model has proved worldwide to produce graduates which are attractive for the labour market, able to follow the fast evolution of technologies and capable not only to produce code but also to think and solve problems. One of the aims of such programme should also be, and it is, to prepare

graduates who are "*able to carry out independent research work, continue Doctoral studies in Lithuanian and foreign universities"*

This programme is partially successful, as its graduates are indeed in high demand on the job market. But there is a lot of room for improvement. The Reviewing Panel finds the programme management to be one of its weak aspects. This weakness results, in particular, in many faults in the curriculum design, including many repetitions and some courses covering topics which are not really of central interest in computer science. The Reviewing Panel is also critical about the teaching methods, which do not rely much enough on students own activity and which are seen by the Review Panel as one of the reasons why very few graduates of the programme are successful in academic career.

Concerning the teaching staff, the feelings of the Reviewing Panel are very much mixed. On one hand there are a few active and highly cited scientists among the staff. But on the other hand a closer look reveals that aging of the staff is a critical issue. There are only two teachers who are 40 years old or younger, none of them having a PhD degree. The median age is 56 years. The two most highly cited researchers are both about 70 years old (and nobody under 50 years is really internationally known and cited). None of the older scientists seems to have managed to build a group around him. Low level of the research activity of the staff is seen by the Reviewing Panel as the second important reason why so few of the graduates of the program choose academic career. The outlook, concerning the staff, is most alarming. This should be seen by the Faculty as extremely worrying and appropriate measures should be taken.

V. GENERAL ASSESSMENT

The study programme *Informatics* (state code – 621I10001) at Vilnius 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	2
2.	Curriculum design	2
3.	Staff	3
4.	Material resources	4
5.	Study process and assessment (student admission, study process student support, achievement assessment)	3
6.	Programme management (programme administration, internal quality assurance)	2
	Total:	**16**

*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. Jukka Paakki
Grupės nariai: Team members:	Prof. Rolf Backofen
	Prof. Jerzy Marcinkowski
	Vida Juozapavičienė
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Vertimas iš anglų kalbos

VILNIAUS UNIVERSITETO ANTROSIOS PAKOPOS STUDIJŲ PROGRAMOS *INFORMATIKA* (VALSTYBINIS KODAS – 621I10001) 2014-03-21 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-98 IŠRAŠAS

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V. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus universiteto studijų programa *Informatika* (valstybinis kodas – 621I10001) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	2
2.	Programos sandara	2
3.	Personalas	3
4.	Materialieji ištekliai	4
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	2
	Iš viso:	**16**

* 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)

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IV. SANTRAUKA

Vilniaus universiteto Matematikos ir informatikos fakulteto Kompiuterijos katedros įgyvendinamos *Informatikos* magistro studijų programos filosofija atitinka kompiuterijos mokslų studijų, kurias siūlo matematikos katedros, tradiciją, kai daug dėmesio skiriama fundamentaliam teoriniam dalykui ir pagrindinių sąvokų suvokimui, dėl to, kad technologiniams dalykams skiriama mažiau laiko, nei paprastai būtų priimtina pagal techninių studijų tradiciją. Pagal šį modelį visame pasaulyje buvo išugdyti darbo rinkai patrauklūs absolventai, galintys sekti greitą technologijų evoliuciją ir gebantys ne tik generuoti kodus, bet ir mąstyti bei spręsti problemas. Vienas iš tokios programos tikslų turėtų būti (ir yra) parengti absolventus, kurie *„gebėtų atlikti savarankišką mokslinių tyrimų darną, tęsti doktorantūros studijas Lietuvos ir užsienio universitetuose*“.
Ši programa iš dalies yra sėkminga, nes darbo rinkoje iš tiesų vyrauja didelė jos absolventų paklausa. Tačiau dar daug kur reikia stengtis. Ekspertų grupės manymu, programos vadyba yra vienas silpniausių

jos aspektų. Būtent tai lemia daugelį programos sandaros trūkumų, tarp kurių yra daug pasikartojimų, nagrinėjamos tokios kai kurių dalykų temos, kurios iš tikrųjų kompiuterijos moksle nėra pagrindinės. Ekspertų grupė taip pat kritiškai vertina mokymo metodus, kurie nepakankamai pagrįsti pačių studentų darbu, o tai, ekspertų grupės nuomone, yra viena iš priežasčių, kodėl tik keletas programos absolventų sėkmingai tęsia akademinę karjerą.
Ekspertų grupės nuomonė dėl dėstytojų buvo labai skirtinga. Viena vertus, tarp personalo narių yra keletas aktyvių ir gerai vertinamų mokslininkų. Tačiau, kita vertus, išanalizavę atidžiau, pastebėjome, kad esminė problema yra personalo senėjimas. Yra tik du dėstytojai, kuriems 40 ar mažiau metų, nė vienas iš jų neturi daktaro laipsnio. Vidutinis personalo amžius – 56 metai. Du aukščiausios kvalifikacijos mokslininkai yra apie 70 metų amžiaus (ir nėra nė vieno jaunesnio nei 50 metų, kuris būtų pripažintas ir tikrai gerai žinomas tarptautiniu mastu). Panašu, jog nė vienas iš vyresnių mokslininkų nėra subūręs savos grupės. Ekspertų grupės nuomone, žemas personalo mokslinių tyrimų lygis yra antroji svarbi priežastis, kodėl tiek nedaug programos absolventų renkasi akademinę karjerą. Personalo klausimo perspektyva kelia daugiausia nerimo. Fakultetas turėtų tai svarstyti kaip itin nerimą keliantį klausimą ir imtis reikiamų priemonių.

III. REKOMENDACIJOS

1. Katedra, įgyvendinanti šią vertinamą studijų programą, turėtų arba iš naujo suformuluoti jos misiją, o ypač atsisakyti tikslo išugdyti būsimuosius mokslininkus, arba turėtų daryti viską, kas galima, kad itin reikšmingai padidintų mokslinių tyrimų veiklą kompiuterijos moksle.
Tokiu atveju turėtų egzistuoti bent viena aktyvi mokslinių tyrimų grupė, kad galėtų motyvuoti studentus ir supažindinti juos su moksliniais tyrimais. Tokios grupės greičiausiai neįmanoma sudaryti artimiausiu numatomu laiku vien tik iš dabartinio personalo ir studentų. Todėl universitetas turėtų daryti viską, kas įmanoma, kad įdarbintų mokslo darbuotoją, turintį tinkamą mokslinių tyrimų patirtį ir gebantį suburti savo grupę.

2. Reikėtų imti taikyti aktyvesnes mokymosi formas tiek pirmosios studijų pakopos metu, tiek magistro studijų metu. Reikėtų atsisakyti tokios mokymo kultūros, kai dėstoma beveik vien tik skaitant paskaitas.

3. Iš studijų turinio svarbu pašalinti akivaizdžius trūkumus. Vertėtų iš naujo apibrėžti studijų rezultatus, kad jie nekartotų bakalauro studijų rezultatų ir juos būtų galima įgyvendinti. Studijų planas turėtų būti perrašyti taip, kad dalykai nebūtų vien tik pirmosios pakopos studijų dalykų pakartojimai. Derėtų persvarstyti kai kurių individualių dalykų naudą.

4. Programos vadyba turėtų būti aktyvesnė ir entuziastingesnė. Atsakingi už programą žmonės turėtų tikėti, kad ją galima pagerinti ir pasiekti sėkmės.

5. Ekspertų grupės nuomone, vertinant personalą nereikėtų atsižvelgti į „ISI Web of Science” sąrašą, nes tai nėra kompiuterijos mokslui tinkama kokybiškų publikacijų skelbimo vieta. Jei atsiranda poreikis atlikti „kriterijinį“ vertinimą, šiuo metu daug naudingesnis įrankis būtų„Microsoft Academic Search“ platformoje pateikti reitingavimo sąrašai.

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Paslaugos teikėja patvirtina, jog yra susipažinusi su Lietuvos Respublikos baudžiamojo kodekso[1] 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė, parašas)

[1] Žin., 2002, Nr.37-1341.