



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus Gedimino technikos universiteto
STUDIJŲ PROGRAMOS
ŠILUMOS INŽINERIJA (valstybinis kodas – 621E31001)
VERTINIMO IŠVADOS

EVALUATION REPORT OF
THERMAL ENGINEERING (state code – 621E31001)
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	<i>Šilumos inžinerija</i>
Valstybinis kodas	621E31001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Energijos inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (1,5 metai), iššęstinė (2 metai)
Studijų programos apimtis kreditais	90 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Šiluminės energijos inžinerijos magistras
Studijų programos įregistravimo data	Lietuvos Respublikos švietimo ir mokslo ministro 2007 m. vasario 19 d. įsakymu Nr. ISAK-225.

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Thermal Engineering</i>
State code	621E31001
Study area	Technological Sciences
Study field	Energy Engineering
Type of the study programme	University studies
Study cycle	Second
Study mode (length in years)	Full-time studies (1,5 years), part-time studies (2 years)
Volume of the study programme in credits	90 ECTS
Degree and (or) professional qualifications awarded	Master of Thermal Engineering
Date of registration of the study programme	19 th February 2007, under the Order of the Minister of the Ministry for Education and Science of the Republic of Lithuania No. ISAK-225.

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I. INTRODUCTION

1.1. Background of evaluation process

The evaluation of on-going study programmes is based on the **Methodology for Evaluation of Higher Education Study Programmes**, approved by the Order No 1-01-162 of 20th December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter, SKVC). Evaluation is intended to help higher education institutions to constantly improve their study programmes and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: 1) *self-evaluation and the Self Evaluation Report prepared by a Higher Education Institution (hereafter, the HEI)*; 2) *a visit of the Review Panel at the higher education institution*; 3) *preparation of the evaluation report by the Review Panel and its publication*; 4) *follow-up activities*.

On the basis of the study programme external evaluation SKVC takes a decision to accredit the study programme either for 6 years or for 3 years. If evaluation of the programme is negative such programme is not accredited.

The programme is **accredited for 6 years** if all evaluation areas were evaluated as “very good” (4 points) or “good” (3 points).

The programme is **accredited for 3 years** if none of the areas was evaluated as “unsatisfactory” (1 point) and at least one evaluation area was evaluated as “satisfactory” (2 points).

The programme is **not accredited** if at least one of evaluation areas was evaluated as “unsatisfactory” (1 point).

1.2. General

The application documentation submitted by the HEI follows the outline recommended by SKVC. Along with the Self Evaluation Report and Annexes, the following additional document has been provided by the HEI after the site-visit:

No.	Name of the document
1.	The second cycle study programme of Thermal Engineering: study field subjects, conducted by professors

1.3. Background of the HEI/Faculty/Study field/Additional information

Vilnius Gediminas Technical University (hereafter, VGTU) is a state higher education institution, established by the Seimas of the Republic of Lithuania. The Self Evaluation Report (hereafter, the SER) states “VGTU is one of the largest higher education institutions in Lithuania and strives to become the leader in technology and engineering studies in the Baltic States. The aim of Vilnius Gediminas Technical University is to educate highly trained, creative and socially active specialists, who would be able to successfully perform in Lithuanian and foreign labour and research markets”, and that “The most important scientific study and research division is the department. The department shall independently solve any research and studies-related tasks set by the University and the Faculty”. There are ten faculties at the University overseen by a management structure reporting to the Rector who is assisted by four Vice-Rectors and the Chancellor. The Rector is in charge for the University activities and performance results. The management collegial bodies, the Council and the Senate, appoint and oversee the work of the Rector who formulates the University’s vision and strategic plan. The Council is responsible for securing support for the University and approving the budget and other financial and strategic activities. The Senate is a collegiate body formed from the University staff and oversees implementation of the study programmes. The management structure of the University is similar to that in most European universities.

The *Faculty of Environmental Engineering* comprises seven departments and four scientific divisions. The second cycle programme in *Thermal Engineering*, considered in this report, is carried out by the *Department of Building Energetics* within the Faculty. The programme was reviewed in 2009 and was accredited until August 2015.

The programme is designed to serve the needs of the labour market in Lithuania in the energy demand sector, with particular emphasis on building energy demand. The Panel was able to find out that there is a need for graduates in this field, which was demonstrated by engagement of students in jobs related to their field of study while performing their studies and staying in the sector after graduation.

In general, the SER is comprehensive and detailed. It gives a detailed description of the University structure and the Programme, but provides relatively little critical “evaluation”. It tends to often show compliance with legal requirements and University regulations rather than assess the quality or discuss the situation. Occasionally, the SER states that requirements are met without

specifying evidence. The report also attempts to show that the recommendations from the previous external evaluation were addressed.

The present report does not repeat or summarise publicly available information available from the SER; comments are made here if the Panel disagree or do not fully understand certain statements or if weaknesses of the SER are detected.

In addition to the second cycle programme in *Thermal Engineering* discussed in this report, the Panel has reviewed two other programmes carried out at the same Department; the second cycle programme in *Energy Engineering and Planning* and the first cycle programme in *Building Energetics*. Certain meetings were common for the three programmes and thus the reader will find a number of identical or quasi-identical sections in the three corresponding reports.

1.4. The Review Panel

The Review Panel was composed according to the *Description of the Review Team Member Recruitment*, approved by the Order No 1-01-151, 11/11/2011 of the Director of the Centre for Quality Assessment in Higher Education. The visit to the HEI was conducted by the Panel on 01-02/12/2015.

1. Prof. Abdalnaser I. Sayma (Chair of the Team)

Professor of Energy Engineering, and Associate Dean for Postgraduate Studies at the School of Mathematics, Computer Science and Engineering, City University London, United Kingdom.

2. Prof. Zbigniew Hanzelka

Director of the Department of Power Electronics and Energy Control Systems at the AGH University of Science and Technology, Poland.

3. Prof. Frank Behrendt

Professor for Energy Process Engineering and Conversion Technologies for Renewable Energies at Berlin Institute of Technology (TU Berlin), Germany.

4. Dr. Thomas Flower

Dean of Faculty at the UAS Hamburg, Faculty for Engineering and Computer Sciences, Germany.

5. Dr. Ramūnas Gatautis

Research Associate at Lithuanian Energy Institute, Lithuania.

6. Mr Giedrius Gecevičius

Doctorate Candidate (Energy and Power Engineering) at Lithuanian Energy Institute, Lithuania.

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

Fourteen intended learning outcomes are listed in the SER with many of them being of too generic nature and only some being a bit more specific in the special skills section. While this may reflect certain settings made by the University, at least a more specific subset of intended learning outcomes reflecting the focus of this study programme should be defined. On the website¹ the role of the study programme is defined as resulting in degree holders being able to work in institutions related with systems of sustainable supply and consumption of energy, first of all heat, the main activities of which are design, consulting, teaching and research. **Here again, the description is too general in nature when compared with the study programme itself, which is very much focussed on energy conversion aspects closely related to buildings.**

The SER gives a clear outline of the current and to be expected demand for the near future in the Lithuanian and European energy sector with respect to scientifically trained graduates from universities. A strong focus of the study programme is put on energy efficiency in the building sector combined with a shift away from fossil energy sources to renewable ones. The continuously changing technological situation in this field results in potential employers looking for graduates from universities being not only well trained in the current state-of-the-art but also being capable of dealing with these changing challenges at their future workplaces. This study programme aims at creating graduates being up these tasks.

The name of the study programme *Thermal Engineering* does not fully reflect its content in the best possible way. The current title could be interpreted in various ways not necessarily related to buildings, but also to power plants and its components. The focus on energy supply to buildings should find its way into the name.

2.2. Curriculum design

The study programme does exist in both a three and a four-semester variant designated as full-time and part-time mode, respectively. The shorter version aims at full-time studying students while the longer one would be more suitable for students working full-time. The legal requirements as set out in the Order of the Minister for Education and Science of the Republic of Lithuania “General Requirements for Master Degree Study Programmes” (3 June 2010 No V-826) are

¹ <https://medeine.vgtu.lt/programos/programa.jsp?fak=3&prog=113&sid=I&rus=U&klb=en>

fully met for both versions of the programme. Both variants comprise 90 ECTS of which 55 ECTS are in the field of study. There are 5 ECTS of (two offered) elective subjects and the final thesis amounts to 30 ECTS. There is an inconsistency between Table 3.1 in the SER and Annex 3.1 to that document insofar, that in Table 3.1 the sum of the ECTS is 120 while in Annex 3.1 (as discussed above) both variants of the programme are listed with 90 ECTS. Table 3.2 in the SER lists 90 ECTS, so the difference for the Table 3.1 may be the result of a copy-and-paste error from another document. This may also be true for the observation that in Section 3.3 reference is made to a study programme entitled *Heat Engineering* and not *Thermal Engineering*.

For the three-semester programme the semester-based load is 30 ECTS, the four-semester programme shows a stronger fluctuation with 22, 25, 19, and 24 ECTS per semester. This uneven distribution should be carefully checked, because this may cause additional problems to students working full-time in parallel to attending this programme.

The difference in time-requirement for full- and part-time studies is too small to be effective. Given the need for many students to spend significant part of their daily time for non-academic work the part-time version of the programme should be half of the full-time in doubling of the semester needed. Otherwise a high drop-out rate of the students as observed is unavoidable. Special care has to be taken with respect to the Master thesis in the case of the part-time programme.

The field study subjects are at the right level in terms of problem solving and the scientific innovation level in comparison with the Master level of studies. The University clearly indicates in the programme the study field that the students are accepted to and the list and content of supplementary subjects are available. The maximum number of subjects studied in each semester does not exceed five. The independent work amounts to 80 % of the overall study time in case of the full-time and 76 % in the case of the part-time mode (Paragraph 39 of the SER). These overall numbers for the two versions of the study programme are not broken down by study subject in the SER, it should exceed 30 % per subject required by the legal acts.

Small study subjects with only 3 ECTS should be avoided because they result in a high overall number of examinations typically increasing the workload compared with the situation for larger subjects.

Generally, the titles of the nine final theses for the period 2013/14 provided in the Annex 8.4 of the SER indicate both experimental and analytical topics based on a mixture of independent scientific and applied research. However, the Panel were not able to assess the quality of the sample

of theses provided during the visit, as they were not written in English. The assessment process of the theses is consistent with Masters' studies requirements, where a defence board is appointed which includes the academic supervisors and reviewers. The final theses submission and defence dates are announced at least one month before the defence according to the SER.

While the contents of the subjects based on the provided list of topics taught are suitable for the level of study and for the achievement of the intended learning outcomes, the Panel noticed from the sample of the assessment scripts provided during the visit that the level of questions and answers are relatively simple and mainly of qualitative rather than quantitative nature. The Review Panel was not able to verify that this is the case across all subjects.

A criticism vocalised by current students as well as alumni is that the curriculum is reasonably strong with respect to the technical content, but misses elements promoting report-writing and general management skills.

From an international perspective (the Panel is aware of the fact that it is an usual practise in Lithuania) it is somewhat unusual for a one-and-a-half and a two-year Master degree programme, respectively, to start the work on the Master thesis directly in the first semester. Moreover it is not clear whether this represents an advantage to the students. Especially when students moving into this University either from another Lithuanian institutions or even abroad are at that time not familiar enough with the offerings of the various faculty members to make a profound decision on what topic they would like to work on. Moreover, the first two semesters of the programme should result in a deeper understanding of the students of the field also likely influencing their interest on different research questions and, by that, their possible choice of topic for their thesis. The description of the process of preparing and finalizing the Master thesis is overly detailed for the SER.

2.3. Teaching staff

The general description of the University's structure lacks clarity. While the components University – Faculty – Department are clearly understandable and standard, the role of the scientific and study laboratories as well as the other academic institutes and centres remains unclear with respect to the teaching programme. In part they seem to be leftovers from the former separated research institutions (academy institutes) and the universities only focussed on teaching. Depending on the amount of personnel in those institutes the basis for the teaching efforts could be broadened.

The teaching staff of the programme consists of thirteen/fourteen teachers, eight of the teachers are full-time while the remaining five are part-time. The amount of effort that part-time lecturers devote to this programme is not clear from the SER. Two of the lecturers are full professors, both of them part-time. To what extent the part-time involvement of the two full professors does reduce their effective contribution to the overall study programme cannot be derived from the SER. **While the SER does not provide clear data on the proportion of subjects delivered by full professors, information sent after the visit show that the two professors together with a marginally involved third professor (V. Martinaitis) deliver 20 % of the field study subjects which is in line with the legal requirements. Without this previously not-mentioned colleague the full professors would only cover 18 % of the field study subjects, which would be below the legal requirements.** Following information given after the visit, this difficulty evolved over recent years with the number of full professors involved decreasing from 4 to 2 and an accompanying decrease of their teaching share from 42 % to below 20 %. Eight of the teachers are full-time associate professors, two part-time lecturers and one a part-time assistant. With the exception of the assistants and one of the lecturers, all the remaining teaching staff are educated to a doctoral degree level (i.e., 92 % of teaching staff hold a PhD). All teachers have the necessary practical experience as stipulated by the legal requirements. A quarter of the teachers do have a pedagogical experience of up to five years, three quarters have a longer experience of up to 49 years. Overall the number of teachers involved in this programme as well as their pedagogical and practical experience is appropriate for the purpose. The prescribed legal structure of the teaching staff is fulfilled. Also the distribution between younger and experienced persons is reasonable. At least a part of this group attained various training courses with respect to their teaching capability. Between 2009 and 2014 a generational change seems to have taken place with seven out of nine full professors leaving while the number of younger faculty from five to twelve.

The Review Panel had the opportunity to hold a meeting with the teaching staff on the programme, which was attended by most of them. Most of the teaching staff could communicate in English although only few held a continuous discussion with the Panel. Despite a rather high teaching-load of 400 h over a period of 30 weeks (12-14 h/week, respectively), the Panel sensed a high level of dedication and enthusiasm by the teaching staff and that they are very eager to get engaged in research activities to progress their career and use this research to underpin the teaching process. However, their ability to engage in meaningful research was hindered by the high teaching load through the number of contact hours with students and the lack of incentives by the University in terms of providing suitable funding to kick-start their research career. It was found

also that all PhD students at the Department are supervised by full professors which does not allow teaching staff of lower ranks to develop this skill, for example through acting as a co-supervisors or second supervisors to those PhD students.

Part of the teaching staff works principally in industry and contributes only a few hours of teaching per week to this study programme. This approach can strongly contribute to the understanding of the students of the industrial needs for engineering skills. This prepares them well for their future industrial careers but not necessarily to the same extent for an academic one.

In a second-cycle study programme a reasonable involvement of the teachers in the field of research related to the teaching area tends to be helpful to bring the students in contact with relevant current developments. The scientific output of the teaching staff involved measured by peer-reviewed publications is limited. In Annex 4.3 of the SER just nine publications are listed for the period 2009 to 2015 for the full group.

Members of the staff have been involved in a limited number of national and European Union funded research projects. There has been no European Union project where a member of the group was responsible for the coordination.

The SER lists 24 local and national research contracts where one or more members of the group participated.

2.4. Facilities and learning resources

The rooms for teaching seem to be adequate for the small number of students currently participating in the programme. From the description in the SER it does not become clear to what extent the rooms are shared with students from other programmes. The work-room 2410 is rather small (35 sqm) for concentrated work of up to 12 students.

Annex 5.1 of the SER lists measurement equipment available for the study programme and the preparation of the Master theses. No information is given on its age and usability. The on-site visit resulted in mixed results with respect to the lab equipment. Part of it, e.g., the equipment for building integrated heat supply from renewable sources was quite modern and very useful for teaching as well as limited research purposes. On the other side of the spectrum was the so-called Electronics Laboratory, which essentially was only useful for a basic subject in classical electrical engineering.

There seems to be limited number of computer workstations with suitable software for the use by the students on the Master programme, but the Panel was assured that there are sufficient licences of the software that could be accessed remotely by the students.

The central library has a wide range of resources that can be accessed by students in addition to a number of quiet areas dedicated for the students to work individually or in small groups. The library also provides access to students to a wide range of electronic resources. These resources can be easily accessed from within the campus as well as from home due to a widespread availability of fast (> 100 Mbit/s) Internet connection in Lithuania. This access also allows a very good access to the various types of simulation software supplied by the University as part of various subjects in the study programme.

All teaching staff makes use of the Moodle platform to put teaching materials to students. During a meeting with a group of students, the Panel was able to understand that the students are satisfied with the availability of teaching materials on Moodle and they make full use of it as well as the electronic resources available through the library.

2.5. Study process and students' performance assessment

In the years 2012, 2013, and 2014, 1, 4, and 2 students were admitted into the part-time study programme. Into the full-time study programme there were no admissions in 2012 and 2014, and 10 in 2013. The students' selection process described in the chapter 6.1 of the SER would only be meaningful when the study programme would encounter significantly more applicants than slots available. The formula given in the SER takes into account some form of weighted diploma grades and publications. The SER indicates that further details are available on the web site, but the Review Panel could not check these details, as they were not available in English. The Panel were not able to understand the formula clearly. Applicants to the second-cycle studies can apply to up to 16 programmes that should be arranged in the order of preference in their application. If the entrants are selected to a number of study programmes, they are invited to register only in the one highest in their list of preferences and are not allowed to change that once the offer is made. All entrants for a study programme must have passed compulsory examinations related to their programme of choice. The SER gives a list of specialised subjects that should have been studied by entrants, however, it is not clear to the Panel if these are required for this programme or all second-cycle programmes in the Department. A link is given to further details, but this was found to be broken and most probably information are not in English for the Panel to verify de-

tails. However, it is apparent that entrants, who have not passed some of those subjects, have the chance to sit and pass the missing examinations.

The number of students on the programme has been in a steep decline since the academic year 2008 where 23 students were admitted (with 18 students successfully graduating in 2010) to 1 student in 2012 (graduating in 2014). This in part may be explained by a decreased number of state-funded places provided by the Government. An additional factor can be seen in general decrease in interest in technical study programmes. The job opportunities are described as great for graduates of the study programme *Thermal Engineering* which contradicts the observed lack of interest.

With respect to the admission numbers there are significant discrepancies between the various tables in Chapter 6 of the SER. These cannot be resolved from the SER.

The Review Panel requested an explanation of how the finances for each programme are handled. The Dean explained the system using rough percentages and figures based on the University's financial model. However, there does not seem to be a suitable economic model that assesses the financial viability of individual programmes at the University and thus the Panel was not able to provide meaningful recommendations in this regard.

Students follow a structured timetable prepared at the Faculty level taking into account teachers time and suitability to students needs. During discussions with staff and students, it was made clear that teaching is done mostly in the evenings to allow students to attend to their day jobs. Also students expressed that lecturers show good understanding to their need to work during the day and provide them with the necessary support when they are not able to attend lectures.

Involvement of students in research and applied research activities is facilitated through involvement with projects in some of the study subjects, conducting research practice and through their final thesis. Of particular importance is the inclusion of the mandatory study subject Scientific Researches and Innovations. Students are encouraged to publish their research in the proceedings of a conference held at the University and in the Journal "Science – Future of Lithuania". Master students are also invited to participate in organising the conference.

Students on the programme are offered opportunities to study a part of the study subjects abroad, prepare final theses or undergo internship. The Faculty has signed students and teachers exchange agreements under ERASMUS programme with 83 European universities. However, it is difficult to see how this could be applied in practice with all students are in full-time employ-

ment during their studies. The Panel however was told by one of the social partners that they would encourage students employed at their organisation to undertake opportunities abroad as it would bring benefit to their organisation.

The University and Faculty have put in place numerous measures to provide the students with adequate academic and social support. Information are made available to students about the objectives of their studies, intended learning outcomes, time tables, optional study subjects and all other necessary material via the University web site and other published material. They have the opportunity to meet the Dean and heads of departments at the start of their studies and have the opportunity to ask for clarifications. Students can consult their teachers during published office hours. During the visit, a number of students mentioned to the Panel that they are very happy with the support given to them by the teachers during office hours and that teachers are also available outside office hours to provide support when needed particularly for the students who cannot attend office hours due to their external work requirements. Sports, health and cultural support is also available to students although it is difficult to see how most students can make use of these facilities with their busy study and working life.

The students are assessed for achieving the intended learning outcomes in a number of methods including written examinations, course work, course projects and laboratory reports and oral examinations of the laboratory report when suitable. These are seen to be suitable form of assessments with a healthy variation of type of assessments. The assessment criteria and methods are made available to students on the web pages at the start of their term. Good care is taken in the preparation of the exam timetables and they are published to students on the web pages and notice boards in the University in advance to allow suitable time for preparations.

While the primary focus of the programme seems to prepare students for a research career as apparent from the intended aims and learning outcomes, from the Panel meeting with the alumni, it seems that almost all graduates undertake a professional career, in many cases not directly related to the course of their studies.

2.6. Programme management

The Review Panel found out that there is a clear and transparent management structure of the programme based on information in the SER and discussions during the visit with the University senior management team, the Faculty management team and the programme management team and its teaching staff. The Study Programme Committee within the faculty has the responsibility

to approve newly developed or improved curricula and their subjects. Each faculty is divided into a number of departments where the Head of Department and the Study Programme Committee within the Department are responsible for the management, delivery and continuous monitoring and development of the programme. The student representative in the Study Programme Committee is not elected by the students but is nominated by the Head of Department from the members of the student union.

There is a process of collecting data about the programme through a number of routes. The first is the student feedback questionnaire. This is conducted after each study subject and full participation of students is enforced through sanctions of withholding access to Moodle if they do not complete the questionnaire by the given deadline. The second route is through intra-faculty feedback. The third route is through questionnaires sent to alumni and the final route is through feedback and interactions with social partners. In addition to that, the Head of Department has regular meetings with top students to hear their views about the curriculum and its delivery.

The data collected is regularly analysed and discussed at the Study Programme Committee and recommendations for changes and improvements are acted upon as suitable. The Panel were able to see evidence of that through for example the introduction of modern analysis software within the curriculum. Students also mentioned that the University is responsive to their feedback and recommendations. However, the student feedback data and the process of acting on the findings should be made more transparent.

The internal study quality assurance system at the University is based on the Standards and Guidelines for Quality Assurance in the European Higher Education Area. Improvement of information system is one of the main objects in study quality management. The SER mentions that the study programme and study subjects database are updated regularly when new study programmes and new subjects are developed and present programmes are updated.

With respect to the overall management of the study programme, some aspects, e.g. the Master thesis, seems to be somewhat overregulated.

III. RECOMMENDATIONS

1. The programme *Thermal Engineering* should have more specific intended learning outcomes consistent with the specific focus of the syllabus on building energy, particularly heat supply. It is also suggested that the programme name should reflect this. As part of this clarification a clear distinction has to be achieved from another study programme *Energy Engineering and Planning*.
2. The University should review teaching staff qualifications to ensure that there are sufficient full professor level teachers delivering the study subjects with appropriate teaching load.
3. The Faculty should provide opportunities and suitable base funding for academic staff to get involved in high quality research and participate in the supervision of PhD students to allow them to develop their career.
4. The declining number of students is of concern. The Department should review the situation on the light of market requirements and external competition and consider marketing the programme beyond the capital for example. Closer interactions with industry in Lithuania including significant financial support from there which would be the most helpful for this study programme to survive.
5. There is a high rate of drop-out of students from the programme at various stages of their study. This is more likely to be related to inability of students to cope with the full-time study while at full-time employment. The part-time version of the programme with four instead of three semesters seems not to be sufficient to overcome the hurdle of this double load on the students.
6. The student feedback data and the process of acting on the findings should be made more transparent.

IV. EXAMPLES OF EXCELLENCE

1. There is a very good partnership between the Department and social partners; the Department listen to the recommendations and advice of the social partners and continuously develops the programme to meet the market requirements, while social partners provide support to students particularly in application projects for their thesis.
2. There is a good evaluation system of the teaching and learning process at the Department. This is composed of intra-faculty evaluations and student evaluation of teaching staff. The Department and University are serious about implementation of change in programme content and practices based on evaluation results.
3. The academic staff do offer an extensive support of the students resulting in a very positive perception by them.

V. SUMMARY

The last external evaluation of the study programme *Thermal Engineering* hosted by Vilnius Gediminas Technical University was undertaken in 2008 leading to an accreditation for the period August 2009-2016. Since then the programme underwent structural changes mentioned in the SER but not explained further.

The current version of study programme on *Thermal Engineering* provides a (very) good environment for study. The University has a clear management and decision-making structure which facilitates the effective and efficient running of the programme and its continuous development to meet the needs of employers and the society. The students benefit for a well-structured programme and good support from the University and teaching staff.

The Panel were able to verify that the facilities available to student are generally good and appropriate for teaching Master programmes. This covers lecture rooms, laboratories and library facilities in addition to the electronic access to teaching materials and the ability to remotely access analysis software necessary for their project work.

The Review Panel however is concerned about the continuous decline in the number of students admitted to the programme. There is also a concern about the high rate of drop-out at the various stages of study despite the fact that these were explained by the reduction in Government funded places for higher education and the involvement of students in full-time employment while undertaking the full-time degree. The recent and current cohorts of students were in the order of 10 to 15 per annum, which is a somewhat unhealthy and non-sustainable relation in terms of an efficient use of resources. It should be considered to reorganize this programme as a continued-learning one. An important part of this reorganization would be the inclusion of companies as grant-givers and/or general sponsors. This approach can be justified by the repeatedly cited interest of Lithuanian companies in graduates in this field of engineering.

It is also the view of this Panel that the programme intended learning outcomes should be re-cast to be more specific to the programme rather than the general form presented, including changing the name of the study programme.

In a short term the University should review teaching staff qualifications to ensure that there are sufficient full professor level teachers delivering the study subjects with appropriate teaching load.

VI. GENERAL ASSESSMENT

The study programme *Thermal Engineering* (state code – 621E31001) at Vilnius Gediminas Technical University is given a positive evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	2
2.	Curriculum design	3
3.	Teaching staff	2
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	3
6.	Programme management	3
	Total:	16

*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.

Grupės vadovas: Team leader:	Prof. Abdalnaser I. Sayma
Grupės nariai: Team members:	Prof. Zbigniew Hanzelka
	Prof. Frank Behrendt
	Dr. Thomas Flower
	Dr. Ramūnas Gatautis
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**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO ANTROSIOS PAKOPOS STUDIJŲ PROGRAMOS ŠILUMOS INŽINERIJA (VALSTYBINIS KODAS – 621E31001)
2016-02-29 EKSPERTINIO VERTINIMO IŠVADŲ
NR. SV4-73 IŠRAŠAS**

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VI. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus Gedimino technikos universiteto studijų programa *Šilumos inžinerija* (valstybinis kodas –621E31001) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	2
2.	Programos sandara	3
3.	Personalas	2
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	Iš viso:	16

* 1 - Nepatenkinamai (yra esminių trūkumų, kuriuos būtina pašalinti)

2 - Patenkinamai (tenkina minimalius reikalavimus, reikia tobulinti)

3 - Gerai (sistemiškai plėtojama sritis, turi savitų bruožų)

4 - Labai gerai (sritis yra išskirtinė)

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V. SANTRAUKA

Paskutinis Vilniaus Gedimino technikos universitete vykdomos studijų programos *Šilumos inžinerija* išorinis vertinimas buvo atliktas 2008 m., po jo studijų programa buvo akredituota 2009–2016 m. laikotarpiui. Nuo tada, kaip paminima, bet išsamiai nepaaiškinama savianalizės suvestinėje, studijų programa buvo struktūriškai keičiama.

Dabartinė studijų programos *Šilumos inžinerija* versija užtikrina (labai) gerą studijų aplinką. Universitete yra nustatyta aiški organizacinė, sprendimų priėmimo bei vadybos sistema, kuri sukuria prielaidas efektyviam ir veiksmingam programos vykdymui bei tęstiniam tobulinimui, siekiant darbdavių ir visuomenės poreikių atitikimo. Tinkamai sudaryta programa bei reikiama parama iš universiteto ir akademinio personalo teikia didžiausią naudą studentams.

Apskritai, ekspertų grupė gali patvirtinti, kad materialieji ištekliai skirti programos vykdymui yra tinkami. Tai pasakytina apie auditorijas, laboratorijas ir biblioteką, taip pat elektroninę prieigą prie mokymo medžiagos ir galimybę nuotoliniu būdu prisijungti prie analizei skirtos programinės įrangos, reikalingos darbui su projektais.

Vis dėlto ekspertai yra susirūpinę dėl tęstinio mažėjančio studentų skaičiaus. Taip pat susirūpinimą kelia didelis įvairiais studijų etapais nubyrančių studentų skaičius, nors tokia tendencija vizito metu ir buvo aiškinama mažėjančiu valstybės finansavimu studijoms bei tuo, kad studentai ne tik studijuoja nuolatinėse studijose, bet ir dirba visą darbo dieną. Ankstesnėje ir dabartinėje studentų laidose mokėsi atitinkamai 10 ir 15 studentų per metus, o tai nėra pakankamas skaičius kalbant apie racionalų išteklių naudojimą. Reikėtų apsvarstyti studijų programos perorganizavimo į tęstines studijas galimybę. Svarbus šios reorganizacijos aspektas – įmonių, kaip dotacijų teikėjų ir (arba) rėmėjų, įtraukimas. Šis siūlymas yra pagrįstas pasikartojančiu programos socialinių partnerių ir darbdavių tikinimu, kad šios srities specialistai yra itin paklausūs Lietuvos darbo rinkoje.

Ekspertų grupės manymu, reikėtų performuluoti šios studijų programos numatomus studijų rezultatus, kad jie būtų labiau susiję su programos esme (ne bendrojo pobūdžio), įskaitant ir studijų programos pavadinimo pakeitimą.

Universitetas trumpuoju periodu turėtų daugiau dėmesio skirti akademinio personalo kvalifikacijai ir užtikrinti, kad studijų dalykus dėstyti pakankamai profesoriaus pedagoginį vardą turinčių dėstytojų, su nustatytu tinkamu darbo krūviu.

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IV. IŠSKIRTINĖS KOKYBĖS PAVYZDŽIAI

1. Katedra labai sėkmingai bendradarbiauja su socialiniais partneriais – yra įsiklausoma į jų rekomendacijas, patarimus, kurių pagrindu studijų programa yra nuolat tobulinama, siekiant atitikimo darbo rinkos poreikiams, o socialiniai partneriai teikia paramą studentams, ypatingai rengiant taikomuosius projektus baigiamiesiems darbams.
2. Katedroje taikoma gera mokymo ir mokymosi procesų vertinimo sistema. Ji susideda iš tarpfakultetinių vertinimų ir studentų atliekamų dėstytojų vertinimų. Katedra ir universitetas yra rimtai nusiteikę studijų programos turinio ir praktikų tobulinimo atžvilgiu, pagal grįžtamojo ryšio rezultatus.

3. Akademiniis personalas studentams teikia įvairiapusę pagalbą, kurią studentai vertina itin teigiamai.

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III. REKOMENDACIJOS

1. *Šilumos inžinerijos* studijų programoje numatomi studijų rezultatai turėtų būti apibrėžti konkrečiau – labiau orientuoti į programos esmę – pastatų energetiką, o jeigu dar tiksliau – į šilumos tiekimą. Tai taip pat turėtų atsispindėti ir studijų programos pavadinime. Siekiat visiško aiškumo, ši studijų programa turėtų turėti aiškią atskirtį nuo kitos – *Energijos inžinerijos ir planavimo*.
2. Universitetas turėtų atkreipti dėmesį į dėstytojų kvalifikaciją ir užtikrinti, kad studijų da-lykus dėstytojų pakankamai profesoriaus pedagoginį vardą turinčių dėstytojų, kuriems darbo krūvis būtų tinkamai nustatytas.
3. Fakultetas turėtų suteikti galimybes ir reikiamą finansavimą akademinio personalo įsitraukimui į aukšto lygio mokslinių tyrimų vykdymą, taip pat apsvarstyti galimybę dides-niam skaičiui dėstytojų vadovauti doktorantų disertacijoms.
4. Mažėjantis studentų skaičius kelia susirūpinimą. Katedra turėtų įvertinti situaciją atsi-žvelgdama į darbo rinkos poreikius, išorės konkurenciją ir apsvarstyti galimybę studijų programą reklamuoti ne tik sostinėje. Reikėtų glaudžiau bendradarbiauti su Lietuvos pramonės sektoriumi, įskaitant jų teikiamą finansinę paramą, kuri labai padėtų studijų programos rentabilumui.
5. Studentų nubyreėjimo rodikliai visu studijų metu yra aukšti. Taip galimai yra dėl to, kad studentams yra per sudėtinga derinti nuolatinės studijas ir darbą visą darbo dieną. Iššęs-tinės studijos, trunkančios keturis, o ne tris semestrus, nėra pakankama priemonė šios problemos sprendimui.
6. Studentų grįžtamojo ryšio teikimo ir reagavimo į jo pagrindu gautus duomenis sistema turėtų būti skaidresnė.

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Paslaugos teikėjas patvirtina, jog yra susipažinęs su Lietuvos Respublikos baudžiamojo kodekso 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė, parašas)