STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus Gedimino technikos universiteto

KOMPIUTERIŲ INŽINERIJOS PROGRAMOS (621H69001) VERTINIMO IŠVADOS

EVALUATION REPORT OF *COMPUTER ENGINEERING* (621H69001) STUDY PROGRAMME

at Vilnius Gediminas technical university

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	***Kompiuterių inžinerija***
Valstybinis kodas	621H69001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Elektronikos ir elekrtros inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	2 – oji studijų pakopa
Studijų forma (trukmė metais)	Nuolatinė (2), ištęstinė
Studijų programos apimtis kreditais	120
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Kompiuterių inžinerijos magistras
Studijų programos įregistravimo data	-

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	***Computer engineering***
State code	621H69001
Study area	Technological science
Study field	Electronic and electrical engineering
Kind of the study programme	Master studies
Study Cycle	2nd cycle
Study mode (length in years)	Full-time (2), part-time
Volume of the study programme in credits	120
Degree and (or) professional qualifications awarded	Master‘s degree in computer engineering
Date of registration of the study programme	-

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I. INTRODUCTION

Master degree studies in Computer Engineering have been carried out at Vilnius Gediminas Technical University since 2007. The Computer Engineering is the second cycle Masters studies program. The graduates of the program receive the Master of Computer Engineering degree. Execution of the Computer Engineering Bachelor Study Program has never been evaluated by external experts since its launching in 2007.

External evaluation of Vilnius Gediminas Technical University (VGTU) Study Program has been conducted by an international expert group consisting of Prof. Dr. Toomas Rang (group leader), Prof. Dr.-Eng. Tilmann Krueger, Doc. Dr. Sergey Olegovich Shaposhnikov, Prof. Dr. Dangirutis Navikas and Monika Simaškaitė (student) through analysis of the self-evaluation report and meetings with the administrative staff of the Faculty of Electronics, the group of preparation of the self-evaluation report, teaching staff of the Study Program, students of the Study Program and graduates, and their employers.

The expert group has analysed the Study Program aims and learning outcomes, curriculum of the Study Program, quality assurance (management) of the Study Program, study process, staff and other factors.

II. STUDY PROGRAM ANALYSIS

1. Study Program aims and learning outcomes

The Study Program aims and learning outcomes are satisfactorily defined, they are clear for teaching staff, students and employers and it was clearly presented in the Self-Assessment-Report (SER).

Access to the Study Program aims and key learning outcomes are available on the VGTU website. It is notable that the Study Program aims submitted in the self-evaluation report (SER) and the profile of the Study Program listed on the website are not entirely the same. The evaluation group would expect information in these resources to be in close agreement. The study outcomes are clearly formulated in four groups: knowledge, understanding, special skills, and general abilities. The Study Program outcomes are comparable with similar European Study Programs and correspond to the Study Program aims. Complexity level of the learning outcomes corresponds to qualification requirements described in national and EU documents. The outcomes are achievable during the study period (4 semesters).

The Study Program is created by implementing the project "Rearrangement and Renewal of VGTU Master Study Programs in Electronics and Informatics Engineering Study Area and of the Doctoral Studies" No BPD2004-ESF-2.5.0-03-05/0017, financed by the European Union structural funds. The Study Program aims and learning outcomes are consistent with the type and level of studies and the level of qualifications offered. The study courses are in accordance with the Study Program aims and the specified level of qualifications. The name of the Study Program Computer Engineering, its learning outcomes, content and qualifications offered are all compatible with each other.

2. Curriculum design

The Computer Engineering 2nd cycle Study Program comprises 120 ECTS credits within two years. The Study Program corresponds to the requirements for Study Programs according to legal documents issued by Ministry of Education and Science of Lithuanian Republic and resolutions of the Government of Lithuanian Republic. The degree awarded is Master in Computer Engineering. The Study Program is well coordinated with the corresponding bachelor Study Program. The study courses and/or modules are spread evenly, their themes are not repetitive.

Computer Engineering Study Program includes 2 specializations: Computer Technologies, and Integrated Systems Design, but the students are admitted to the Computer Technologies specialization only. As it is mentioned in SER "The Integrated Systems Design" specialization should be removed from the Computer Engineering Study Program, because there at the Electronics Faculty in Electronics Engineering 2nd cycle Study Program the studies in the very similar specialization entitled Micro- and Nano- Electronics are provided". This could also be reasonable because the number of enrolled students does not exceed 12.

The teaching methods comprise different methods e. g., lectures, demonstration, seminars, group work, case studies, project work, etc. for students to gain necessary knowledge of the course, acquire practical skills, be able to summarize and analyze the research results, and learn to use acquired knowledge and skills creatively. In order to increase student competitiveness internationally, attention to development of innovation and management skills should be paid.

During the evaluation visit students also reported that they would like to see less paper writing and more interactive training methods.

3. Staff

The teaching-staff involved into teaching of the Study Program meets the legal requirements. At present, the number of the teaching staff is adequate to ensure learning outcomes. Evidence is provided regarding the training and development opportunities given to the academic staff. These include the provision of training courses, encouragement to publish scientific work, and opportunities for international visits. There is a strong international involvement of some of the academic staff.

As reads from the self-evaluation report the teaching staff for the Study Program of Computer Engineering has taken or takes part in many research projects funded by Agency for Science, Innovation and Technology, Lithuanian State Science and Studies Foundation and projects financed by the industry. They also implemented the projects of studies and development funded by the EU. However, the biggest part of the research activities is carried out by the teachers whose age is over 60 years old. It shows that the Department and Faculty administration should more actively involve other teachers of the Study Program in the scientific research. More than 30 % of teachers of the Study Program are over 60 years old what may cause a threat the sustainability of the Study Program. However, meeting with the administration revealed that there is no staff development plan to solve possible future problems. The knowledge level of foreign language (English) amongst the academic staff is varied and may hinder their use of English texts when preparing material for students.

4. Facilities and learning resources

Evidence is provided to indicate that the facilities and equipment provided for the students on this Study Program is appropriate to the level of the Study Program. The tour of facilities during the evaluation visit demonstrated some fine examples of support for the master students, such as the microcontrollers and embedded systems being used, but equipment of the study laboratories requires some improvement in the near future. However, it was not clear if a plan of equipment upgrade was in place.

The students have access to a well provisioned library as well as online access to databases of scientific publications through the library website. There course books are also available to students in the departments. Coursework material produced by teaching staff is available by a several forms. During the meeting with students it was mentioned that usually lectures are held after noon and in evenings. Such arrangement of studies makes real (not theoretical 30 ECTS credits per semester) workload of students studying the Study Program questionable.

According to the self-evaluation report (description of courses, annex 3.1) some of modules are provided with a low quantity of teaching materials (textbooks) (e.g. in module "Microcontrollers and their Study Programming**"** there is only one copy of the first reference in faculty library, the same situation with module "Power Semiconductor Devices" references 1 and 2).

5. Study process and student assessment

Admission requirements do not differ from requirements for other Study Programs and are based on common principles of the university. Students are enrolled with bachelor degree in the same or adjacent study area assuring decent level of determined knowledge. The enrolment criterion is the weighted average from bachelor studies. In 2011 the range was from 7.63 to 10. During the last five years amount of students admitted to the Study Program varied from 10 to 12. However, the specific action plan for attracting students to study under this Study Program was not presented in the self-assessment report and during the meeting with administration staff. Student dropout rate is decreasing - in 2011 all 10 enrolled students graduated.

The students of the Study Program are encouraged to participate in research carried out at the faculty and some students participate in the projects carried out at the department and institute of research, which indicates that the theoretical background of students is very strong. However, the representatives of industry indicated that there seems exist a lack of implementation of technologies' innovations in the training activities taken place at the university. Some students enrolled on the Study Program have employment commitments, which severely limit their availability for activities outside of their obligatory Study Program commitments. The students are encouraged to publish their work and present the results in conference of the young scientists titled as "Electronics and Electrical Engineering" organised by the Faculty of Electronics.

The students have access to mobility through the Erasmus Study Program. Faculty has 33 Erasmus contracts with 33 European universities. Students are selected on a competitive basis. The mobility of students increases annually (from 26 in 2006/2007 to 62 in 2010/2011). These are the numbers of whole Electronics faculty; statistical data concerning Computer Engineering Study Program student mobility were not presented. However there is a lack of motivation to go abroad amongst students. It is suggested that the advantages of mobility should be made clear to students and the Faculty should make appropriate choices of student mobility partners to ensure full recognition of credits. The assessment system of student performance is clear, adequate and publicly available (explained at the first lesson of each course).

The distinction between the attributes of bachelor's and master's degree Study Programs is not adequately different to characterise the graduates of the Study Program as those who could naturally adopt a leadership role in their place of employment, when compared with bachelor's degree graduates. Enhancing the practices in private sector more than in institute would be a feature.

6. Study Program management

Responsibilities of decision making and monitoring the implementation of the Study Program are clearly allocated to the competency of the Study Committee, which includes the consideration and submitting of the newly prepared of improved Study Programs and their course modules. The Computer Engineering Study Program committee and the Study Committee of the Electronics Faculty lead the methodical cooperation with the heads and teachers of Electronic systems, Computer Engineering and Telecommunication Engineering departments implementing the Study Program". However meetings with teaching staff, students and the self-evaluation group showed that the Study Program management system is not clearly understood by all of the personnel and students. Therefore students and some lecturers do not see possibilities to initiate significant changes to the Study Program.

The system for collecting feedback from students is developed in a traditional way: at the end of a semester the students answer on the questions for evaluating the study course content, course material presentation (its clarity, forms of presentation, accessibility, etc.), teaching methods, teachers' competence and communication skills, and provides proposals for the improvement of the course quality." However the meeting with students revealed the lack of publicity on implementation of feedback results.

There was no clear evidence available and presented in discussions about the direct involvement of interested parties (e.g. industry) in the process of curriculum development. The level of stakeholders' involvement in the evaluation and improvement processes should be improved in order to allow active involvement of students and employers in the process. However informal communication between the staff, students and employers is present. No clear evidence of systematic use of outcomes of internal evaluation of the Study Program for the improvement of the Study Program was presented. The internal quality assurance system should be improved and made more open for teaching staff, students and employers. All stakeholders should be informed of formal possibilities about getting involved in the quality assurance process and encouraged to take part.

III. RECOMMENDATIONS

1. The Faculty and Study Program administration should keep the entire teaching staff involved into the strategic development of the Faculty, Departments and degree Study Programs.
2. A system for the monitoring and analysis of the labour market needs and demands should be developed. The analysis results should be systematically used for continuous improvement of the Study Program.
3. The study process should be reviewed to maximize opportunities to enhance the development of critical thinking abilities and team-working skills during the delivery of the Study Program.
4. Closed feedback loops with practical involvement of employers, students and all teaching staff should be implemented in the quality assurance system.
5. Lectures and practical/laboratory studies should be held in day time. High level of attention should be paid to meet the ECTS workload requirements for the Master level studies.
6. Some of the devices and boards in study labs should be upgraded.
7. Staff development plan should be elaborated.
8. Consideration should be given to making more formal use of alumni and employers.
9. Possibilities for improvement language skills of students and teachers should be created.
10. Involvement of lecturers from industry into the curriculum (depending on their experience and knowledge involvement could span several lectures, parts of courses or whole courses) should be increased.

IV. SUMMARY

Study Program aims and learning outcomes

Positive quality aspects

- The aims and learning outcomes of the Study Program are well defined and publicly available.
- The Study Program is based on a clear modular description of the learning contents.
- The name of the Study Program, its learning outcomes, and the qualifications offered are compatible with each other.
- Study Program aims and expected learning outcomes are based on demands of academic community and society.

Negative quality aspects

- There was inconsistency between aims of the Study Program listed in the SER and the profile of the Study Program listed on the website.
- Discussions the expert group had with students revealed that not all students seem to have sufficiently been made aware of the very aims of the Study Program.
- No systematic feedback from industry on the aims and expected learning outcomes is collected.

Curriculum design

Positive quality aspects

- The curriculum design meets legal requirements.
- Study courses are spread evenly, their themes are not repetitive.
- The contents of the modules are consistent with the type and level of the studies.
- The students have to present their work in student conferences.

Negative quality aspects

- Study courses should embrace scientific research (especially international).
- The content of the Study Program does not sufficiently stimulate acquisition of competence in independent and innovative work.

- No systematic measures on the improvement of the curriculum design based on the feedback from employers/graduates are introduced.

Teaching staff

Positive quality aspects

- The Study Program is provided by the staff meeting legal requirements.
- The qualifications of the teaching staff are adequate to ensure learning outcomes.
- The academic-staff encourages creativity amongst the students through projects, hobby work, involvement in research, and final thesis.
- Teachers carry out research activities including participation in research projects funded by Agency for Science, Innovation and Technology, Lithuanian State Science and Studies Foundation and projects financed by the industry.

Negative quality aspects

- There is a lack of foreign teachers engaged in the Study Program.
- One third of teachers in the Study Program are over 60 years old what may cause a threat to the sustainability of the Study Program.
- The knowledge level of foreign language (English) amongst the academic staff is varied and may hinder their use of English texts when preparing material for students.
- The largest part of research activities are carried out by staff over 60 years old.

Facilities and learning resources

Positive quality aspects

- The premises for studies are adequate both in their size and quality.
- Libraries, computer labs and reading rooms at the University and Faculty are accessible for a reasonable period during daytime.
- Teaching materials (textbooks, periodical publications, databases) are mostly adequate and accessible.
- Lecturers widely use free electronic resources.

Negative quality aspects

- The process of upgrading hardware and software should be transparent and planned for up to 5 years.
- Some measurement equipment used in the laboratories is old and although still meets the needs of the teaching and learning, but does not provide the students experience with international standards.

Study process and students' performance assessment

Positive quality aspects

- Admission requirements are well-founded, the higher education institution ensures an adequate level of academic and social support.
- The assessment system of student performance is clear, adequate and publicly available.
- Students are encouraged to actively participate in research activities.
- The presented final works make good impression and show a culture of presentation.
- Good level of the social support is provided by the University.

Negative quality aspects

- The overlap of some material from bachelor's to master's level Study Program, combined with limited opportunities for students to work together due to timetable constraints reduces the opportunities for engagement with material at the high learning levels.
- The Study Program is taught in the afternoon and evening because most of the students are employed. It remains still unclear how the students are able to arrange and merge the 40h full time studies per week with the part- or full time job.
- There is little motivation amongst the students to participate in the Erasmus Study Program.

Study Program management

Positive quality aspects

- Responsibilities off decisions making and monitoring the implementation of the Study Program are clearly allocated.
- Relationships with the companies and organizations working in computer engineering and similar industries are established.

Negative quality aspects

- The lack of cooperation between the administration and the teaching staff on the development of the Study Program is present.

- University staff is not sufficiently informed about expectations and requirements of the industry.
- A specific measures plan for attracting students to study under the Study Program seems to be generally missing.
- The knowledge of the alumni is not fully utilised by the faculty and university for the future development activities of the Study Program. No systematic monitoring of the Study Program by the alumni taking into account the later professional career development possibilities.
- Consideration should be taken to utilising more formal use of alumni and employers.
- The involvement of stakeholders in the continuous evaluation and improvement process is not adequately defined. In particular, it is not clear how respect to student opinion is paid during the process.

V. GENERAL ASSESSMENT

The Study Program *Computer Engineering* (state code – 621H69001) at Vilniaus Gediminas technical university is given **positive** evaluation.
Study Program assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation Area in Points*
1.	Study Program aims and learning outcomes	3
2.	Curriculum design	3
3.	Staff	3
4.	Material resources	3
5.	Study process and assessment (student admission, study process student support, achievement assessment)	3
6.	Study Program management (Study Program administration, internal quality assurance)	2
	Total:	**17**

*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.