



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus Gedimino technikos universiteto

**STUDIJŲ PROGRAMOS *PASTATŲ ENERGETIKA* (valstybinis  
kodas – 612E30002)**

**VERTINIMO IŠVADOS**

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**EVALUATION REPORT**

***OF BUILDING ENERGETICS (state code – 612E30002)***

**STUDY PROGRAMME**

At Vilnius Gediminas Technical University

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## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Pastatų energetika</i>
Valstybinis kodas	612E30002
Studijų sritis	Technologijos mokslai
Studijų kryptis	Energijos inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė (4 metai), iššęstinė (6 metai)
Studijų programos apimtis kreditais	240 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Energijos inžinerijos bakalauras
Studijų programos įregistravimo data	Lietuvos Respublikos švietimo ir mokslo ministro 1997 m. gegužės 19 d. įsakymu Nr. 565.

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## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Building Energetics</i>
State code	612E30002
Study area	Technological Sciences
Study field	Energy Engineering
Type of the study programme	University studies
Study cycle	First
Study mode (length in years)	Full-time studies (4 years), part-time (6 years)
Volume of the study programme in credits	240 ECTS
Degree and (or) professional qualifications awarded	Bachelor of Energy Engineering
Date of registration of the study programme	19 <sup>th</sup> May 1997, under the Order of the Minister of the Ministry for Education and Science of the Republic of Lithuania No. 565.

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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 20<sup>th</sup> 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.

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

Vilnius Gediminas Technical University (hereafter, VGTU) is a state higher educational institution, established by 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 first cycle programme in *Building Energetics*, considered in this report, is carried out by the *Department of Building Energetics* within the Faculty.

The programme is designed to serve the needs of the labour market in Lithuania in the building energy demand sector. The Panel were 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 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 first cycle programme in *Building Energetics* discussed in this report, the Panel has reviewed two other second cycle programmes carried out at the same Department in *Energy Engineering and Planning* and in *Thermal Engineering*. 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 01/12/2015.

**1. Prof. Abdunaser 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

The aims of the programme are clearly defined and publicly available in English on the University's web site<sup>1</sup>. These are to train specialists, who upon completing their studies of general, basic and special study subjects would be able to analyse and simulate energy transformation processes, be able to recognise, formulate and solve engineering problems related to heat production and transformation, energy management, supplying and exploitation of heat and gas, indoor air quality; be able to plan, design, use new and present energetic, thermal systems and equipment, which has high energy transformation, consumption and management efficiency, is cost efficient, high quality and reliable, is sustainable in terms of resources consumption and impact on the environment. However, the entry through the home page of the web site (<https://medeine.vgtu.lt/>) is in Lithuanian and thus it is difficult to navigate through to the English language pages to find the programme description unless the full link below is known.

The programme's intended learning outcomes, also available on the same web link as the programme, contain 20 items grouped into five groups addressing (1) knowledge, (2) ability to apply laws, rules, principles and basics, (3) ability to apply knowledge, collect, interpret and process data and transfer information and ideas, (4) ability to collect knowledge, base it on understanding and communicate it and (5) acquire skills of self development and self learning.

It is obvious that these are generic intended learning outcomes that can be applied to any engineering and technology programme. During the visit, the Panel understood that this formulation of the intended learning outcomes follows the strict University guidance. It is however acknowledged by the Panel that specifics of intended learning outcomes are present in the specifications of each of the study subjects. However, it is the view of the Panel that the programme team should make more efforts to either provide more specific intended learning outcomes for the programme as a whole within the framework specified by the University or demand flexibility in the University's framework to enable casting the intended learning outcomes in a more specific manner.

The Panel is satisfied that the programme's intended learning outcomes, as specified in the individual study subject descriptions, are based on the academic requirements, public needs and

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<sup>1</sup> <https://medeine.vgtu.lt/programos/programa.jsp?sid=F&fak=3&prog=154&rus=U&klb=en>

needs of the labour market in Lithuania, in particular for energy provision to buildings in addition to other more general knowledge and transferable skills. During the visit, the Panel also found out that practical work is available for students in companies throughout all years of study including visits to different companies after the first year, further emphasising the link to labour market needs. The Panel also agrees that the aims of the programme and its intended learning outcomes are consistent with the first cycle of study, even though they are too ambitious in few places. For example, one of the intended learning outcomes of 'Engineering Thermodynamics' taught in semester three states "To be able independently formulate a scientific approach on thermodynamic efficiency evaluation and optimization opportunities of actual energy production, supply and use systems". The Panel view it would be difficult for students to achieve the ability to evaluate, and optimise systems from both supply and demand at this early stage of the study and even by the end of the qualification particularly that this qualification is focusing on energy demand for buildings. Thus some intended learning outcomes need to be reviewed to ensure complete consistency with the level of qualification.

The name of the programme and its content, as reflected in the individual study subject details, as well as the intended learning outcomes are consistent to a large degree with the level of study and the qualification offered. The Panel was able to verify from the interviewed alumni and social partners that the programme content has strong links to professional requirements, public needs and the needs for the labour market. This was reflected from the significant degree of engagement from industry with the programme and the availability of employment opportunities of students graduating from the programme and in many cases, students working in related fields while still studying. The SER however states that the University does not collect statistics about graduate prospects due to lack of resources, however, data presented in Annex 6.1 based on information from Lithuania Labour Exchange shows a variation of employments rates year on year with 38% job offers in 2014, 60% in 2013 and 18% in 2012 of those registered on the exchange.

## ***2.2. Curriculum design***

The programme is offered in full-time over four years (eight terms) and part-time over six years (twelve terms). Both variants comprise 240 ECTS of which 175 ECTS (73 %) are in the field of study, 15 ECTS (6 %) are general university subjects and 32 ECTS (13 %) elective subjects. In addition, 18 ECTS are devoted to internships and 15 ECTS for the final theses. The curriculum



design thus satisfies the legal requirements for the first cycle of study<sup>2</sup>. A further option is offered to college graduates who can obtain the degree by completing 120 ECTS in addition to their college qualification.

A maximum of seven subjects are studied each term and the number of ECTS are equally distributed among the terms (30 ECTS per term). At the start, general subjects such as fundamental world outlook, humanities, social sciences and general theoretical subjects are offered to provide foundations for understanding subject units in subsequent years. Speciality subjects in building energetics and introductory practice are started in the second term to maintain students' interest. The particular specialism starts in the fifth term while professional activities are delivered after all the specialisation subjects are completed. More complex projects are provided in the sixth and eighth terms to practice application of knowledge of specialisation subjects and development of abilities. Preparation of final theses starts in the seventh term and finishes with three stages at the end of the eighth term. This distribution of study subjects and the smooth transition in the level of complexity of materials are consistent with the first cycle of study. In some subjects, there is a large and very wide range of topics being covered with the risk of sacrificing a suitable depth in the given subjects of study. For example, *Electronics and Electrical Engineering* has too many topics and seems to be very intensive. During the visit this was explained by the fact that it only the basics of electronics and electrical engineering are taught and details are not essential for the students in this programme. This, in fact, confirmed the above concern of the Panel. Thus the Panel feels that they cannot ascertain from the given information that the contents of the subjects are fully consistent with the type and level of study, however, talking to academic staff and students during the visit, it is perhaps possible with low confidence to state that the consistency in this respect is present. In future revisions of the descriptions of the study subjects, care should be taken to make these descriptions consistent as conveyed to the Panel during the visit. Themes of subjects are not repetitive and study subjects are scheduled in such a way, that students would be able to have subjects only after completing needed subjects in previous semesters.

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 stated intended learning outcomes, the Panel noticed from the sample of the assessment scripts provided during the visit that the level of

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<sup>2</sup> General Requirements of the First Degree and Integrated Study Programmes, approved by the Order of the Minister for Education and Science of the Republic of Lithuania on 9 April 2010 No V-501.

questions and answers are relatively simple and mainly of qualitative rather than quantitative nature. The Panel was not able to verify that this is the case across all subjects. The scope of the programme based on the descriptions given in Annex 8 is suitable to meet the subject specific intended learning outcomes as well as the general intended learning outcomes of the programme.

The content of the programme is generally a mixture of basic knowledge necessary to provide good foundation of knowledge to students and the necessary technical skills in the field of study and some transferable skills in addition to content that keeps the programme up to date with latest developments in the field. However, further relevant areas are lacking and it is recommended that these are addressed in the future, for example, smart grids, smart buildings and energy markets in Lithuania and Europe.

The Panel was reassured that the study subject's contents are constantly being improved and updated. For example, the study subject *Integrated Design of Buildings (Basics of BIM)* taught in the seventh semester has been introduced which contains 3D design. This is now being introduced in industry in Lithuania. The Panel believes that the programme could benefit from a general electronic and automation study subject to educate students about the requirements of new technologies in the market and addition to study subjects in smart grids and smart buildings. The Lithuanian Government started national programme for renovation and retrofitting multi-apartments dwellings. There is a market need for professionals with the skills related to this subject and it would be useful if this is reflected in the study subjects.

### **2.3. Teaching staff**

The number of academic staff involved with teaching this programme is 101. 233 students were enrolled in the academic year 2013/14. This gives a student-staff ratio of about 2.3, which gives a very low ratio compared to standard situations in other European countries putting a question mark on the economic viability of the programme. 7 % of the academic staff are full professors, 45 % associate professors, 27 % lecturers and 18 % junior lecturers. According to the SER, 98 % of the teaching staff are undertaking research activities related to their field of teaching. The majority of teaching staff have the necessary practical experience as stipulated by the legal requirements. The practical experience of teachers ranges from 1-51 years while 65 % have a practical experience between 2-6 years. Large proportion of the teachers has no involvement in other activities outside the University. The majority of teaching staff has scientific experience ranging from 2-51 years with large number of above five years of experience. There is also a good mixture of pedagogical experience. 66 % of the teachers have a PhD in a science subject. It

is legally required to have at least 50% of the study subjects delivered by teachers holding a PhD in the subject area of study<sup>3</sup>. While the SER does not provide exact figure to verify this requirement, it states “93% of the study subjects are delivered by scientists”. It further states, “It may be claimed that teachers qualifications is sufficient to achieving the programmes goals”. It is recommended in the future that this requirement is verified more clearly. The teaching workload for academic staff as presented in the SER is adequate. The Panel concluded that the number of teaching staff, academic qualifications and the range of experience are adequate to delivering the necessary education and achieving the intended learning outcomes. There is a large gap however in the number of years of experience between teaching staff at professorial level and most of the remaining staff. There are a number of teaching staff with significant number of years of practical experience who seem to have started later in their career to gain scientific experience and hence engaged in the pedagogical process.

During the last five years, there was a natural teachers turnover in the programme. The number of professors is decreasing due to retirement, while the associate professors do not meet the tightened qualification requirements for promotion to full professors, typically related to the level or research and publications. The number of lecturers is increasing due to the involvement of industry into the study process. The SER confirms that the stated staff turnover has no impact on the delivery of the programme and typically only minor changes are made to study subject details when staff are changed which is consistent with University regulations.

Inspection of the CV's of academic staff shows that nearly all of them are engaged in research demonstrated by their publications. However, almost all publications are at the national level with the exception of less than a handful in conferences in Poland, Latvia and the UK. There does not seem to be any engagement with research at the international level or publications in international journals. There are few external engagements through the Erasmus programme for example, but these are mostly academic rather than research engagements.

Teachers' continuous professional development and training is mandatory according to VGTU regulations, which states that associate professor, during their tenure, must improve their qualification by means of training. The young teachers (i.e. those who have just acquired the doctor of science degree) usually undergo training in Lithuanian enterprises and their production facilities. According to the SER, during the analysed period, seven teachers of the study

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<sup>3</sup> General Requirements of the First Degree and Integrated Study Programmes, approved by the Order of the Minister for Education and Science of the Republic of Lithuania on 9 April 2010 No V-501.

programme have been trained with the average duration of training for three months. In addition, the University provides the allocation of points for lectures delivered at foreign universities, for participation in seminars on studies-related issues, confirmed by a certificate. This is done to ensure the participation of teachers in exchange programmes.

Lecturers also participate in foreign exchange programmes, primarily Erasmus, where they participate in the delivery of lectures close to their subject area and participate in organisational meetings, scientific conferences and training in addition to research and international projects, where 64 teachers from the Department of Building Energetics participated in such activities between 2009 and 2015. The Panel see this as good contribution to staff training, however, it would be useful to implement a more structured continuous professional development programme for staff by the University which does not seem to be present.

The Review Panel had the opportunity to hold a meeting with the teaching staff of the programme, which was attended by a sample that may not be completely representative as none of the full professors attended. Most of the teaching staff could communicate in English although only few held a continuous discussion with the Review Panel. 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.

#### ***2.4. Facilities and learning resources***

There are sufficient studying facilities for the students in the programme. During a tour the Panel was able to see teaching facilities of various sizes suitable for the typical student cohort on the programme and for smaller breakaway smaller group lectures and tutorials. The quality of the teaching rooms is generally adequate with suitable seating and visual display units connected to a computer in all the teaching facilities visited. Some of the teaching rooms are equipped with a computer for each student studying the subject with the necessary software installed and the Panel was able to see one of the practical sessions in action.

Annexes 5.1 and 5.2 of the SER list the laboratories and equipment used for measurements primarily related to the building energetics degree suitable for conducting experiments during the study in this programme. The dates of installation or upgrade of the facilities show that most of the equipment are relatively new, even though very little if any of those listed in the Annex have been updated in the last five years. New investments through funding by the European Commission were made recently in some of the laboratories, but from the descriptions the Panel received during the visit, these seem to be more used by Masters and PhD students. Nevertheless, this shows an adequate level of investment in the laboratories hardware and keeping this equipment up to date. In general, the laboratories visited by the Panel were of adequate standards with good equipment necessary to perform experiments relevant to the study subjects. In particular, the thermodynamics and fluid flow laboratory has wide range of experiments covering many important fundamental concepts and processes. There is a concern however about the close proximity of the test benches designed for various experiments that are conducted simultaneously by different groups of students in regards to health and safety and the level of noise may be present in the laboratory. The number of technicians supporting the students was also thought not to be adequate. The laboratory that the Panel was told to be the Electronics lab did not seem to have any electronic equipment and only few out-dated electrical objects were observed.

The new facilities in the Renewable Energy Laboratory are of good standard in terms of hardware and data analysis software. However, there seems to be limited number of computer workstations with suitable software for use by students and mostly devoted to the Master programme.

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.

All teaching staff make 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***

The admission process to the first cycle of study is organised centrally by an organisation authorised by the Lithuanian Higher Education Institution Association LAMA BPO. Applicants can apply for state funded and non-funded places. Applicants must have a secondary education. The applicants should obtain a competitive mark based on the evaluations of mathematics, physics, and the Lithuanian as well as a foreign language. Equal weighting is given to all subjects except mathematics, which is given twice as much as the other subjects. The minimum mark for acceptance in the programme varies from year to year reflecting the achievements of the applicants and their matching to the available places. The study programme is delivered in both Lithuanian and English and thus the candidates are requested to indicate their choice in the application. There are usually few students taking up the English language version of the programme. Students can put a large number of programmes and universities in their applications listing them in order of priority and they are admitted to their highest priority suitable for their grades. VGTU is the only University offering this programme and thus the students have no other choices if they wish to study this subject. While there may be imperfections in the admissions process, it is not under the control of the University and thus the Panel will not suggest improvements.

The number of students on the programme has been in decline for the period of provided data from 2009/10 academic year (282 students) to 2013/14 (233 students), with the exception of one year when the number was slightly higher than the one before. This is alarming, but it has been explained by the reduction in the number of state-funding provided by the Government. However, this raises question marks on the future financial viability of the programme where the number of teaching staff remained almost at the same level. 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.

It is however of some concern that a large number of students are dropping out from the programme particularly in the first year. The percentage of students dropped out from those admitted to the programme in 2010 (graduating in 2014) was 28% while for those admitted in 2009 was 44% and in 2008 is 30%. The SER explains this by the fact that the programme does not attract the best students from secondary school and also due to the poor attendance to

lectures. It also quoted insufficient individual skills. This brings into question the long-term viability of the entire system and waste of resource on those students. It may be more effective to reduce the number of places available to the programme to increase the quality and reduce drop-out rates and wasted resources. It may also be of benefit to those dropping out students through making a much suitable choice from the outset.

Students follow a structured timetable prepared at the Faculty level taking into account teachers time and suitability to students needs. The study process attempts to address a balance between academic subjects, research and skills development and encourages systematic independent work by the students. The study process is regulated by Studies Regulations and the annual study plan.

Involvement of students in research and practical research activities is facilitated through involvement with projects in some of the study subjects, conducting research practice and through their final thesis. 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 internships. The Faculty has signed students and teachers exchange agreements under ERASMUS programme with 83 European universities.

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 website 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. Sport, 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 types 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.

## ***2.6. Programme management***

The 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.

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 subject unit database are updated regularly when new study



programmes and new subjects are developed and present programmes are updated.

### **III. RECOMMENDATIONS**

1. The programme should have more specific intended learning outcomes consistent with the specific focus of the programme relating the general aspects to those provided by the study subjects. Some of the study subjects intended learning outcomes should be revised to reflect the level of studies.
2. Further relevant study areas are lacking and it is recommended that these are addressed in the future, for example, smart grids, smart buildings and energy markets in Lithuania and Europe.
3. The Department should make effort to provide opportunities to academics to develop their career through reducing their teaching workload and allowing them to participate in PhD student supervision. Additionally, research pump priming funding should be provided to enable academics to kick-start their research careers.
4. Some concern was raised about holding a number of experiments in a small lab at the same time in regards to noise and availability of sufficient technical staff and improvements to this aspect are necessary. The Electrical Engineering Lab should be better equipped to be fit for purpose.
5. The large drop-out rate should be addressed by specific measures, for example reducing the number of places to focus on quality. This should also reduce the waste of resources.
6. The assessment process should be more rigorous and exam papers should have more quantitative content.
7. The student feedback data and the process of acting on the findings should be made more transparent.

#### **IV. EXAMPLES OF EXCELLENCE**

1. The Department is constantly evaluating the programme in a number of ways including student feedback questionnaire, regular surveys of alumni views and self evaluation. They are constantly planning and implementing improvements to the programme accordingly.
2. Practical work for students in companies throughout all years of study including visits to different companies after the first year and inviting experts from industry to present lectures to students provides good link to industry and improves students awareness of practical issues and opens opportunities for employment.
3. Students' feedback reflected high level of satisfaction of their experience, good engagement and understanding of the opportunities offered to them by the degree.

## V. SUMMARY

The study programme on *Building Energetics* hosted by the Vilnius Gediminas Technical University provides an excellent environment for study. The University has a good organisational structure with 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 from a well-structured programme and good support from the University and teaching staff.

The Panel was able to verify that the facilities available to student are generally good. 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 high drop-out in the number of students admitted to the programme, particularly after the first year, which is primarily due to accepting students of poor qualifications.

It is also the view of the Review Panel that the programme intended learning outcomes should be re-cast to be more specific to the programme rather than the general form presented. It is also recommended that the programme should continue to develop to meet the modern needs of building energetics reflecting also the need of the country to comply with the European Union and international obligations.

## VI. GENERAL ASSESSMENT

The study programme *Building Energetics* (state code – 612E30002) 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	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	3
	<b>Total:</b>	<b>18</b>

\*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
	Mr Giedrius Gecevičius

**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO PIRMOSIOS PAKOPOS  
STUDIJŲ PROGRAMOS *PASTATŲ ENERGETIKA* (VALSTYBINIS KODAS –  
612E30002) 2016-02-29 EKSPERTINIO VERTINIMO IŠVADŲ  
NR. SV4-71 IŠRAŠAS**

&lt;...&gt;

**VI. APIBENDRINAMASIS ĮVERTINIMAS**

Vilniaus Gedimino technikos universiteto studijų programa *Pastatų energetika* (valstybinis kodas –612E30002) vertinama **teigiamai**.

<b>Eil. Nr.</b>	<b>Vertinimo sritis</b>	<b>Srities įvertinimas, balais*</b>
1.	Programos tikslai ir numatomi studijų rezultatai	3
2.	Programos sandara	3
3.	Personalas	3
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	<b>Iš viso:</b>	<b>18</b>

\* 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)

&lt;...&gt;

**V. SANTRAUKA**

Vilniaus Gedimino technikos universitete vykdoma studijų programa *Pastatų energetika* užtikrina puikią 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 didelio studentų nubyrėjimo, ypač po pirmųjų studijų metų. Tai, visų pirma, įvyksta dėl to, kad priimami ne itin studijoms pasirengę asmenys.

Ekspertų grupės manymu, reikėtų reformuluoti studijų programos numatomus studijų rezultatus, kad jie būtų labiau susiję su studijų programos specifika (ne bendrojo pobūdžio). Taip pat rekomenduojama studijų programą toliau tobulinti, kad ji atitiktų modernias pastatų energetikos tendencijas bei atspindėtų šalies poreikį atitikti Europos Sąjungos ir tarptautinius įsipareigojimus.

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#### **IV. IŠSKIRTINĖS KOKYBĖS PAVYZDŽIAI**

1. Katedra nuolat įvairiais aspektais vertina studijų programą, įskaitant studentų apklausas, reguliariai vykdomas absolventų apklausas ir savianalizę. Atitinkamai yra nuolat planuojamas ir įgyvendinamas studijų programos tobulinimas.
2. Studentų praktikos įmonėse visu studijų laikotarpiu, įskaitant apsilankymus skirtingose įmonėse po pirmųjų studijų metų bei darbo rinkos atstovų kvietimus dėstyti studentams, skatina tvirtą ryšį su pramone, taip pat padeda studentams geriau suvokti praktinius dalykus ir atveria galimybes įsidarbinti.
3. Studentų grįžtamasis ryšys rodo, kad jie yra labai patenkinti savo studijomis, atsidavę ir suvokia, kokias galimybes jiems suteiks šis išsilavinimas.

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#### **III. REKOMENDACIJOS**

1. Studijų programos numatomi studijų rezultatai turėtų būti konkretesni, labiau atitinkantys programos specifiką bei susiejantys bendruosius programos aspektus su tais, kurie dėstomi studijų dalykuose. Kai kuriuos studijų dalykų numatomus studijų rezultatus reikėtų peržiūrėti siekiant, kad jie atitiktų studijų pakopą.
2. Studijų programoje nėra dėstomos tam tikros temos, kurias ateityje reikėtų įtraukti, pavyzdžiui, išmanieji tinklai, išmanieji pastatai bei energijos rinkos Lietuvoje ir Europoje.

3. Katedra turėtų stengtis suteikti sąlygas akademinio personalo karjerai mažinant dėstymo krūvį bei leidžiant didesniam skaičiui asmenų vadovauti doktorantų disertacijoms. Be to, reikėtų finansuoti mokslinius tyrimus, taip padedant akademiniam personalui pradėti mokslinę karjerą.
4. Ekspertų grupės manymu, rūpestį kelia daugybė eksperimentų, atliekamų mažoje laboratorijoje, taip pat triukšmas ir techninio personalo prieinamumas – šie aspektai yra svarbūs ir tobulintini. Elektros inžinerijos laboratorija turėtų būti labiau aprūpinta reikiama įranga, kad atitiktų jai keliamus tikslus.
5. Reikėtų imtis specialių priemonių dideliame studentų nubyrėjimui mažinti, pavyzdžiui, mažinant studijų vietų skaičių ir daugiau dėmesio skiriant kokybei. Tai taip pat turėtų sumažinti eikvojamus išteklius.
6. Vertinimo procesas turėtų būti griežtesnis, o egzaminų užduočių turinys – kokybiškesnis.
7. Studentų grįžtamojo ryšio rinkimas ir reakcija į jo pagrindus prietas išvadas turėtų būti skaidresni.

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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)