



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

**Vilniaus Gedimino technikos universiteto
MECHANIKOS INŽINERIJOS PROGRAMOS
(612H33001, 61209T104)
VERTINIMO IŠVADOS**

**EVALUATION REPORT
OF MECHANICAL ENGINEERING (612H33001,
61209T104)
STUDY PROGRAMME**

at Vilnius Gediminas Technical University

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Išvados parengtos anglų kalba
Report language - English

Vilnius
2012

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Mechanikos inžinerija</i>
Valstybinis kodas	612H33001, 61209T104
Studijų sritis	technologijos mokslai
Studijų kryptis	mechanikos inžinerija
Studijų programos rūšis	universitetinės studijos
Studijų pakopa	pirmoji
Studijų forma (trukmė metais)	nuolatinė (4)
Studijų programos apimtis kreditais	240 ETCS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Mechanikos inžinerijos bakalauras
Studijų programos įregistravimo data	2002-06-14, No 1093

INFORMATION ON ASSESSED STUDY PROGRAMME

Name of the study programme	<i>Mechanical Engineering</i>
State code	612H33001, 61209T104
Study area	technological sciences
Study field	mechanical engineering
Kind of the study programme	university studies
Level of studies	first cycle
Study mode (length in years)	full time (4)
Scope of the study programme in credits	240 ETCS
Degree and (or) professional qualifications awarded	bachelor of Mechanical Engineering
Date of registration of the study programme	14/06/2002, No 1093

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The Centre for Quality Assessment in Higher Education

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I. INTRODUCTION

External evaluation of Mechanical Engineering bachelor study programme at Vilnius Gediminas Technical University has been analysed by an international expert group consisting of dr. Joerg Longmuss (team leader), prof. dr. Jukka Matias Ahokas, prof. dr. Franco Bernelli, assoc. prof. dr. Sergey Shaposhnikov, assoc. prof. dr. Kazimieras Juzėnas and student Martynas Ubartas through analysis of the self-evaluation report and meeting with the administrative staff of the Faculty of Technology, the group of preparation of the self-evaluation report, teaching staff of the study programme, recent student of the programme and graduates and their employers.

Expert group has analysed the programme aims and teaching outcomes, curriculum of the programme, quality assurance (management) of the programme, study process, staff and other peculiarities.

The group of experts has found also that engineering studies are lacking good image in Lithuania and that impacts both quality and quantity of mechanical engineering students.

The previous external evaluation of mechanical engineering bachelor study programme was carried out in 2008. One of the most important aims of the recent evaluation was to assess changes made in accordance with the remarks and recommendations of previous evaluation. This assessment was very useful for evaluation of the tendency and rate of changes in the university and programme and foreseeing future possibilities.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

Statements on evaluation of programme aims and learning outcomes according to the following criteria:

The programme aims and learning outcomes are clear. However study aims and outcomes in chapter 2 and table 3.2 of the self-evaluation report are different (SG and BG parts), for egz. Chapter 2 defines SG aim: SG1. *“Skills to perform specialized research in order to develop new knowledge and techniques, and integrate knowledge from different fields as well as interpret data”*, and the aim in table 3.2 is *“SG1. Ability to analyze and design systems of machines and mechanisms applying CAD/CAM; to analyze the production process, select materials the necessary equipment used in manufacture, to carry out engineering calculations of mechanical systems”*, or a presented BG6 aim *“BG6. Ability to maintain professional competence through lifelong learning.”* does not appear later in explanatory table. Task T2 (*“T2. To provide a theoretical framework for the profession and the work necessary to forming engineering and practical skills, such as collecting and educating the ability to analyze and understand the information related to the field of mechanical engineering, identifying problems, learning how to work with machines and mechanisms for measuring systems, equipment, methods as well as assessing the key parameters of mechanical systems”*), outcomes Z3 *“Z3. Humanities and social sciences, and engineering activity required for development of erudition and philosophical outlook.”*, Z4 *“Z4. General knowledge necessary for science technology, engineering and biomechanics”*, SG2, *“SG2. Skills to program and operate independently new programming languages and software*

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packages.”, SG10 “*SG10. Design and operate various mechatronic devices and systems as well as computerized engine management systems*” are presenting quite specific tasks (e.g., knowledge of biomechanics) that are not general for bachelors of mechanical engineering. Outcome BG2 “*BG2. Abilities to work in a team, communicate with colleagues and specialist in adjacent fields, and be in charge of others work.*” And BG4 “*BG4. Abilities to work group to communicate with colleagues and experts in related fields, to be a leader and a reasoned defense of his position.*” and BG4 repeat each other. Detailed module description is available just for university members; the public has access only to short versions.

- Generally, the programme aims and learning outcomes are based on the academic and professional requirements, public needs and the needs of the labour market as they have been stated by graduates and employers.

- The programme aims and learning outcomes are consistent with the type and level of studies and the level of qualifications offered as they comprise common standards for a bachelor degree at the European level, e.g. they coincide basically with the EUR-ACE criteria.

- The name of the programme, its learning outcomes, content and the qualifications offered are compatible with each other since they represent what is commonly understood as “Mechanical Engineering” at the bachelor level.

- The group of experts included and analysed the aspects of scientific research as an important part of study aims and outcomes. It has to be stated for the bachelor program in Mechanical Engineering, referring to the self-evaluation report and meetings during the visit, that the level of students’ involvement into research as a practical aspect of engineering is weak and should be improved.

2. Curriculum design

Statements on evaluation of curriculum design according to the following criteria:

- The curriculum design basically meets the requirements for the first level studies, set by the Ministry of Education and Science. The total volume of the programme is 240 ECTS, the number of credits dedicated for the general university subjects is 15 ECTS, subjects of study field consist of 187 ECTS, including 15 ECTS dedicated for practical training. However, it is stated that the volume of specializations subjects is 30 credits (in table 3.1 it is stated “at least 60 credits”), but 8 credits of free choice subjects are calculated into this volume. This seems questionable. Also it is stated that students in some cases may choose 2 free choice subjects in the same semester, but the total number of subjects per semester will exceed 7 in such case (which appears a minor problem).

- Study subjects and modules seem to be spread evenly and their themes may not be repetitive. However, the presented descriptions of subjects do not present the full list of themes. At least in the English version of module descriptions there is sometimes a different understanding of the topics and some are not filled in appropriately / completely.

- The content of the subjects and modules is generally consistent with the type and level of the studies; with the same remark as above. The international activities of students are rather limited.

- The content and methods of the subjects/modules are generally appropriate for the achievement of the intended learning outcomes; with the same remark as above. There are some inaccuracies in the Z5 part of table 3.2. The general skills are frequently unclear or not related to content / learning form of the course. General skills like “team work” are described as “foreseen outcomes”, but not included into the evaluation criteria. Due to time constraints it could not be clarified how interactive learning and problem / project learning take place in practice.

- The content of the programme generally reflects the latest achievements in science and technologies; with the same remark as above. However, the curriculum seems more orientated towards a scientific career while students, graduates and employers, as well as staff of the faculty stated that the programme aims to prepare employees for industry. Both students and employers see a lack of practical skills.

3. Teaching staff

Statements on evaluation of teaching staff according to the following criteria:

- The study programme is provided by the staff meeting the legal requirements. More than 50 percent of teachers hold a scientific degree, out of 74 teachers there are 14 professors teaching at the programme, also, other teachers have a sound pedagogical experience.

- The qualifications of the teaching staff are generally adequate to ensure learning outcomes, although for many teachers no international activities are documented.

- The number of the teaching staff with a present student / teacher ratio of 5.5/1 and student / Professor ratio of 20/1 is adequate to ensure learning outcomes.

- The teaching staff turnover is basically able to ensure an adequate provision of the programme. Average age of teachers is quite high. 21 out of 68 presented teachers are beyond the retirement age, 5 of them even above 70. There was a number of younger professors hired in the last years and the department has a considerable number of doctoral students. Therefore it can be expected that the situation will improve in the future.

- The higher education institution creates conditions for the professional development of the teaching staff necessary for the provision of the programme, as they have e.g. opportunities to participate in European exchange programmes or industrial attachment.

- For most of the teaching staff in natural sciences and engineering involvement in research directly related to the study programme is stated in the list of teachers provided by the faculty.

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4. Facilities and learning resources

Statements on evaluation of facilities and learning resources according to the following criteria:

- The premises for studies (classrooms, libraries etc.) are adequate both in their size and quality as far as it could be determined during the visit.

- The teaching and learning equipment (laboratory and computer equipment, consumables) are adequate in size and number. The laboratories are well equipped for basic knowledge of mechanics. However, they are (except the CNC-laboratory including corresponding IT equipment) very limited regarding advanced engineering.

- It could not be clarified to which extent the higher education institution has adequate arrangements for students' practice; however this does not seem to be a severe problem, since most of them do already work in the engineering field before the end of their studies.

- Teaching materials (textbooks, books, periodical publications, databases) are adequate and – according to the students – sufficiently accessible.

5. Study process and students' performance assessment

Statements on evaluation of study process and student assessment according to the following criteria:

- The admission requirements are well-founded. However these initial requirements do not secure motivated students since – according to staff, students and graduate – many applicants do not opt for engineering as their first choice.

- The organisation of the study process ensures an adequate provision of the programme and the achievement of the learning outcomes. Graduates and employers are satisfied with the theoretical level of the programme. Practical preparation apparently needs development.

- Students are encouraged to participate in research and applied research activities as far as these take place at all.

- Students have opportunities to participate in student mobility programmes, although the English language courses apparently do not prepare them adequately for this. It was not clear whether the students receive enough encouragement in the first years of their study, later an additional obstacle is that they are usually already working.

- The higher education institution ensures an adequate level of academic and social support.

- The assessment system of students' performance is clear and adequate. Its public accessibility seems limited, comprehensive descriptions of subjects seem to be inaccessible from outside of university.

- Professional activities of the majority of graduates meet the expectations of programme providers and employers. However, students also mentioned that there is lack of Professional orientation, students are not well informed about their career possibilities

6. Programme management

Statements on evaluation of programme management according to the following criteria:

- Responsibilities for decisions and monitoring of the implementation of the programme are allocated. However, there is apparently a lack of a common vision and a faculty strategy towards future engineering and its teaching; including the determination of long term objectives and a systematic involvement of students, graduates and employers.

- It was stated that information and data on the implementation of the programme are regularly collected and analysed, but there was no evidence presented on how this takes place in detail. There is no mechanism established to secure that the credit points (including the hours of students' independent work) stated in the study plans are corresponding to the real work load.

- The outcomes of internal and external evaluations of the programme do not seem to be systematically used for the improvement of the programme. There was e.g. no strategy visible to reduce the very high dropout rate of students.

- Most recommendations of the previous evaluation were implemented. Training of practical engineering skills still is claimed to be insufficient by students and graduates. The provision of knowledge of the foreign languages, especially English, seems not to have improved.

- The evaluation and improvement processes partly involve stakeholders. Particularly students do not seem to be involved rather formally than practically.

- The internal quality assurance measures are to a certain extent effective and efficient. In the responses of employers and graduates, all employers were satisfied with the level of preparation of graduates. Students were however e.g. critical about some courses not being up to date and about poor and outdated laboratory equipment. There was apparently improvement on this in some aspects but no general strategy was presented.

III. RECOMMENDATIONS

- 3.1. Development of a faculty strategy towards teaching future engineering
- 3.2. Encouragement of international activities (ERASMUS, international projects etc.)
- 3.3. Introduction of more practical tasks from industry into courses and final works
- 3.4. Presentation of possible application / employment areas of course content to the students
- 3.5. Considering starting in semester 1 with at least one engineering subject to raise students' motivation.
- 3.6. Giving students feedback on the results of their course evaluation

IV. SUMMARY

Main Strengths

Programme aims and learning outcomes

- Graduates and employers state that programme aims and learning outcome are according to public needs and the needs of the labour market

Curriculum design

- Good theoretical knowledge of graduates

Teaching staff

- The renewal of teaching staff is under way with several young and motivated teachers

Facilities and learning resources

- The laboratories are well equipped for basic knowledge of mechanics
- There are two laboratories for advanced engineering: robotics and a full cycle of manufacturing (3-D software, software to turn this into production data and CNC-machines to manufacture work pieces accordingly), although it became not clear to which extend they could be used by bachelor students

Study process and students' performance assessment

- Students feel they are listened to individually

Programme management

- Good relations with graduates and employers (high programme image among them)

Main Weaknesses

Programme aims and learning outcomes

- Students claim not to receive a direct impression of practical engineering work in industry

Curriculum design

- Students and employers claim a lack of practical skills
- Little international activities of students

Teaching staff

- Average age of teachers is quite high. 21 out of 68 presented teachers are beyond retirement age, 5 of them even above 70.

Facilities and learning resources

- There are far too little laboratories equipped with modern engineering technology

Study process and students' performance assessment

- Language teaching (English): Although students claim a very high work load in this subject, many are not able to communicate orally
- According to students and graduates, too few teaching approaches support practical engineering skills

Programme management

- The quality of the English version of the Self Evaluation Report and the accompanying documents is not acceptable
- Lack of a common vision and a faculty strategy towards future engineering and its teaching
- No strategy was presented to reduce the high dropout rates
- Students are not always involved into a systematic development and improvement of the study programme

V. GENERAL ASSESSMENT

The study programme *Mechanical Engineering* (state code – 612H33001, 61209T104) of 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	3
2.	Curriculum design	3
3.	Teaching staff	3
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	3
6.	Programme management	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.

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