STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus Gedimino technikos universiteto

SPAUDOS INŽINERIJOS PROGRAMOS (621H74001) VERTINIMO IŠVADOS

EVALUATION REPORT OF *PRINTING ENGINEERING* (621H74001) STUDY PROGRAMME

at Vilnius Gediminas Technical University

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Išvados parengtos anglų kalba

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	***Spaudos inžinerija***
Valstybinis kodas	621H74001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Gamybos 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	Gamybos inžinerijos magistras
Studijų programos įregistravimo data	2001-08-02 Nr.1187

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	***Printing Engineering***
State code	621H74001
Study area	Technological Sciences
Study field	Manufacturing Engineering
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 or Manufacturing Engineering
Date of registration of the study programme	02/08/2001 No. 1187

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I. INTRODUCTION

The Master´s degree study programme of "Printing Engineering" is implemented by the Department of Polygraphic Machines (hereafter called the Department) of the Vilnius Gediminas Technical University (VGTU) Faculty of Mechanic (FM). This Department is implementing also the first study cycle programme in Printing Engineering.

The external assessment procedures of this study programme were initiated by the Centre for Quality Assessment in Higher Education in Lithuania nominating the external assessment peer group of Dr. Joerg Longmuss (Germany), Prof. Johan Malmqvist (Sweden), Assoc. Prof. Arvidas Masiulis (Lithuania), Jonas Renatas Lazaravičius (Lithuania), and Domas Rimeika (Lithuania).

The basis for the evaluation report is the written Self-Assessment Report (SAR) of the Department, its annexes and the site visit of the experts on 8th May 2013. During this visit the experts reviewed the organisation of the programme, the way in which the curriculum is designed, the way the quality is assured, the qualification of the staff, facilities and learning resources, study process, students assessment and programme management.

During this visit they met with administration staff, staff responsible for preparation the SAR, teaching staff, students, alumni and with social partners. They had the occasion for familiarizing with students' course and final papers (thesis) and examination material as well as visiting auditoriums, libraries and other facilities (studios, teaching spaces, computer services, etc.).

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

(*All numbers of paragraphs refer to the self-evaluation*)

VGTU's study programme "Printing engineering" aims features an ambitious aim (§ 16) including (excerpt) "provide students with specialized knowledge in printing engineering … skills of scientific research … skills in management … interest in innovation … settle … problems … upon global market conditions". The aims are relevant for two different professional roles: technologists and managers. The name of the programme is consistent with its aim. The aims and the program learning outcomes are publicly available.

The programme targets an important sector of Lithuanian industry. Appropriate actions are taken to understand the needs of Lithuanian industry. Industrial representatives as well as Department staff assured during the visit that the teaching staff is in continuous exchange with enterprises. This is backed by a survey on needs in specialists in Lithuania carried out by employees of the National Development Institute in the year 2008 (§ 33-34). The strong relations between employers and the programme were further evidenced by interviews with social partners at the site visit.

The expected learning outcomes are structured into knowledge, understanding, special skills and general skills (§ 17-21). 16 programme learning outcomes are stated. It is claimed that the EUR-ACE standards and the Dublin descriptors where taken into account (§ 29) when developing the learning outcomes but this claim is difficult to validate and confirm. The structure is different and it also seems that several EUR-ACE requirements lack correspondents in the programme's learning outcomes, including "awareness of project management and business practices, such as risk and change management", "to function effectively as leader of a team that may be composed of different disciplines and levels", and to "work and communicate effectively in national and international contexts". It cannot be confirmed that the expected outcomes of the programme meets the international standards expressed in the EUR-ACE standards.

The confusion is further complicated when a comparison between the Dublin descriptors and the programme aims is provided (Table 2.2). However, the programme aims in Table 2.2 differ from those presented in section 2.1.1. One needs to ask which the official programme aims are. In addition, the mapping of the third Dublin descriptor to a programme aim seems to be lacking some content.

Further, the programme learning outcomes are essentially technical in nature. However, the programme aims point to several different competences or specializations, including research and development, management, operational development and understanding of global market conditions. The aims are thus relatively broad. This view was confirmed by interviews with alumni and social partners. The graduates of the programme had gone on to careers both as technologists and as managers. The programme learning outcomes fail to capture this scope of knowledge and skills. The programme needs to work with its faculty, students and social partners to work out a vision for what kind of graduates that the programme should educate in the future and the most suitable programme content for its graduates.

There are good routines in place to annually update the learning outcomes, with respect to input from faculty, students and employers.

In conclusion, the programme aims and learning outcomes are based on the academic and/or professional requirements, public needs and partly the needs of the labour market. 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, its learning outcomes, contents and the qualifications offered are compatible with each other. However, the programme aims and learning outcomes are not well defined, rather the self-evaluation presents several differing versions (Section 2.1.1, Table 2) of programme aims, causing confusion for the reader. Further, the aims and the programme learning outcomes are not well aligned, the learning outcomes reflecting a more narrow set of knowledge and skills than the aims. Further, despite that it is stated that the EUR-ACE standards were taken into account when developing the programme learning outcomes, the programme's learning outcomes lack several EUR-ACE outcomes, addressing project management, leadership, teamwork and communication in international contexts.

2. Curriculum design

The curriculum of VGTU's "Printing Engineering" programme comprises 120 ECTS in total, subdivided into: 62 ECTS related to the study profile, 19 ECTS University determined and student elective subjects, and 39 ECTS – final work. This meets the basic legal requirements.

The curriculum is heavily weighted toward specific technical aspects or techniques of printing engineering, including topics such as control of printing equipment, simulation of printing equipment, dynamics of printing machines etc. There are also some supporting mathematical and mechanical engineering subjects of more general nature including reliability theory and the finite element method. A positive development is that the curriculum is being renewed by the introduction of new subjects "Computerized Image Processing and Identification" and "Investigation on 3D Printing Processes" (page 27).

However, "Fundamentals of research and innovation" (4 ECTS) is the only compulsory course that seems to develop non-technical knowledge and skills to some degree. This is very little for a program that also has aims to "form skills in management", "settle technological, administrative and legal problems", in "global market conditions". The need for the programme to develop such knowledge and skills was confirmed in interviews with alumni and social partners who accounted for the professional roles of the programme's graduates. The programme needs to include management and leadership subjects pertinent to the actual professional roles of its graduates.

An interesting feature of the programme is the three preparatory final works subjects. Adequately applied, these subjects could provide students with a very strong basis for their final degree projects. However, one avenue for developing the programme could be to change one of the project subjects into a large team-based project, enabling the development of skills of working in a large team and also leadership skills. This project subject could have a specific focus, e.g. an innovation project, whereas the other could maintain its research focus.

It should be noted that several students' final works, such as Investigation of Adhesive Strength of Glued Printed Products, Investigation of Strength of Corrugated Board Package, are more in line with the direction of Mechanical Engineering than Production and Manufacturing Engineering.

The programme is taught in Lithuanian. The university provides opportunities for studies abroad, mainly through the Erasmus programme, but only few "Printing Engineering" students participate in such exchanges. However, the printing industry is international and collaborations in English, German, Russian and French are common. The programme is encouraged to develop a stronger international orientation amongst its students. This could be achieved through more active encouragement to study abroad, and through introducing learning experiences taught in English including whole subjects, lectures, written assignments and oral presentations.

Many of the students work part time in industry and the majority do their thesis work in industry. However, there seems to be less connection with professional practise and new developments in printing engineering in the regular subjects. There are many ways to strengthen these connections e.g. by inviting practicing professionals to lecture at the university, carrying out assignments in companies, organising visits. Theoretical subjects should be closer connected with practical problems of printing engineering.

In conclusion, the curriculum design meets legal requirements; study subjects and/or modules are spread evenly, and their themes are not repetitive; and the content of the subjects and/or modules is consistent with the type and level of the studies. The content and methods of the subjects/modules are appropriate for the achievement of the intended learning outcomes. The scope of the programme is sufficient to reach the stated learning outcomes. The content of the programme reflects recent developments in relevant science and technology. However, the learning outcomes poorly reflect the aims of the programme and the actual professional roles of its graduates: the curriculum is suitable for a technologist career but provides less preparation for a management career, a path that nevertheless a substantial fraction of the graduates pursue. The curriculum needs to be revised with the needs of this group in focus. The programme should also introduce learning experiences dedicated to teamwork and communication in English.

3. Staff

The self-assessment report indicates the recruitment criteria of academic staff working in the "Printing Engineering" study programme of second cycle. The criteria demonstrate competences in the research and subjects matters. The teaching staff of the programme consists of 5 professors, 7associated professors and 2 lecturers, as stated in Table 2.5. Most lectures in the programme have a scientific degree in technologies sciences and almost all of them work in the University. Researchers from other 3 faculties and 1 institute of University are invited to lecture on the programme (§ 75).

The State and University legal requirements of staff are fulfilled.

According self-assessment report, the qualification of the teaching staff is adequate to ensure the intended learning outcomes of the programme.

The number of teaching staff is adequate to ensure learning outcomes. But the ratio between students and teacher number is small, on the average 2 students to 1 lecturer (according Table 2.5).

The staff turnover allows adequate provision of the programme and the staff is sufficiently professionally developed through scientific research, projects and other areas (§ 85–92). The staff turnover during the last years was relatively low with more than 40 % of the teaching staff being above 60 years (§ 84).

According to the report (§ 88–91) the University partly creates conditions for the professional development of the teaching staff necessary for the provision of the programme. For example, during of the interview was informed that teachers of the Department of Printing Machines in 2010 developed their professional skills in courses of teaching information visualization and electronic means using in teaching process which were organised by University. But in other cases continuing professional development has a more individual focus rather than implementation of a whole staff development policy in faculty and department.

The exchange process of lecturers in the programme is not balanced. During assessment period 3 lecturers of the programme visited universities abroad (Table 2.6). But to find the number of foreign teachers those visited the programme is sophisticated. Therefore, in the self-assessment report is given only total number (23) of lecturers (Table 2.7), who visited the Faculty of Mechanics from 2006 to 2012 years period.

The self-assessment report indicates (§ 98) that teaching staff of the programme took part in research related to the programme. Research activity of the department academic staff is related to the subjects of the programme.

It should be noted that in the self-assessment report (p. 34) strengths and weakness of the teaching staff are analysed and planned improvement measures for staff qualification are explained. Therefore, it can be presumed that the Department is knowing the current situation and will carry out some measures for staff qualification improvement.

4. Facilities and learning resources

The Expert Team inspected the facilities and learning resources at the Faculty. The Faculty disposes a number of auditoriums, laboratories. Auditoriums, computerised auditoriums and technical laboratories correspond to the requirements of hygiene and work security, as stated in §100 – 103.

Computerised auditoriums are equipped with an adequate number of computers, including commercial software which is used in different printing companies.

The number and size of specialized laboratories of the Department of Printing Machines are too low and should be increased.

The existing equipment in laboratories is mostly suitable for standard laboratories works, research and test making. More of specialized equipment, newer testing equipment is needed. This is planned, but not present at the moment, except of the new 3D printer. The experts suggested that this may be solved with either redistribution of internal financing or, in addition, with the development of a strategy of services and closer cooperation for research and test of products for enterprises. This would allow gathering more real practice for students and for the Faculty to renew the existing equipment with new one or keep it up to date.

Beside equipment also consumables for technical testing need more funding.

Students practice – arrangements for students practice at different enterprises and institutions around Lithuania are present, but mostly inside the country. The faculty should emphazise participation in the Erasmus mobility programm – it is used not often enough. The experts advise that gathering best experiences from abroad companies would be good practise not only for students.

There is a sufficient number of methodical resources available at the Library and reading rooms, as stated in Appendix 2.4.2. There is a number of practical material in Lithuanian language, a

wider range of newest informations is available through the internet. Access to international databases is present and used, as stated in §116.

E-learning system Moodle is present, but usage of it should be extended, for better communication and news delivery.

5. Study process and student assessment

The requirements to the level of applicants for admission to the second-cycle studies are clearly defined (§129). The Dean's assistant is in charge of admission issues (§147)

Professors and students stated during the visit that students are mainly taught in traditional methods and that group work is hardly taking place although this would be needed to reach the sought learning outcomes.

Students may participate in scientific / research projects if they are taking place in the faculty (§193), but beside a planned project around a 3 D-printer no examples were presented. There are opportunities for students to present their scientific work (§194), e.g. at a student's research conference.

In principle students have the opportunity to go abroad since the faculty participates in Erasmus programmes with many foreign universities (§195). However only 1 student of "Printing engineering" participated in this in the last 5 years - due to language / subject problems (§196). Given the fast international development in the printing sector, this does not seem to be satisfactory.

To ensure an adequate level of academic and social support, the faculty e.g. organises

- "Open Days" and of competition together with Kaunas University of Technology to identify and celebrate the best students (§151);
- A broad offer on the academic (§170-178) and the social (§179-186) side.

The assessment system of students' performance is adequate and publicly available in the module description. Students claim that they get informed in advance on the requirements. The system seems to be a little complicated (see formulas to determine the mark in the module cards and also §155-159), but to be clear.

The professional activities of the majority of graduates meet the programme providers' expectations. There is a long list of graduates working in printing companies (§200), and graduates claim that all their former fellow students also got adequate positions.

6. Programme management

Responsibilities for decisions and monitoring of the implementation of the programme are clearly allocated: at the study programme committee of the department, then the faculty, then the senate (§206).

Information and data on the implementation of the programme are apparently not regularly collected and analysed, although the self-report says so (e.g. §214 – 218), but students do not seem to be aware of online questionnaires or other arrangements of systematic feedback from students and there is – according to the faculty leaders – no systematic survey on the whereabouts of graduates. There is no indication that feedback is systematically collected on single courses. However, graduates are positive that the department takes up feedback from students and works on improvement of the programme.

There is no indication that the recommendations of the assessment of 2006 (Annex 5) or any other evaluation were systematically converted into action. It can be appreciated that in the self-assessment in each chapter a list of strengths and weaknesses is presented. However, too often they do not name specific measures (e.g. the tables in §201 and §243).

In the last section of Annex 7 there is no systematic deduction of measures being derived for previous 2007 evaluation results. Only plans are presented, but there was no evidence that they were actually realised.

To involve stakeholders into the improvement processes, there are social partners and students in the study committee (§207).

In general, there is just limited evidence that the internal quality assurance measures are effective and efficient. Some formalised procedures as quantitative surveys with questionnaires might not be needed since there are only around 10 to 12 students per year, but other forms should be implemented.

III. RECOMMENDATIONS

1. The faculty should develop a vision for the future of the programme - together with social partners, graduates and students - and derive a portfolio of content and improvement action from this. Part of this programme development should be the improvement of students' recruitment to ensure the future existence of the study programme.
2. The faculty should close feedback loops for the programme to assure a continuous improvement process. This would imply an institutionalised process of studies on students' satisfaction, on graduates' professional roles and on the need of employers, with associated improvement suggestions.
3. The learning outcomes of the programme should be revised to be coherent with the programme aims and with the EUR-ACE standards. Specific learning outcomes for project management, leadership, quality management, teamwork and communication in international contexts are needed.
4. The connection with professional practise and new developments in printing engineering should be strengthened, e.g. by attracting more lecturers from industry, carrying out assignments in companies, organising visits, extending periods of practice etc. Theoretical subjects should be closer connected with practical problems of printing engineering (graduates suggested case studies and simulations as possible means).
5. Management qualities (e.g. operational development, quality management) and leadership qualification of the students should be further strengthened due to the leading positions graduates usually obtain. Group work and project-based learning should be more emphasised to support this.
6. Students should be further supported in improving their English (in particular technical English) with emphasis on speaking and writing skills, e.g. by involving more English literature; English lectures assignments and presentations in English etc. Were possible also skills in a second foreign language (German, Russian, French) should be supported.
7. The international orientation of the students should be strengthened, e.g. by more encouragement and support of participation in the ERASMUS programme, periods of practice in foreign countries, visits etc.
8. Education lab facilities should be expanded in size and function.
9. The Department should aim to balance the staff exchange process and promote training of staff in other institutions.

IV. SUMMARY

As main strengths of the programme the evaluation team considered:

- Enthusiastic and loyal students, claiming that they learn to become independent workers
- The trust of the employers that the printing department of VGTU educates and trains the future employees they do need
- Efforts to renew the programme, both in terms of staff and of curriculum
- A recently required 3D-Printer designated to become the nucleus of a number of research activities

As main challenges that require action the evaluation team considered:

- A need to develop a consistent vision for the development direction of the faculty and the department
- Closed feedback loops with students, graduates and social partners
- A revision of the curriculum according to international standards including a further development of the curriculum
- A strong connection with the state of the art and new developments in printing engineering – both for teachers and for students
- A need to further internationalize the programme through exchange and improvement of language skills
- A renewal and continuous development of the staff

These challenges were reverted by the evaluation team into a total of 9 recommendations.

V. GENERAL ASSESSMENT

The study programme *Printing Engineering* (state code – 621H74001) at Vilnius Gediminas Technical 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)	3
6.	Programme management (programme administration, internal quality assurance)	2
	Total:	**15**

*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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