



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Klaipėdos universiteto
PERDIRBIMO PRAMONĖS INŽINERIJOS PROGRAMOS
(621H70007, 62409T104)
VERTINIMO IŠVADOS

EVALUATION REPORT OF
PROCESSING INDUSTRY ENGINEERING (621H70007,
62409T104)
STUDY PROGRAMME
At Klaipėda University

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Perdirbimo pramonės inžinerija</i>
Valstybinis kodas	621H70007, 62409T104
Studijų sritis	technologijos mokslai
Studijų kryptis	gamybos inžinerija
Studijų programos rūšis	universitetinės studijos
Studijų pakopa	antroji pakopa
Studijų forma (trukmė metais)	d studijos (2)
Studijų programos apimtis kreditais	120 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	gamybos inžinerijos magistras
Studijų programos įregistravimo data	Nr. 565, 1997-05-19

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Processing Industry Engineering</i>
State code	621H70007, 62409T104
Study area	Technological Sciences
Study field	Production and Manufacturing Engineering
Kind of the study programme	university studies
Cycle of studies	second
Study mode (length in years)	full time (2)
Scope of the study programme in credits	120 ECTS
Degree and (or) professional qualifications awarded	Master of Production and Manufacturing Engineering
Date of registration of the study programme	No. 565, 19-05-1997

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I. INTRODUCTION

Klaipeda University (KU), established on 1991, offers a second level university study programme on **Processing Industry Engineering** since 1997, when it was developed in the Faculty of Marine Engineering according to the needs of Klaipeda region. The curriculum has been redesigned in 2011 after a national evaluation took part in 2008. It was recommended to the University to supplement the graduate study programme of Processing Industry Engineering with subjects complying with the title of the study programme; to regulate Master students' research by designing respective academic subject syllabi; and to look for opportunities to expand and update laboratories. The Master-programme lasts 2 years and is equivalent to 120 ECTS credits.

This written evaluation is based on the content of self-assessment report made by the self-assessment team of the Master's Programme in **Processing Industry Engineering**, and on the observations of the discussion carried out during the visit at Klaipeda University (KU) on March 22, 2012.

This evaluation has been performed in subsequent stages:

1st Reviewing the supplied documents and writing a draft evaluation report. These drafts have been read and discussed by all members of the accreditation team before the audit at the university took place. This work started in February and was finalised by the end of April 2012.

2nd Interview with administrative staff, programme organizers, teaching staff, students, graduates and employers on March, 22nd at KU. The audit team enjoyed the very good preparation of this meeting as well as the open and informative atmosphere provided by KU. The first conclusions have been reported to the stakeholders at the end of this day.

3rd Overall discussion on all evaluated study programmes on March 24th and writing the final report by the expert in the field of studies, which has been reviewed by all members of the audit team.

4th A summary report of the impressions of the audit team obtained for all study programmes evaluated during their one week stay and their general recommendations, especially with regard to the structure of the master programmes has been written. The reader is kindly referred on this annex in addition.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

Programme of **Processing Industry Engineering** gives degree of Master of Production Engineering, taught at Faculty of Marine Engineering, more specifically at Mechanical Engineering Department. It supports development of the country according to Long-Term Strategy of Lithuanian Economy until 2020, and is in agreement with regional policies. The aims and learning outcomes of the programme have been well described and categorized in the self-assessment report of KU.

The developed programme aims are typical to Mechanical Engineering Master's level education with strong accent to processing and handling of bulk materials. Integration of potential students in different fields of engineering (e.g., Chemical Engineering, Materials Engineering) has been achieved. Students, graduates and employees agreed that the aims of the programme meet at least local requirements for this second level university programme. The graduates are employed in major Lithuanian companies; there is increasing need for graduates due to development of the *Baltic Sea Valley*. However, if to consider **Processing Industry Engineering** study programme, then learning outcomes are more inclined towards materials engineering than processing/technologies. As the processing industry engineering will be a prioritized engineering category also in Horizon 2020 strategy (while it was not outlined in 7th

Framework Programme), the importance of the study programme to EU and Lithuania is growing.

The expected learning outcomes have been described in detail on the basis of four categories as knowledge, cognitive understanding, and practical abilities on special skills, and transferred (general) abilities. The learning outcomes are missing with regard to Bloom's taxonomy categories as synthesis and evaluation, which are essential for scientific oriented Master programmes.

The plain name of programme in English without additional explanation is confusing for foreigners, but also for students searching corresponding international exchange programs; in future perspective broader *Industrial Engineering* with specialization in *Process Engineering* should be considered.

2. Curriculum design

The curriculum design meets legal requirements, set by the Ministry of Education and Science for the second cycle study programme. It consists of 120 ECTS credits, from which 51 ECTS are directly related with research. Thus it provides a broad and high level education in mechanical engineering equivalent to level VII of the European Qualification Framework. 30 ECTS dedicated for the final thesis.

The number of study subjects does not exceed 5 courses per semester. The study modules are divided equally between three terms, leaving the last semester for thesis preparation. There are four elective courses, but a student can pass the programme without selecting any of them. In this case the business and social sciences subjects of curriculum remain uncovered. There are no free studies foreseen, which is limiting the development of students and is a restrictive factor in student exchange. Some subjects are not on level of Master's studies (e.g., "Numerical Engineering Methods"), but in case of 4 years Bachelor's studies students should be already acquainted with these.

The course names fit well, but often the courses are more inclined towards Mathematics and Materials Engineering than *Processing Industry Engineering* by content. There is certain improvement, as alumni claimed need for packaging technologies, then "Packaging Technologies and Equipment" is attached into programme. "Research basic" has national nature, but it needs to be more global – in research, and especially in processing industry engineering would be recommended to suggest English study materials, and one of the most used in universities is "How to Write and Publish a Scientific Paper" by Robert A. Day and Barbara Gastel.

There is any course taught in English to support advancement in academic English language; however the region is one of the most internationalized in Lithuania due the Klaipeda Sea Port, *Baltic Sea Valley*, and several large international enterprises in the area. Alumni pointed out importance of English language in their engineering career. There could be optional technical/academic English classes in study programme.

The programme does include advanced processing industry engineering related technologies, from engineering side "Computerized Machine Control Systems" fits well for the achievement of the intended learning outcomes. At the same time the curriculum includes several modern materials engineering related courses e.g. "Tribology", "Rheology", "Composite Materials Manufacturing Technologies and Research". All these demand strong laboratory base either in university or co-operative industry.

"Logistics and Administration" is elective course only, and there is no reasoning why it does not cover supply chain management and ERP systems, essential for modern processing industry engineering, especially at important international seaport region as Klaipeda. Study visits to the companies in terms of course subjects or engineering practice would improve the study programme.

The programme design appears to be oriented on the academic research but gives less to national labour market. The programme includes study modules of “Research” 1-3 targeted to independent scientific research for industry of Western Region of Lithuania. In practice, the research topics were often not related with processing industry needs, but research topics of academic staff members, mostly materials engineering and machine dynamics.

3. Teaching staff

The teaching staff meets legal requirements. The lecturing are held by 10 people, who are experienced in academic teaching and have PhD degree, including 4 professors. The number and qualification of staff members is adequate, and teaching load is spread evenly. The research fields of teaching staff are mostly to general mechanical engineering or materials engineering. The experience in evening studies has long tradition, and staff members are used to it. On the other hand, evening classes allow teaching staff (but also students) at daytime deal with scientific research projects. Several industrial leaders are alumni of the curriculum, but the research projects of students are not always connected with industry. Therefore academic staff members have often offered own research topics and encourage students towards academic research career.

As scientific activity the Faculty of Marine Engineering holds a biannual national scientific conference Technological Research in Western Lithuania, providing forum for students, academic staff members and industry specialists. Industry is helping in university research by providing research topics only in a small amount today, but there is positive trend. As laboratory equipment has been updated the interest of industry is growing. Staff members have adequate selection of software for own research. Currently there are two PhD students involved in Master studies as teaching staff.

The university has a limited support to scientific visits of academic staff members, at the same time MSc students have compulsory conference presentation during studies. The teaching staff of programme is also succeeded to keep balance between processing industry engineering related applied research projects and long-term scientific research. On Professors’ level the participating scientists have been recognized as experts at the international scene, but younger staff members have less international publications. The academic mobility is used every year, but not by all academic staff members. However, there is positive trend in academic staff members’ mobility.

4. Facilities and learning resources

The premises for study process have been improved and facilitate the amount of students. The study process is organised mostly as evening classes to allow students keep daily jobs at enterprises.

The equipment and software of classrooms, computer labs etc. has been improved significantly, and there is clear progress in updating laboratory equipment. The provided equipment is serving also processing industry needs and there is evidence of increasing links between university and industry. However, the upgrading of laboratories was not finished for the time of evaluation.

The library units are well equipped with related textbooks and specific scientific journals. Library collections and databases are also accessible through computer network to students and academic staff members. The library participates in development of national integrated academic electronic library. Additional course specific material has been worked out from the academic (in Lithuanian language). However, students are not completely satisfied with existing study

materials and literature. They found the textbooks too difficult to study; there is not enough literature in Lithuanian language. The students are not satisfied that lecturers do not provide them with the material to study from. In their opinion, it would be much easier if they could use distance (e-)learning instead of attending the purely theoretical lectures.

5. Study process and students' performance assessment

During 2010-2011 were defended 8 Master theses (graded 10-8). The topics are more manufacturing engineering related (vibration analysis, wear, friction, rapid prototyping, bearings durability, corrosion resistance) and less process-oriented (share of bulk matter, gas materials metering). The admission requirements are well founded and all students admitted during the period 2005-2011 were students with good or average grades from their Bachelor studies. The Bachelor degree has to be from technological area. Although, the number of applicants in 2011 is very small – were admitted 6 students.

It is a full-time study programme, mostly all of the students are working, and it is the reason of the big drop-out. However, from students' point of view, drop-outs are caused by the lack of motivation. All of the students are studying in state-supported place. Generally, the students found this programme interesting and important for their work.

Students are encouraged to participate in research activities predominantly in choosing the themes for their master theses within the staff research and project activities. They also take part in conferences such as "Works of Technology Science in Western Lithuania". Students know the requirements from the industries for their research theme and they try to connect them with their future career.

Student mobility is low, both with regard to outgoing and incoming students. At the site visit the students explained that the subjects of the study programme did not fit to study programmes in foreign universities. Another reason is their employment in Lithuania. As students work daily, they were afraid to lose the job. There was mentioned also, that difference in study programme compared to similar programmes abroad is making fitting Erasmus studies difficult.

Students are not motivated to orient into scientific career due to low salaries in universities compared to industrial sector. The financial support system is well founded. Klaipeda University has a Career Centre that aims to help university graduates to successfully integrate into professional and social activities. Also graduate students can work at *Baltic Sea Valley* as University cooperates with it.

Students are well informed about the assessment methods and are content with their implementation. The arrangements for preparing and presenting the final theses for examination are clear and rigorously followed. One graduate is proceeding in Doctoral studies and manages well.

Graduates as well as employees interviewed during the audit session declared that the study programme meets the local market requirements. Graduates suggested including additional micro and macro economy subjects.

6. Programme management

The MSc programme is managed by Faculty of Maritime Engineering. The Mechanical Engineering Department in this has a long-term experience of study organization. The development of programme is well aligned with development of *Baltic Sea Valley*. New campus is planned in 4-5 years perspective. Half of the university council members are from industry, supporting also the university facilities development. Foreign students are expected to bring in terms of internationalisation. The study programme related laboratories are also foreseen into *Baltic Sea Valley* facilities. *Baltic Sea Valley* project has been integrated be lead of Vice Rector

of International Relations. There is good cooperation with other universities in terms of e-library development and doctoral studies.

However, the management cooperation with alumni is unstructured. The number of students is low despite integration of both Mechanical and Chemical Engineering. Industry's input into research projects remains low.

III. RECOMMENDATIONS

The name of the study programme in English is not clearly understandable, other alternatives as "Industrial Engineering" or "Process Engineering" instead would make it more appropriate. This opinion of the expert team has been underlined by the response of students and graduates as well as prospective employers during their interview sessions.

The level of English language teaching should be increased as region is related with international harbour services and processes. In order to approach European standards, teaching language should be switched to English. By that the programme would also be more attractive for students from abroad. Optional "Academic English" could be included into study programme. The course "Research Basic" should be taught in English.

There are missing free studies in the study programme. It is recommended to include at least 5 ECTS free studies into curriculum to enhance student exchange and student's personal development.

The elective courses are not integrated into study plan. This must be changed, as workload for evening classes grows otherwise too extensive. Some elective courses are necessary for Master's education, e.g. "Logistics and Administration" should be compulsory course not elective.

It is recommended to add a course of Entrepreneurship and Innovation to enhance synthesising and evaluation of different approaches to entrepreneurship. It also has added value in terms of Bloom's taxonomy.

Study programme should include Engineering and Management Praxis, at least 2 ECTS, and also site visits to enterprises are needed. If students are working daily, their processing industry engineering related work can be taken into account in terms of filling up curriculum.

The management support to distance (e-)learning (e.g. by Moodle) should be increased, thus students could retain quality in otherwise heavy contact hours workload at evening classes.

Teachers should be encouraged to participate in international mobility programmes with provision made for longer visits (3 to 6 months) which will allow the participant time to absorb the latest technological developments and participate in the research in host institutions to the benefit of their own research on return to Lithuania.

Academic staff should engage more with the international community by attending international conferences and publishing in the top international journals in their field.

More students should be encouraged to participate in international mobility programmes by expanding the range of optional subjects, making it easier for them to find appropriate study subjects in host institutions.

A strategy should be devised to arrest the decline in the number of students admitted to the programme including, maybe, increasing the number of state-funded places.

IV. SUMMARY

A 2nd level university study programme with high potential for research in a future oriented field has been analyzed. Essential progress has been made for renewal of laboratory equipment and the curriculum is supported by *Baltic Sea Valley* national programme. The study programme is consistent and in agreement with local legal rules.

The name of the programme in English does not precisely describe the content; change of the name could attract the students by the real contents of the studies and also provide potential employers and collaborators from industry with a recognizable brand.

The content of the master programme is driven rather more from local industrial demand than from international scientific trends. As most of the students are employed for fulltime jobs in industry and the study programme is performed in evening classes.

The audit team recognized similar deficiencies in all master programmes evaluated during their one week work at different universities all over Lithuania. The needed measures described above require of course long lasting processes. Nevertheless, the experts concluded to suggest a limited accreditation for three years only in order to observe, if necessary decisions have been made and the process for change has been initiated.

4.1 Programme aims and learning outcomes

Strengths:

University of Klaipeda is the only university in Western region of Lithuania preparing graduates in mechanical engineering field. There is growth of the industry and shortage of engineers in processing manufacturing sector (mainly large and service-oriented enterprises). The study programme addresses a real on-going need of providing manpower to fill vacancies in companies in the general engineering sector of the Lithuanian economy. Therefore graduates are very likely to find employment. The skills set also means that graduates have a wide range of employment opportunities. Beside mechanical engineering, which accumulates largest part of the subjects, technological side of the programme also includes chemical engineering and materials engineering.

Weaknesses:

The title of the programme in English (*Processing Industry Engineering*) does not fully describe the curriculum and the specialisation of the graduates in their final Master papers. Therefore consideration should be given to changing the title and orient it more towards industrial engineering or process engineering. The name of the programme in English is also confusing and makes students difficult to find suitable exchange programmes (in terms of Erasmus). Learning outcomes are not analyzed in categories of synthesis and evaluation.

4.2 Curriculum design

Strengths:

The main strength of the curriculum design is its integrative nature in engineering.

Requirement for students to publish a scientific paper from their research, strong emphasise onto scientific research.

Weaknesses:

The main weakness of the curriculum is rigid structure (no free studies or engineering practice, elective studies are not counted into the minimal needed part of the curriculum), causing overload of this Master programme and dropout of students.

4.3 Teaching staff

Strengths:

Main strength of the staff is its readiness in preparing nationally competitive graduates which are able to develop bulk material processing technologies on evening studies basis.

All teachers are well qualified, sufficiently experienced and meet the qualification requirements.

Weaknesses:

The main weakness of the teaching staff: professors, associate professors and lectures are their lack of scientific work in the field of *Processing Industry Engineering*. Reluctance of teachers to participate in international mobility programmes such as Erasmus. Insufficient participation in international conferences and publication in top international journals.

4.4 Facilities and learning resources

Strengths:

There are adequate lecture rooms, developing laboratories and good library facilities, also some good materials engineering devices and facilities suitable for engineering education. There is long-term strategy to modernize the laboratory equipment and facilities.

Weaknesses:

Some equipment used in the study process is generally very modest; the renewal of laboratories is still in process.

Incomplete implementation of the virtual learning environment (Moodle)

Outdated learning material provided by some teachers

4.5 Study process and student assessment

Strengths:

The students are satisfied with Master's programme.

Best students get state financed places.

High employment rates of graduates

Weaknesses:

The university suffers a continuous decrease of admitted students.

Voucher system limiting number of state-financed places.

Low take-up of mobility programmes

Foreign universities curricula differ from the Processing Industry Engineering curriculum.

Erasmus study courses is difficult to take into account due missing free studies possibility.

4.6 Programme management

Strengths:

There is a well organized programme management and clear progress on the ongoing improvement process. Good cooperation with *Baltic Sea Valley* project.

Weaknesses:

Decline of the number of students is stated by the administration but appropriate measures are not planned. Cooperation with alumni is unstructured.

V. GENERAL ASSESSMENT

The study programme *Processing Industry Engineering* (state code – 621H70007, 62409T104) of Klaipeda 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	3
2.	Curriculum design	2
3.	Teaching staff	3
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	3
6.	Programme management	3
	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.

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