



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Šiaulių universiteto  
**INFORMATIKOS STUDIJŲ PROGRAMOS (621I10007)**  
**VERTINIMO IŠVADOS**

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**EVALUATION REPORT OF *COMPUTER SCIENCE***  
**(621I10007)**  
**STUDY PROGRAMME**  
at Šiauliai univeristy

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## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Informatika</i>
Valstybiniai kodai	621I10007
Studijų sritis	Fiziniai mokslai
Studijų kryptis	Informatika
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2)
Studijų programos apimtis kreditais	120
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Informatikos magistras
Studijų programos įregistravimo data	2001-08-02 Nr. 565

## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Computer science</i>
State code	621I10007
Study area	Physical Sciences
Study field	Informatics
Kind of the study programme	University Studies
Study Cycle	Second
Study mode (length in years)	Full-time (2)
Volume of the study programme in credits	120
Degree and (or) professional qualifications awarded	Master of Informatics
Date of registration of the study programme	2001-08-02 Nr. 565

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The Centre for Quality Assessment in Higher Education

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## I. INTRODUCTION

The Lithuanian Centre for Quality Assessment in Higher Education has invited five independent experts and one representative of students (hereinafter called Expert Team) from Finland, Austria, Lithuania and Norway to review and assess the higher education second cycle study (Master) programme *Computer Science* (state code 621I10007, informatics study field) at Šiauliai University (hereinafter ŠU). The full-time study programme (further Programme) is delivered by the Faculty of Mathematics and Informatics, ŠU, coordinated and conducted by the Department of Informatics (further Department, DI) with the help of teaching staff from other departments of ŠU.

The Expert Team visited the Faculty on February 27, 2013<sup>1</sup>.

The Expert Team met the administrative staff (3) of the Faculty represented by the Dean, Head of the Department of Mathematics, and Chair of the Council of the Faculty. General issues, such as structure of the faculty, financing, and quality improvement measures, and reasons for students' intake decrease and dropouts, etc. were discussed.

On the meeting with staff responsible for preparation of the Self-Analysis Report (2), the Expert Team has discussed the content of the Self-Analysis Report to clarify points that were described not clearly enough in the report. Also design, content and specific distinguishing features of the programme were discussed. The questions concerning less uncovered in the self-assessment report issues were discussed. After that, a meeting with members of teaching staff (4) of the Programme took place.

The Expert Team conducted also interviews with students (4). Students of all study years (except the first year) were presented. The Expert Team was familiarized with students' attitude towards the Programme: the students expressed mostly positive opinions about the Programme. The Expert Team had possibility to familiarize with students' final works. Finally, in separate meeting, the Expert Team met graduates (4) and social partners (6). They have also expressed positive attitudes about the Programme.

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<sup>1</sup> During this day (February 27) the Expert Team had actually a joint visit concerning 2 study programmes at the Faculty. Some of the meetings with the Programme stakeholders were performed jointly.

At the conclusion of the visit, the Expert Team conducted a meeting with staff of the Faculty and presented general remarks related to the visit and highlighted some strengths and weaknesses of the Programme under review.

The Programme was assessed and accredited in 2010. One of the aims of the present evaluation was to assess changes made in accordance with the remarks and recommendations of the previous evaluation.

In the following, the findings of the Expert Team are outlined. The Self-assessment report submitted by the Faculty, the observations made at the time of the visit, and the supplementary material received during the visit form the basis of these assessments

## II. PROGRAMME ANALYSIS

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

The learning outcomes of the Programme are well substantiated and designed in agreement with the Programme goals. Information about the study programme is publicly accessible in the section “Studijų programos“ of the University website.

The Programme aims and learning outcomes, generally, are based on professional requirements, public needs and the needs of the labour market. The links between learning outcomes and the learning outcomes of study subjects as well as between the studies and the methods of evaluation of students' achievements are outlined. The topics of the study subjects are detailed enough; they are compatible with modern contexts, based on faculty research results and recent literature.

Since most of graduates are employed in the region (80%), the analyses of software used by local companies in the region should be done and the programme should teach the most relevant software used by these companies.

The programme aims and learning outcomes are consistent with the type and level of studies and the level of qualifications offered. The name of the programme, content and the qualifications offered are compatible with each other. One of the aims of the Programme is “to educate Masters of Informatics who ... will know the technologies of data mining” However, there is only one

subject is directly devoted this topic (Data Mining) and yet another subject only indirectly connected to data mining (Data Management Technologies). Since (as it is stated in SAR) the specific focus of the Programme is application of data mining technologies and optimisation methods in distributed systems, it is difficult to see how this aim supposed to be achieved through such limited studies of data mining. Team of Experts agree that data mining is related to Statistical Modelling and Analysis, Database Management Systems, Stochastic Programming and Investigation and Applications of Heuristic Algorithms. However, the content of these courses should be more focused on data mining applications. For example, it looks like statistical courses are focused on (stochastic) optimization, which is not a focus of data mining.

To be more specific:

In “Statistical Modelling and Analysis” (P170M138) course the main aim is “...providing knowledge required for calculating complex multiple integrals and solving stochastic optimization tasks using Monte-Carlo method”. It would be expected of such course to contain topics needed for example for both supervised (predictive) modeling building methods such as classification or regression algorithms etc., and unsupervised methods such as clustering, associations, and sequences that focus on discovering previously unknown or unsuspected relationships in a data set (for example, machine learning). Also practical work in this course should be related to data mining.

“Stochastic Programming” course (P175M010) is presented as a pure stochastic optimization course. The main aim is “... presenting main chapters of stochastic programming and training practical solution skills of optimization with uncertainty tasks”. It is not clear (and not easy to see) how stochastic optimization can be used in data mining. Generally, mathematical programming approaches can be used to solve such fundamental problems (related to data mining) as feature selection, clustering, etc. However, no indication of such (or any other) connections is given in the course description.

Heuristic Algorithms are used a lot in data mining. However, in “Investigation and Applications of Heuristic Algorithms” (P175M100) course is focused on solving optimization tasks etc., instead of focusing on data mining applications such as, for example, dimension reduction and feature selection methods based on heuristics, use of GA for classification, etc. The course should contain link to data mining problems and at least indicate how heuristic algorithms are used in data mining.

Since most of graduates are employed in the region (80%), the analyses of software used by local companies in the region should be done and the programme should teach the most relevant software used by these companies.

## ***2. Curriculum design***

The Computer Science study program meets the requirements of the Lithuanian legal acts and normative documents, the Statute of SU, and regulatory documents governing the development of study programs and procedures of studies.

Study subjects and/or modules are spread evenly, their content generally are not repetitive. The content of the subjects and/or modules generally is consistent with the type and level of the studies. Topics of study subjects are detailed enough, and sufficient to achieve respective learning outcomes. However, according to the subject list, six out of 15 subjects (not considering thesis and research work 1-3) specify lists of main references with more than three main references (8 main references in one case). To be realistic such lists should be rather short (f. ex. 1-3 references) or be more specific by identifying what pages in main references are part of the curriculum. All other references should be moved into recommended reading.

Forms and methods used in classes are satisfactory. Teaching/learning process is organized in different forms: self-dependent work, classroom work, i. e. lectures, practice, laboratory works, there are used different methods, e. g., verbal instruction, demonstration, discussion, group work, case studies, testing, project work, etc.

The total scope of studies, the scope of individual modules and groups of modules (including theoretical subjects, course papers, practical work and final exams), final exams, student independent and auditorium work meet the regulations on studies legislation.

The content of the programme generally reflects the state-of-the-art in the field. The compulsory subjects ensure that students acquire the latest knowledge in the informatics study field and develop a critical understanding of knowledge interaction of the informatics and other fields. The elective subjects are intended for student's training in the selected specialization. The free subjects are offered by all departments of SU and must be approved by the Programme's study committee.

The specific focus of the study programme is application of data mining technologies and optimisation methods in distributed systems. However, in our opinion such combinations is not very natural and practical (may be this is the main reason why it is not found in any other universities as mentioned in item 39 in SAR). In addition, the share on data mining in the Programme is quite limited – only one six credit subjects in the first semester directly focused on data mining (P175M452). The recommendation is that curriculum should be adjusted to the focus of the Programme (application of data mining technologies and optimisation methods in distributed systems) or the focus should be modified. Concerning the previous assessment we found that in the respect of curriculum design not much has changed during past three years.

### *3. Staff*

The teaching staff providing the Programme formally meets legal requirements. The study programme corresponds to the research interests of the teaching staff. The staff members expertise are sufficient for teaching associated with the Programme.

The number of the teaching staff members of the Department (10) who involved in the Programme is adequate to ensure learning outcomes. The workload of the teaching staff of the programme being assessed is very similar. Prof. G. Kulvietis (464 hrs), Prof. L. Sakalauskas (340 hrs) and Assoc. Prof. S. Turskienė (382 hrs) do the most of the work in the Programme. According to the SAR for the academic year 2011–2012, in the analysed study programme, approx. 59% of contact work was being delivered by permanent teachers. Habil Doctors, Professors deliver approximately 67% of contact work hours; they teach 9 out of 15 speciality subjects (not counting the research work and Master's Thesis). However, two professors (Genadijus Kulvietis and Leonidas Sakalauskas, holding 0.5 position each) from Vilnius deliver seven of these subjects.

Lecturers of the study program undergo the certification process, and the tenders for the positions are organised once in 5 years' term as established in the University Statute. The core of the study program teaching staff is permanently employed at SU (but not all full time) and they are appointed to positions through public tendering procedures for the time of 5 years as established by the University Statute. Their scientific and educational activities have been evaluated during the certification. The structure of the teaching staff of the study programme according to the age groups: the average age of teachers is 53 years, three teachers are below 40, four are below 60, and three are over 60.



Most teachers involved in the study program have travelled abroad on academic purpose during the last 5 years. Sabbatical leave are difficult to arrange from economical point of view which effects quality of conditions for professional development of the teaching staff, however teacher take part in short term exchanges. In our opinion more teachers should use international mobility and the absence of sabbatical leave has, to some extend, an effect to professional development of staff.

#### ***4. Facilities and learning resources***

Classrooms and computer classrooms have enough capacity to ensure proper conditions for students. With respect to the number of students of the Programme, the number of classrooms and laboratories is sufficient. Technical and hygienic conditions in the laboratories and classrooms are comfortable. All the premises correspond to the modern requirements of work safety and hygiene.

Students of the Programme have the possibility to use the services of SU library. Teaching materials (textbooks, books, periodical publications, databases), generally, are accessible. Overall, central library is very close to department of informatics. Library has undergone renovation and now is very comfortable, easy to use and modern. There are independent work rooms, all rooms and conference halls have modern equipment. The library is open on work days until 8 p.m., on Saturdays – until 4 p.m. During the period of preparation of graduation these by students and during examination sessions the Library working hours are extended until 10 p.m. However, the central digital sources of scientific publications in Informatics (Computer Science), the ACM Digital Library and IEEE Xplore (the IEEE digital library) are not available in the University library. The University should take immediate actions for obtaining the rights to these libraries, which is essential not only for scientific research in Informatics but also for the Master's theses in the area.

Also, some equipment looks to be outdated (at least for multimedia). There is a need to provide more information on alternative technologies especially used by local companies (for example open source) and increase student mobility (it looks to be completely absent for master students).

## ***5. Study process and student assessment***

Admission to higher education institution is based on the adoption of basic principles, i.e., admission grade is the arithmetic mean of the undergraduate diploma grades and bachelor thesis grade. This study program accept all students who have graduated from university-level undergraduate studies in the major field of Informatics and Information Technologies or completed additional compensatory (equalising/bridging programme) courses.

There is a good organization to ensure the study process, whereas 84% of students are completing this study program. University performed the analysis which has identified that the most significant reason why the remaining 16% of progressive students drop out of this study program was too high tuition fees, inability to combine study and work, and due to other personal reasons. However, the biggest issue for the Programme is a very small number of students.

Some Informatics Master's students are involved into scientific research. This is proven by joint articles with teaching staff of the Department of Informatics in scholarly journals Young Researchers' Works (3 Master's students), Information Sciences (1 Master's student). Students participate not only at scientific conferences organized by the Faculty but also at deliver presentations prepared jointly with their research advisers at conferences organised by other universities.

Siauliai University Career Centre organises meetings with prospective employers, helps to get successfully integrated into professional and social activities, stimulate career development, and develop university collaboration with employers when preparing specialists who are on demand on the labour market. The employers look to be satisfied of the level of the student skills. All students graduated from this study program get job by their specialization.

Academic and social support means are available to Master's students. Academic support is provided in the form of provision of information on the programme, flexible studies timetable, possibility to study according to the individual curriculum, timetable of academic staff's consultations, consultation of students on issues of studies and career. Social support is provided in the form of scholarships, social allowances, diminishing of the tuition fee or it payment in parts, a possibility to live in dormitories, socio-cultural, health services, psychological, legal assistance.

Moodle is used to support learning. However, it is not optimized in the sense that there are too many Moodle spaces (5) in use. However, students are pleased that all of the information about the topics that they are being studied can be found in the system. The students suggested to combine all Moodle sub-systems in one.

During the period of 4 years, there was no significant mobility of students. The faculty encourages students to go abroad for studying. Students do not go to university to study for a variety of reasons: many of them already have jobs, weak foreign language skills, etc.

At the same time after review of available out opinion that the level average master theses should be dramatically improved. Considering evaluation on Master thesis it is obvious, in some cases, after looking through the content of the thesis, that it is graded too high. Much more emphasis should be taken to increase the quality of final thesis to upgrade it towards level of master degree. This was also mentioned in previous assessment in year 2010.

## ***6. Programme management***

Responsibilities for decisions and monitoring of the implementation of the programme are allocated. The management of the study programmes and the process of decision making are regulated by SU Statute, SU Regulations for Study Programmes Committees, SU Regulations for the Group for Monitoring Study Programme's Quality. These provide a detailed description of the study programme management process.

The Programme is supervised by the Department of Informatics. The Group for Monitoring Study Programme's Quality consists of 5 members (Head of the Group for Monitoring Assoc. Prof. Dr K. Žilinskas, Head of the Department L. Tankelevičienė, Prof. L. Sakalauskas, G. Macaitis (employers' representative), M. Donelavičius (students' representative)). Assoc. Prof. Dr K. Žilinskas is also a supervisor of the Programme.

All the members of the Study Committee actively participate in the renewal of the study programmes. The university teachers are involved in the preparation of the study programmes, while the study subject descriptions, with regard to the comments and requests of the social partners, are prepared in the departments.

At the end of each year, at the Department meeting, results of academic, methodical and research activities of teaching staff are analysed; the Head of the Department presents the report to the Faculty Dean.

Research and management of quality at ŠU is performed on several levels: the University level; at the Faculty; at the department level; at the level of teaching staff. Assessment of the studies process (the macro level) is held each year since 2008. The last assessment has been carried out in 2010. Some teaching staff members carry out assessment of the content of their delivered subjects and the quality of instruction (on the micro level). However, after analysing of all areas and after on site visit it can be stated that internal quality measures are not very effective and efficient. Much more emphasis has to be taken towards making the formal structure of programme management more effective.

The formal procedure for getting feedback from students on *subject level* should be compulsory for all subjects and each semester. Recommendations from industrial social partners should be made more visible (to see their involvement in the Programme). Recommendations from the previous evaluation should be fully implemented.

### III. RECOMMENDATIONS

1. Access to IEEE/ACM digital libraries as prime source for research and master theses
2. Quality of master theses need substantial improvement.
3. Provide Erasmus exchange opportunities for master students.
4. The programme should more focus on software used by regional companies (for example, open source).
5. Curriculum should be adjusted to the main focus of the Programme (on data mining).
6. Reduce lists of main references (in subject descriptions) to reasonable size.
7. Optimize use of Moodle – reduce number of Moodle spaces (5) in use.
8. Implemented compulsory formal procedure for getting feedback from students on subject level.
9. Introduce actions to increase number of students (for example, by changing the student admission policy in such a way that more students would annually enter the programme, etc.)

#### IV. SUMMARY

The study programme of Computer Science (state code 621110007, informatics study field) is coordinated by the Faculty of Informatics and Mathematics and conducted by teaching staff of the Department of Informatics. The purpose of the study program is to prepare informatics specialists to perform activities in the following area of application of data mining technologies and optimisation methods in distributed systems.

The most positive aspects are: qualified teaching staff, however, more international mobility would be appreciated; English proficiency of students has improved; enthusiastic and satisfied students. Considering the employment rates it is obvious that Informatics students has a high demand in the region of Siauliai and social partners are satisfied with students of this programme.

The issues, which could be improved, are: urgently increase number of students; increase number professor holding full-time positions at the SU; provide more focus on data mining in order to be in order of programme aims; provide more information about alternative technologies with focus on those used by regional companies; much more emphasis should be taken to increase the quality of final thesis to upgrade it towards level of master degree.; try to re-establish access to IEEE/ACM digital libraries in university library as it is essential not only for scientific research in Informatics but also for the Master's theses in the area; optimize use of Moodle – reduce number of Moodle spaces.

## V. GENERAL ASSESSMENT

The study programme *Computer science* (state code 621I10007) at Šiauliai 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	3
5.	Study process and assessment (student admission, study process, student support, achievement assessment)	2
6.	Programme management (programme administration, internal quality assurance)	2
	<b>Total:</b>	<b>14</b>

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

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

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

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

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## V. APIBENDRINAMASIS ĮVERTINIMAS

Šiaulių universiteto studijų programa *Informatika* (valstybiniai kodai – 621I10007; 62409P107) 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	3
5.	Studijų eiga ir jos vertinimas	2
6.	Programos vadyba	2
	<b>Iš viso:</b>	<b>14</b>

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

2 - Patenkinamai (tenkina minimalius reikalavimus, reikia tobulinti)

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

4 - Labai gerai (sritis yra išskirtinė)

<...>

## IV. SANTRAUKA

Informatikos studijų programą (valstybinis kodas 621I10007, informatikos studijų kryptis) koordinuoja Informatikos ir matematikos fakultetas, o įgyvendina Informatikos katedros dėstytojai. Studijų programos tikslas - rengti informatikos specialistus, kurie dirbtų tokiose srityse, kur galėtų taikyti duomenų gavybos technologijas ir paskirstytų sistemų optimizavimo metodus.

Labiausiai teigiami aspektai yra šie: kvalifikuoti dėstytojai, tačiau reikėtų stiprinti tarptautinį mobilumą; pagerėjusi studentų anglų kalba; entuziastingi ir patenkinti studentai. Atsižvelgiant į įsidarbinimo lygį akivaizdu, kad informatikos studentai turi didelę paklausą Šiaulių regione ir socialiniai partneriai yra patenkinti šią programą baigusiais studentais.



Dalykai, kuriuos reikėtų patobulinti, yra šie: skubiai didinti studentų skaičių; didinti profesorių, dirbančių visu etatu ŠU, skaičių; daugiau dėmesio skirti duomenų gavybai, norint pasiekti programos tikslus; suteikti daugiau informacijos apie alternatyvias technologijas, ypatingą dėmesį skiriant toms, kurias naudoja regiono bendrovės; žymiai daugiau dėmesio turėtų būti skiriama baigiamųjų darbų kokybei gerinti, kad pakelti jų lygį iki magistro laipsnio; universiteto bibliotekoje bandyti iš naujo sukurti prieigą prie IEEE/ACM skaitmeninių bibliotekų, nes jos yra svarbios ne tik moksliniams tyrimams informatikos srityje, bet ir magistrantūros baigiamųjų darbų srityje; optimizuoti „Moodle“ naudojimą: sumažinti „Moodle“ erdvių skaičių.

### **III. REKOMENDACIJOS**

1. Naudotis IEEE/ACM skaitmeninėmis bibliotekomis, kaip pirminiais šaltiniais atliekant tyrimus ir rengiant magistro baigiamuosius darbus.
2. Reikia iš pagrindų pagerinti magistro baigiamųjų darbų kokybę.
3. Magistro studentams suteikti galimybes pasinaudoti „Erasmus“ mainų programa.
4. Programa turėtų būti daugiau orientuota į programinę įrangą, kurią naudoja regiono bendrovės (pavyzdžiui, atvirojo kodo).
5. Studijų turinys turėtų būti suderintas su programos pagrindiniu akcentu (duomenų gavyba).
6. Sutrumpinti pagrindinės literatūros sąrašą (dalykų aprašuose) iki priimtino skaičiaus.
7. Optimizuoti „Moodle“ naudojimą: sumažinti naudojamų „Moodle“ erdvių skaičių (5).
8. Įdiegti privalomą oficialią tvarką, kuri užtikrintų studentų grįžtamąjį ryšį apie dalykų lygį.
9. Imtis veiksmų, kurie leistų padidinti studentų skaičių (pavyzdžiui, pakeitus studentų priėmimo tvarką, kad kasmet į programą įstotų daugiau studentų ir t. t.)