



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

KAUNO TECHNOLOGIJOS UNIVERSITETO
PROGRAMŲ SISTEMŲ INŽINERIJOS PROGRAMOS
(621E16001)
VERTINIMO IŠVADOS

EVALUATION REPORT
OF SOFTWARE ENGINEERING (621E16001)
STUDY PROGRAMME
AT KAUNAS UNIVERSITY OF TECHNOLOGY

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	Programų sistemų inžinerija
Valstybinis kodas	621E16001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Informatikos inžinerija
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 inžinerijos profesinis magistras
Studijų programos įregistravimo data	2001-05-24 švietimo ir mokslo ministro įsakymas Nr. 877

INFORMATION ON ASSESSED STUDY PROGRAMME

Name of the study programme	Software Engineering
State code	621E16001
Study area	Technological Sciences
Study field	Informatics Engineering
Kind of the study programme	University studies
Level of studies	Second
Study mode (length in years)	Full-time (2)
Scope of the study programme in credits	120
Degree and (or) professional qualifications awarded	Master of Software Engineering
Date of registration of the study programme	May 24, 2001, the order of the Minister of the Ministry of Science and Education of the Republic of Lithuania No. 877

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I. INTRODUCTION

The Informatics Faculty of Kaunas University of Technology (hereinafter - KTU) provides the second-level (post-graduate) Study Programme "Software Engineering" (further – the Programme) in the field of Informatics Engineering. The structure of KTU consists of 13 faculties, Centre for International Studies, Library, 13 Research Institutes, 2 Research Centres, 14 administrative units and 7 support units. The KTU Council, Senate, Rector and University Strategic Planning Committee determine strategic guidelines of KTU activities. Vice-Rector for Studies administers and coordinates the activity related to study issues.

Masters in Software Engineering have been prepared at Kaunas University of Technology since 2001. The study Programme was created by the staff participated in the TEMPUS programme project and trained at the universities of UK and Belgium at 1995-1996. The Programme was registered as "Software Engineering" at May 25, 2001, No. 877 (state code 62107T101), re-registered at February 19, 2007, No.ISAK-225 (state code 62107T101) and again re-registered at May 05, 2010, order No.V-635 with new state code 621E16001. First students were admitted in 2001.

In 2011 year this Programme has been 20% updated and received positive external evaluation in the framework of the project AMIPA funded by the European Social Fund and the Lithuanian state budget.

259 students have been admitted to first-level studies and 115 students - to the second-level studies in Informatics Faculty KTU in 2011 and graduated as follows: 147 undergraduates and 122 post-graduates.

The Software Engineering Department of the Informatics Faculty implements the above mentioned Master study Programme "Software Engineering", and its training laboratory of Software Engineering Processes provides the facilities for studies and practice.

The Software Engineering Department uses the potential of its research groups in the areas of the functional testing of systems, software testing, embedded systems development and e-learning in the process of studies. During 2007–2011 year staff of the Software Engineering Department has published 154 publications. The Department also collaborates in the international journal „Information Technologies and Control“. The Journal is publishing papers quarterly in the

printed and on-line versions. Since 2007 this journal is included in the *ISI Master Journal List*. Intellectual resources of the Software Engineering Department induce the responsibility to train the master-level students and to provide them high competence knowledge and abilities.

The Lithuanian Centre for Quality Assessment in Higher Education has invited four experts and one representative of students (hereinafter called Expert Team) from Estonia, Latvia, and Lithuania, to review and assess the Software Engineering university master study programme (621E16001) at the Kaunas University of Technology. The programme is organized by the Informatics Faculty (hereinafter called Faculty). Institutional structure of KTU enables to involve required teachers from all the faculties and departments of KTU.

The Expert Team visited the Faculty on October 3, 2012.

First, the Expert Team met the administrative staff of the Faculty.

Next at the meeting with staff (6 persons) responsible for preparation of self-assessment the Expert Team was given good, clear and exhaustive answers to the questions concerning less uncovered in the self-assessment report issues.

After that, a meeting with 5 members of teaching staff took place.

The Expert Team conducted also interviews with some students. The group consisted of 8 students, among them 5 2nd-year graduates, and 3 1st-year graduate student. The Expert Team was familiarized with students' attitude towards the programme; the students expressed mostly positive opinions about the study programme: professional, responsive and friendly teachers, flexible schedule allowing for work, good connections with commercial companies, good set of electives.

The Expert Team had possibility to observe various support services (class rooms, computer services, library) as well as to familiarize with students' final works.

Finally the Expert Team met 8 graduates and 6 social partners. They expressed a positive attitude about the study programme and informed about rather strong relations with the Faculty.

At the conclusion of the visit, the Expert Team conducted a meeting with staff of the Faculty and highlighted some strengths and weaknesses of the programme under review.

The findings of the Expert Team are reflected in the following. The self-assessment report submitted by 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 programme aims (objectives in SAR) and learning outcomes are defined, clear and publicly accessible

(http://uais.cr.ktu.lt/plsql/mod_dest/stp_report_ects.card_ml?p_valkod=612E10001&p_year=2012&p_lang=LT). However, programme objectives are not explicitly given. E.g., „Underlying Conceptual Basis for Informatics“ is not a comprehensible statement of an objective.

The programme aims and learning outcomes are based on the academic and/or professional requirements, public needs and the needs of the labour market. Especially laudable that the program learning outcomes are fully based on EQANIE's (European Quality Assurance Network for Informatics Education) recommended learning outcomes (Table 4 in self-assessment report).

The programme aims and learning outcomes generally are consistent with the type and level of studies and the level of qualifications offered. However, majority of study course (subject) descriptions do not contain any reference to EQANIE's learning outcomes. So, content of Table 5 in self-assessment report is not well substantiated. Part of learning outcomes mentioned in course descriptions is not mentioned in the Table 6.

The name of the programme, its learning outcomes, content and the qualifications offered generally are compatible with each other. However, matching of program learning outcomes and courses learning outcomes is not presented with certainty.

2. Curriculum design

To the best of Experts Team's knowledge, the curriculum design meets legal requirements set by Lithuanian authorities).

Generally, study subjects and/or modules are spread evenly, their themes are not repetitive. However, many study course descriptions have empty field “Prerequisites”, so it is quite uneasy to comprehend sequence of courses. General subjects (Mathematics, Physics, Philosophy) are not tailored to the programme, they are too general (e.g., it is not clear why software engineers need nuclear physics or quantum mechanics). The content of the subjects and/or modules is consistent with the type and level of the studies. The Software Engineering Department uses the

potential of its research groups in the areas of the functional testing of systems, software testing, embedded systems development and e-learning in the process of studies.

The content and methods of the subjects/modules are appropriate for the achievement of the intended learning outcomes. Design work helps students: a) to accumulate the knowledge and skills of various disciplines in different semesters, b) to develop problem solving skills, c) to acquire collaboration skills d) to improve communication skills, e) to acquire professional experience in large project design. Study methods of real programs solving, real software systems design, group work and semester projects aid students to acquire professionalism in software design. Students are required creatively apply knowledge acquired in theoretical studies in practice designing systems for real customers and companies.

The scope of the programme is sufficient to ensure learning outcomes.

The content of the programme reflects the latest achievements in science, and technologies. During 2007–2011 year staff of the Software Engineering Department has published 154 publications. The Department also collaborates in the international journal „Information Technologies and Control“. The Journal is publishing papers quarterly in the printed and on-line versions. Since 2007 this journal is included in the *ISI Master Journal List*. Intellectual resources of the Software Engineering Department induce the responsibility to train the master-level students and to provide them high competence knowledge and abilities.

Students' opinions:

- more practical work and individual work would be necessary,
- old software tools,
- overlapping content of subjects,
- wish a better selection of electives.

3. Staff

The study programme is provided by the staff hardly meeting legal requirements: exactly 80% of volume of the programme is taught by scientists. That is unbecoming for leading university.

The qualifications of the teaching staff (21 doctors) are adequate to ensure learning outcomes. However, one teacher over 60 still has no scientific degree.

The number of the teaching staff (22) is adequate to ensure learning outcomes.

Studijų kokybės vertinimo centras

Teaching staff turnover is able to ensure an adequate provision of the programme. Main teachers have not been changed.

The higher education institution creates conditions for the professional development of the teaching staff necessary for the provision of the programme. The problem of rejuvenation of teacher team is successfully solved by the inclusion in the teaching process the doctoral students. Currently there are 9 PhD students in the Department of Software Engineering KTU.

The teaching staff of the programme is involved in research directly related to the study programme being reviewed.

4. Facilities and learning resources

The premises for studies are adequate both in their size and quality. The faculty of Informatics has more than 20 computer classes and laboratories where are 310 personal computers intended for studies. More than 100 personal computers are at scientific laboratories and at workplaces of teachers. The servers of the faculty are placed in separate room.

The teaching and learning equipment (laboratory and computer equipment, consumables) are adequate both in size and quality. The technical state of the present computer classes as well as sufficiency of computers and software assures proper effectiveness of teaching. The computer and software equipment used for implementing the Programme are modern and legal. Besides, all students have their own personal computers. All hostels possess Internet.

The program does not contain internship. Teaching materials (textbooks, books, periodical publications, databases) are adequate and accessible. However, electronic material is scattered over different places (Moodle, separate webpages). Students mention it as inconvenience.

5. Study process and student assessment

The admission requirements are well-founded. The admission to the second-level Study Programme Software Engineering at the Faculty of Informatics, KTU, is performed according to General Regulations for General Admission to the Second-Level. The admission is performed by the faculty admission commission organized by the order of the KTU Rector. Persons who have the diploma of university first-level studies of study directions of mathematics, computer science or informatics engineering are admitted to the master's studies (par. 79 of SAR).

The organisation of the study process ensures an adequate provision of the programme and the achievement of the learning outcomes. The study system is performed by applying the methods and ways that emphasize development of activity abilities, competences. The following methods and ways are applied: search for and analysis of scientific and practical literature as well as other documents, course papers, projects, final degree projects and their defence, group work (projects, course papers, group assignments during practical trainings, reports and their presentations), practical trainings, discussions and seminars.

Students are encouraged to participate in research, and applied research activities. The final degree project of the second-level studies is an analytical project based on self-dependent researches. The final degree project is constantly being prepared during all four semesters: the first three semesters are aimed to perform development and implementation of real software system and the fourth semester – is aimed to the preparation of the final degree project (18 credits). The students at the beginning of the first semester get task (implementation of the real software project) that spans over first three semesters. By choosing the tasks priority is taken for projects that come from IT enterprises. During practice the research is performed and the additional material for magister thesis is collected at IT enterprise by supervising of Software Engineering department and representative of enterprise.

Students have opportunities to participate in student mobility programmes. However, participation is rather weak (0 to 4 annually).

The higher education institution ensures an adequate level of academic and social support (par. 97-111 of SAR).

The assessment system of students' performance is clear, adequate and publicly available. The criteria of student's achievements evaluation are publically announced at the beginning of a semester – at the first lecture of a study module the lecturer introduces the students with study module's aim, themes, tasks and schedule of self education and the influence of their grade to the final grade.

Professional activities of the majority of graduates meets the programme providers' expectations. Usually the graduates do not face any problems of their placement. The results of matriculates questioning for the period under assessment showed that more than 90% of matriculates already had job at Lithuania or foreign IT enterprises.

6. Programme management

Responsibilities for decisions and monitoring of the implementation of the programme are clearly allocated. However, more than 10 final works were supervised by one teacher.

Studijų kokybės vertinimo centras

Information and data on the implementation of the programme are regularly collected and analysed. The current issues of the quality of the Study Programme “Software Engineering” are discussed at the meetings of the Department Software Engineering for one or two times during a semester. When a spring semester and examination end, the quality of Study Programmes, final degree projects and their defence is analysed at the meetings of the Department, Dean’s Office and the Board of the Faculty.

The outcomes of internal and external evaluations of the programme are used for the improvement of the programme. The periodicity of the activity of the Internal Study Quality Assurance System is based on the results indicating problematic moments of internal study quality assurance, which are obtained by the interrelated methods and means chosen for the Programme evaluation. At the end of every semester in order to get feedback students get a possibility to evaluate the content of the study subjects and the quality of their delivery according to the order set at KTU [20]; they fill in the electronic questionnaire of the evaluation on their personal virtual sites in the system of KTU academic information.

The evaluation and improvement processes involve stakeholders. However, clear explanation about how changes in the programme (e.g. by the suggestions from social partners) are managed is missing. Teachers discuss their subjects at their departments – what’s next?

The internal quality assurance measures generally are effective and efficient. According to the data of the last five years survey-in-written, it is possible to state that the students positively assess teachers’ didactic system, communication of teachers and students in the study process.

III. RECOMMENDATIONS

1. Taking into account the results of labor market analysis and the needs for IT specialists provided by the representatives of IT industry, we recommend to increase the governmental order for the first level (Bachelor) and entry quotas for the second level (Master) studies financed by the Lithuanian government in Informatics and Informatics Engineering and related fields.
2. To reconcile program's and courses' learning outcomes.
3. To improve formal staff qualification.
4. To close quality system's feed-back loop.

IV. SUMMARY

This is, probably, the most popular study programme of such kind in Lithuania, with strong teaching staff, good infrastructure and learning materials, and good administration.

Kaunas University of Technology actively supports and implements the main strategy requirements of the rapidly developing knowledge society. The aim of the Software Engineering Master's degree Programme is to develop high quality software developers, leaders of the future projects and software business, that are able to develop software that has lasting value, easily reusable and deployable, able to absorb and implement effective design methods, use modern IT tools, manage the complex software systems meeting the Lithuanian economy needs.

The Programme aims and learning outcomes are rather carefully elaborated. However, relationships „programme aims-EQANIE learning outcomes-learning outcomes of particular subject“ are not consistently showed.

The curriculum design is largely rational and adequate to the learning outcomes set. However, it is not clear, to what extent the programme meets the recommendations of SWEBOK.

The qualification and practical experience of the staff is sufficient for the execution of the Programme. However, teacher having no scientific degree in master program is not appropriate, even if legally allowed.

KTU has good infrastructure, library is rich in professional literature.

The organization of the study process is good, though international exchange, student involvement in research activities and the use of electronic learning environment could be expanded.

Study programme management and quality assurance system is in place. However, the quality system could be improved, especially regarding the involvement of feedback from students and social partners.

V. GENERAL ASSESSMENT

The study programme *Software Engineering* (state code – 621E160001) at Kaunas University of Technology is given **positive** evaluation.

Study programme assessment in points by fields of assessment.

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	3
2.	Curriculum design	3
3.	Staff	3
4.	Material resources	4
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.

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