



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus Gedimino technikos universiteto  
**STUDIJŲ PROGRAMOS**  
***ELEKTROS ENERGETIKOS SISTEMŲ INŽINERIJA***  
***(valstybinis kodas - 621H62002)***  
**VERTINIMO IŠVADOS**

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**EVALUATION REPORT**  
***OF ELECTRICAL ENERGETICS SYSTEMS ENGINEERING***  
***(state code - 621H62002)***  
**STUDY PROGRAMME**  
at Vilnius Gediminas Technical University

**Experts' team:**

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Išvados parengtos anglų kalba  
Report language – English

Vilnius  
2015

## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Elektros energetikos sistemų inžinerija</i>
Valstybinis kodas	621H62002
Studijų sritis	Technologijos mokslų studijų sritis
Studijų kryptis	Elektronikos ir elektros inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2 metai)
Studijų programos apimtis kreditais	120 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Elektros inžinerijos magistras
Studijų programos įregistravimo data	2006-11-16

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## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Electrical Energetics Systems Engineering</i>
State code	621H62002
Study area	Technological sciences
Study field	Electronics and electrical engineering
Type of the study programme	University studies
Study cycle	Second
Study mode (length in years)	Full-time (2 years)
Volume of the study programme in credits	120 ECTS
Degree and (or) professional qualifications awarded	Master of Electrical Engineering
Date of registration of the study programme	16 <sup>th</sup> November 2006

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The Centre for Quality Assessment in Higher Education

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## I. INTRODUCTION

### 1.1. Background of the evaluation process

The evaluation of on-going study programmes is based on the **Methodology for evaluation of Higher Education study programmes**, approved by Order No 1-01-162 of 20 December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC).

The 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 self-evaluation report prepared by Higher Education Institution (hereafter – HEI)*; 2) *visit of the review team at the higher education institution*; 3) *production of the evaluation report by the review team and its publication*; 4) *follow-up activities*.

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

The programme is **accredited for 6 years** if all evaluation areas are 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 the SKVC. Along with the self-evaluation report and annexes, the following additional documents have been provided by the HEI before, during and/or after the site-visit:

No.	Name of the document
	(No additional documents were received during the on-site visit)

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

Vilnius Gediminas Technical University is well known in the market of education of Lithuania as public educational institution with the traditions of engineering specialist dating from 1956. Today VGTU educates socially responsible, creative personalities, receptive to the latest scientific discoveries and modern technologies (<http://www.vgtu.lt>). Vilnius Gediminas

Technical University is an accredited, public institution of higher education, preparing qualified specialists in the technological areas.

The study programme is run together with lecturers and scientists from the Centre of Physical Science and Technology, Perspective Technology Applied Science Institute.

Today energetics is one of the most strategic parts of Lithuanian economy that heavily influence overall country progress. According to National Lithuanian strategy it is planned that before 2020 the independence in energetics will be foreseen and number of graduates in the field of energetics are strongly needed.

Previous external evaluation of the study programme was carried on October 19, 2012 and this programme was accredited for three years.

The current evaluation report of the Electrical Energetics Systems Engineering (state code 621H62002) master study programme at Vilnius Gediminas Technical University (further referred as VGTU) is based on the Self-Evaluation Report (further referred as SER), public material and the on-site visit by the International Evaluation Team. This evaluation included

- a) Meetings and discussions with the administration of the VGTU, the SER-preparation team, teaching staff, students, alumni and the social partners (mostly companies), related to the evaluated study programme
- b) Visiting to the labs, library, classrooms, and free-time zones for students and other facilities.

#### ***1.4. The Review Team***

The review team was completed according *Description of experts' recruitment*, approved by order No. 1-01-151 of Acting Director of the Centre for Quality Assessment in Higher Education. The Review Visit to HEI was conducted by the team on *12<sup>th</sup> October, 2015*.

- 1. Prof. dr. habil. Krzysztof Kozlowski (team leader)**, *professor at Poznan University of Technology, Poland;*
- 2. Doc. dr. Sergey Shaposhnikov**, *associated professor at St. Petersburg State Electrotechnical University, Russia;*
- 3. Emeritus Prof. dr. Erkki Lakervi**, *professor emeritus at Helsinki University of Technology, Finland;*
- 4. Doc. dr. Gediminas Valiulis**, *associated professor at Šiauliai University, Lithuania;*
- 5. Mr. Ignas Gaižiūnas**, *students' representative from Vilnius University, Lithuania.*

## **II. PROGRAMME ANALYSIS**

### ***2.1. Programme aims and learning outcomes***

The qualifications gained by the graduates are certified by a master degree. The VGTU is awarding the Master of Electrical Engineering diploma in Electrical Energetics Systems Engineering within two specializations:

- 1) Modern Electrical Power Engineering
- 2) Technologies of Electrical Energetics

The Vilnius Gediminas Technical University is considering the labour market requirements, that are distributors or producers of electrical devices that seek the electrical engineering graduates, and there is a demand of more than 50 specialists and this will also increase by 40% till 2020. The programme's position is discussed among other VGTU on-going programmes in the same field but there is lack of comparison of this study programme with other similar study programmes offered by other universities in Lithuania.

The development of the SP Electrical Energetics Systems Engineering is created based on general requirements and in cooperation with JSC "Precizika MET SC" which specializes in solar photovoltaic technologies, for example. Scientific flavour of the evaluated study programme was achieved taking into account experience in running such programmes in different universities such as Coventry University (UK), Troyes Technical University (France), Lisbon Technical University (Portugal), Linkoping University (Sweden), and Royal Military Academy (Belgium).

As the evaluation team learned from the students, staff, alumni and the companies, the programme aims and learning outcomes seem to be reasonable for all parties, involved in the study programme. Also, the labour market requirements are well considered. In the SER expected learning outcomes are divided into five groups, i.e. knowledge (3 items), research competencies (2 items), special skills and competencies (4 items), social skills and competencies (2 items), and personal skills and competencies (2 items). They are accurate and understandable to young people and have a strong reflection on aims and learning outcomes formulation, therefore these two recommendations (regarding this evaluation area) formulated by the previous evaluation team were implemented. It is positive that the total number of learning outcomes is 13 (considered as not a big number) what makes it possible to realize in the study programme. Three programme aims are clearly defined. One of them refers to application of theoretical knowledge and scientific investigation results (the evaluated study programme is a scientific type of programme). To summarize – the programme aims and learning outcomes are consistent with the type and level of studies and the level of qualifications offered.

The programme aims and learning outcomes are also well defined, clear and publicly accessible as in the university website, “AIKOS” Information system, and LAMA BPO, Association of Lithuanian Higher Education Institution.

As the evaluation team learned during the evaluation, the graduates are well prepared to the labour market especially by their practical skills, though not necessarily scientific competences, since in graduates’ opinion practical skills are the most important. In view of this only a very small number of graduates published papers and this has to be improved as a recommendation, considering this is a master programme.

The name of the programme, its learning outcomes, content, and the qualifications offered are compatible with each other. The study programme Electrical Energetics Systems Engineering corresponds to the mission of the VGTU has logical aims, structure, curriculum and adequate study methods to learn abilities and ensure the achievement of the learning outcomes necessary for the labour market.

As overall impression of the programme aims and learning outcomes – it is really positive. The evaluators have clear impression, that the programme aims and learning outcomes are well accepted by the students, staff and stakeholders.

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

The curriculum design meets all legal requirements. The structure of the study programme is based on the requirements for university studies. The scope of the programme, its subjects, contact and individual work hours, fully correspond to the requirements of legal acts and other legislation documents of the Republic of Lithuania (SER, p. 13).

Duration of the study programme is two years (120 ECTS) and degree awarded: Master in Electrical Engineering. As mentioned previously, the study programme includes 2 specializations. Implementation of study programme (for each specialisation) comprises 9 mandatory subjects two sets of optional subjects (Group 1 consists of two study subjects and Group 2 of 3), one university defined general mandatory subject, one mandatory branch subject, optional subjects and final thesis preparation and defence. Group 1 and 2 consist of optional subjects and are dedicated to students who have completed bachelor programme not necessarily in electrical studies. This in a positive way reflects recommendation formulated by previous evaluation team. Both specialisations differ by 5 subjects (27 credit points) all other offered and no elective courses are available in this study programme. In view of the evaluation team specialisations seem to be narrow and they do not necessary clearly define their content. For example, specialisation Modern Electrical Power Engineering is focused on new energy systems

but does not reflect smart grids, energy efficiency, electric vehicles and electricity market. The second specialisation Technologies of Electrical Energetics seems to be more related to theoretical electrotechnics. The word “modern” that is used in the name of specialisation may be misleading for entrants and graduates. The graduates should be concerned by innovation and future, while modernity shows something new as opposed to old-fashioned things, but these are still in engineering use. The entrants should be more concerned about the future and innovation; modernity is only a part of the future ideas. This was discussed in the previous evaluation report but it was not implemented. The same applies to the recommendation on reflecting the title of this study programme.

As a recommendation, the titles of specialisations should more clearly reflect their content. Their content should include the latest achievements in science and technologies that are related to smart grid, energy efficiency, electric vehicles and electricity market concept.

Study subjects and/or modules are spread evenly and their topics are not repetitive. The logical links and sequence of study subjects are explained in the SER (pages 17 and 19). It is well designed and implemented.

The content of the subjects and/or modules is consistent with the type and level of the studies. The subjects learning outcomes very well designed and they are successfully achievable in the process of studying. This was clearly explained in the SER (Table 3.3.).

The content and methods of the subjects/modules are appropriate for the achievement of the intended learning outcome. The programme scope is more than sufficient to ensure learning outcomes. During the on-site meetings the students, alumni, and representatives from different industry companies have confirmed this information. Although the graduates based on their own experience have expressed their wish to have more laboratory exercises. Current students are satisfied with this study programme and do not plan to go abroad during studies also due to the fact that most of them work.

The courses are well covered with several textbooks, typically in Lithuanian, English and Polish languages, what makes the studies easier for the students. Each year about 10 students come from Turkey, Germany and other countries under ERASMUS to study several courses of this study programme and as a consequence teaching is practically in English. The learning materials are made available for the students by the teaching staff through the Moodle e-learning system or on the web. The Programme is run by very well experienced teachers that have also very good experience in research. During the on-site visit it was observed that master thesis are indeed related to the study programme.



### **2.3. Teaching staff**

The total number of teachers of the programme is 14. The study programme is provided by the staff that meets all legal requirements. Teaching staff is formed in accordance to the General Regulation of Technology (Engineering) Sciences, the Law on Studies and Science of the Republic of Lithuania.

The qualifications and the number of the teaching staff are adequate to ensure learning outcomes. As in 2015 (SER, p.26) - the total number of teachers of the programme was 14. It increased since last evaluation in 2012 by 2 associate professors and currently 7 professors and 7 associate professors serve the programme study Electrical Energetics Systems Engineering. At present 3 associate professors are in the group age 31 to 40 years, 1 associate professor is in the group 51 to 60 years and 3 associate professors are older than 60 years. In the group of professors – 2 fall in the age range 41 to 50 years, 3 in 51 to 60 and 2 are older than 60 years. In summary average age of University professors of the evaluated study programme is about 55 years. Recently 3 young teachers join the study programme. The average age of teachers is relatively good that has positive impact on the programme sustainability. Typically, all teachers have long experience, both pedagogically and in the speciality. The teachers actively participate in professional development: every lecturer has to spend 2 to 6 months at companies or scientific institutions in a 5-year tenure, since the last evaluation two teachers visited universities abroad and one visited a company. They also participate in scientific conferences in Lithuania and abroad that are directly related to the study programme. The data shows that recommendations, formulated during the last evaluation concerning strengthening international cooperation with universities having doctoral programme has been fulfilled.

The teaching staff turnover is able to ensure an adequate provision of the programme. As a positive thing – enthusiastic young teachers in the beginning of their academic career were presented to the evaluation team. The administration of VGTU provides possibilities for teaching staff to attend conferences, workshops, and exhibitions. So the overall situation is quite reasonable.

The programme teaching staff is actively involved in scientific research in general. Regarding the involvement to the scientific research - during the period 2009-2014 the programme teachers published 334 scientific articles among them 189 registered in publication database of Institute for Scientific Information „ISI Web of Science“ that has a citation index. The average number of publications per staff member is 3,77 publications per year. There are also some joint conference publications with students but this situation has to be improved. Besides this point, the teachers of the evaluated study programme are active in research projects that are particularly related to the study programme. Several national and international supported

projects are listed in the SER (on pages 25 and 26). In overall scientific activities of the programme teachers looks good and this is probably due to the strong link of the study programme to the Centre of Physical Sciences and Technology that is very active in innovative projects. This works very well for the evaluated study programme.

As a recommendation, more activities for the administration and teaching staff have to be foreseen in attracting young people to study PhD programme in electrical engineering to serve as replacements for the older teachers. Currently introduction of younger lecturers is required, because continuation is very important since this study programme has a good perspective. It would be nice to see more scientific publications published by teachers together with students as co-authors. Also teachers from the industry rarely have lectures with students, thus there is still room for improvement here.

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

The premises for studies are adequate both in their size and quality. There are 12 classrooms of different size covering the total area of 920m<sup>2</sup> in the faculty. Laboratory work, diploma work, research activities are carried out at three different units: Faculty of Electronics, High Magnetic Field Institute and the Centre for Physical Science and Technology. During the on-site visit, the evaluation team saw facilities and equipment offered by these three units. Students have a good opportunity to have an access to very high national level laboratories especially in the Centre for Physical Science and Technology. Detailed list of equipment used for this study programme is listed in the SER (pages 29 to 30).

The teaching and learning equipment (laboratory and computer equipment, consumables) are adequate both in size and quality. A number of students do not exceed the number of work places. The number of students in the group usually does not exceed 15. Also, it was seen, that the lab facilities are modernized constantly. In the period of 2009-2015 the equipment in the Faculty of Electronics was renewed for approximately 90 thousand EUR. However, further development of labs with the latest (digital and smart) technologies would be highly appreciated by students, the staff and the stakeholders. Students have ability to use the VGTU Library and also the one that is located in the Faculty of Electronics. Students have access to more than 20 databases of the international scientific publications such as ScienceDirect, Zentralblatt MATH, Cambridge Journals, ENDNote Web, Project Euclid, RefWorks, etc. In addition, students can also access to the data bank of the National Library bibliography. Both University and Faculty library facilities are good in size and textbooks and journals that are necessary to study the Electrical Energetics Systems Engineering programme.

At this point evaluation team was surprised that there is no access to the IEEE Xplore at the University. This situation was discussed during the meeting with teachers. Although the Lithuanian IEEE Section exists (it gathers about 150 members) and is active, there is no access to this database in the country. It was previously available, but at present they do not have public access. Due to the fact that this database is very representative for electrical and electronic engineers an effort should be undertaken to find resources to buy it. Certainly the Faculty cannot buy it due to the high cost but the University or perhaps the IEEE Lithuanian Section could discuss what needs to be done to gain full access.

The higher education institution has adequate arrangements for students' research activities. Teaching materials (textbooks, books, periodical publications, databases) are adequate and accessible. Wireless network environment is installed at the Vilnius Gediminas Technical University. It allows only the University students and teachers to connect to the University databases and get the information they are interested in inside and outside the University. Also e-learning environment *Moodle* is widely used in the teaching process, allowing also distribution the teaching materials to students. Also the students are generally satisfied with the facilities of dormitories and free times zones.

Also it is worth to mention, the stakeholders have private equipment that can be used for the study programme but this requires a special agreement between the university and government to arrange it officially. It is a problem that can be discussed further because it would be very beneficial for the study programme. Some classrooms' and laboratories' furniture looks worn out but the evaluation team was informed that the whole facility would be moved to a new centre in two years' time.

### ***2.5. Study process and students' performance assessment***

The admission requirements to the VGTU are clear and well founded. The VGTU Admission Commission is responsible for admissions of students. There is a detailed admission criteria provided in VGTU website. Additional points on admission are given if student had scientific activities.

The organization of the study process ensures an adequate provision of the Programme and the achievement of the learning outcomes. There are good proportions between independent and contact work. Students must choose one of two specialisations upon admission. Students are also provided with the opportunity to choose optional and free subjects. It is positive to see that the University is willing to provide individual study programmes for foreign students and students with disabilities. This opportunity could be offered to all students in order to provide with possibility of more flexible and suited to their needs. Student workload is distributed evenly

throughout the week. However due to large amount of working students, lectures are only being carried out in the second part of the day. Lectures are offered in English as well as in Lithuanian in case there is a need from students or there are foreign exchange students. Generally, the study system in VGTU seems very flexible and can easily fit to the student needs.

Students participate in scientific, artistic, sports and applied research activities. There is a rather small number of students participating in applied research activities. The students should be more encouraged to write joint papers together with their teachers.

The University provides a great variety of artistic activities in which students can participate. Students are encouraged to participate in these activities as VGTU offers one-time grants for good achievements in these fields. However, only students having state funding can receive these grants.

Students of the study programme participate in student mobility programs. There is also a significant number of foreign ERASMUS students.

The higher education institution ensures an adequate level of academic and social support. Generally, VGTU has a good system for consulting students on study process as well as study material. However, students are not aware of some important information relevant to the study process such as Study Programme Committee and possibility for individual studies. It is very positive to see that the University has a Career direction. It can be note that some of the main references for particular subjects can be scarily found in VGTU or its faculties libraries (Annex 8.1) (examples: *Thermodynamic Analysis of Energy Systems*, *Fundamentals of Research and Innovations*, *Virtual Instrumentation*). Students at VGTU are provided with social, incentive memorial and one-time scholarships. The University offers allowances for students with bad financial situation.

The assessment system of students' performance in the College is clear, publicly available and adequate. The assessment system of particular subject is described in its description (Annex 8.1). Part of final result of the student consists of compulsory tasks performed during the semester. Other part is for exams during exam session. This helps to distribute student workload evenly during the semester. The result of an exam can be appealed. The assessment and procedure for master thesis defence is clear. It is positive to see the University is taking measures to prevent academic dishonesty.

Generally speaking, VGTU does not have detailed information on their graduates' employability. However, the University analyses the need for their specialist in labour market.

As a recommendation, it would be convenient to find motivational tools for not state funded students to encourage them to participate in research activities. Students should be more

acquainted with relevant information about study process. Creation of a system to monitor careers of graduates would be greatly appreciated as well.

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

The implementation of the Electrical Energetics Systems Engineering study programme is done by the Study Programme Committee. The internal assessment involves students, teachers, employers and graduates into the processes of the SP assessment and improvement.

Information and data on the implementation of the programme are collected twice a year after winter and spring sessions. Starting from 2007 an automated system of students' surveys was introduced at the university information system (<http://medeine.egtu.lt/studentams/login.jsp>). Students fill out questionnaire concerning the teaching quality, quality of the teaching methods, prepared material and the preparation for lectures. Next, this data is analysed (it is an automated system) and teachers have an access to his/her survey by directly connecting to this system through "Lecturers" field.

The outcomes of the evaluations of the programme are used for the improvement of the programme: but also to improve the teaching process and to give the necessary feedback of the teachers and about the teachers and the subjects. The evaluation and improvement processes involve basically the administration, staff and the students. Each teacher upgrades the courses annually by 5% individually, this is not implemented by the Study Programme Committee. If changes are big (more than 50%) they are to be approved by the University authorities. The role of industry that is also involved in the process is not big. Thus the social partners' involvement within the improvement of the programme should be improved.

The internal quality assurance measures are effective and efficient. It works well both at the Faculty and University level. As an overall impression, it is quite positive involvement of the all parties into the development and maintenance of the study process could be marked. Due to a small number of students that is currently equal to a number of teachers in the study programme there exists a good collaboration between teachers, students and administration.

As a recommendation better feedback on the study process may be expected from the social partners. Practically there are no teachers from industry. Occasionally social partners have lectures for students. Also they cannot offer equipment because it requires an agreement between company and university that formally is very difficult to arrange. Instead individually they offer to use laboratory in their companies. In addition, it seems that there is no regular feedback collected from graduates on the level of satisfaction with results of studies and suggestions on improvement. These bonds have to be strengthened.

### **III. RECOMMENDATIONS**

1. A very small number of students publish papers during studies. Teachers and administration have to encourage them to change this situation. More students have to participate in research activities considering this is a master level programme. The students could publish articles as co-authors along with their teachers.
2. The titles of specialisations should more clearly reflect their content. The content should include the latest achievements in science and technologies that are related to smart grid, energy efficiency, electric vehicles and electricity market concept.
3. More things could be done by the administration and teaching staff to attract young people to study PhD programme in electrical engineering. PhD graduates can potentially replace older teachers and this process should be monitored.
4. Teachers from industry rarely have lectures with students, thus there is room for improvement here.
5. Due to the fact that IEEE database is very representative for electrical and electronic engineers an effort should be undertaken to find resources to buy it. Certainly Faculty cannot buy it due to the high cost but University or perhaps the IEEE Lithuanian Section could cooperate and implement this recommendation.
6. Students should be more acquainted with relevant information regarding the study process. Creation of a system to monitor careers of graduates would be greatly appreciated.

### **IV. SUMMARY**

The current evaluation report of the Electrical Energetics Systems Engineering (state code 621H62002) master study programme at Vilnius Gediminas Technical University (further referred as VGTU) is based on the Self-Evaluation Report (further referred as SER), public materials and on the on-site visit by the International Evaluation Team.

The qualifications gained by the graduates are certified by a master degree. The VGTU is awarding the Master of Electrical Engineering diploma in Electrical Energetics Systems Engineering within two specializations: Modern Electrical Power Engineering, Technologies of Electrical Energetics.

The study programme is run together with lecturers and scientists from the Centre of Physical Science and Technology, Perspective Technology Applied Science Institute. Today energetics is one of the most strategic parts of Lithuanian economy that heavily influence overall country progress. According to National Lithuanian strategy it is planned that before 2020 the independence in energetics will be foreseen and number of graduates in the field of energetics are strongly needed.

As an overall impression of the programme aims and learning outcomes – it is really positive. The evaluators have clear impression, that the programme aims and learning outcomes are well accepted by the students, staff and stakeholders.

The curriculum design meets legal requirements. The structure of the study programme is based on the requirements for university studies. The scope of the programme, its subjects, contact and individual work hours, fully correspond to the requirements of legal acts and other legislation documents of the Republic of Lithuania.

As a recommendation the titles of specialisations should more clearly reflect their content. Their content should include the latest achievements in science and technologies that are related to smart grid, energy efficiency, electric vehicles and electricity market concept.

Study subjects and/or modules are spread evenly; their topics are not repetitive. The logical links and sequence of study subjects are explained properly. The curriculum is well designed and implemented. The content of the subjects and/or modules is also consistent with the type and level of the studies. The subjects learning outcomes very well designed and they are successfully achievable in the process of studying. During the on-site visit the graduates expressed their wish to have more laboratory exercises. Nevertheless, the current students are satisfied with this programme and do not plan to go abroad during studies also due to the fact that most of them work.

The Programme is run by very well experienced teachers that have also very good experience in research. The study programme is provided by the staff meeting legal requirements. The qualifications and the number of the teaching staff are adequate to ensure learning outcomes. The programme teaching staff is actively involved in scientific research in general. As a recommendation, more activities for the administration and teaching staff are required in attracting young people to study PhD programme in electrical engineering. It would be nice to see more scientific publications published by teachers together with students. Also it can be noted that teachers from industry rarely have lectures with students, so there is room for improvement here.

The premises for studies are adequate both in their size and quality. The teaching and learning equipment (laboratory and computer equipment, consumables) are adequate both in size and quality. A number of students do not exceed the number of work places. Also, it was seen, that the lab facilities are modernized constantly. Some classrooms' and laboratories' furniture looks worn out but the evaluation team was informed that the whole facility would be moved to a new centre in the near future. Due to the fact that IEEE database is very representative for electrical and electronic engineers an effort should be undertaken to find resources to buy it.

The organization of the study process ensures an adequate provision of the Programme and the achievement of the learning outcomes. There are good proportions between independent and contact work. Student workload is distributed evenly throughout the week. However due to large amount of working students' lectures are only being carried out in the second part of the day. Lectures are offered in English as well as in Lithuanian in case there is a need from students or there are foreign exchange students. Generally, study system in VGTU seems very flexible and can easily fit to the student needs. As a recommendation, it would be convenient to find motivational tools for students to encourage them to participate in research activities. Students should be more acquainted with relevant information about study process. Creation a system to monitor career of graduates would be greatly appreciated.

The organization of the study process ensures an adequate provision of the Programme and the achievement of the learning outcomes. The internal quality assurance measures are effective and efficient. It works well both at the Faculty and University level. As an overall impression, it is quite positive that there is involvement of all parties into the development and maintenance of the study process. Due to a small number of students that is currently equal to a number of teachers in the study programme there exists a good collaboration between teachers, students and administration. As a recommendation a better feedback on the study process may be expected from the social partners. To summarize, the study programme Electrical Energetics Systems Engineering has a good perspective.



## V. GENERAL ASSESSMENT

The study programme Electrical Energetics Systems Engineering (state code – 621H62002) at Vilnius Gediminas Technical University is given **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. dr. habil. Krzysztof Kozlowski
Grupės nariai: Team members:	Doc. dr. Sergey Shaposhnikov
	Emeritus prof. dr. Erkki Lakervi
	Doc. dr. Gediminas Valiulis
	Mr. Ignas Gaižiūnas

**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO ANTROSIOS PAKOPOS  
STUDIJŲ PROGRAMOS *ELEKTROS ENERGETIKOS SISTEMŲ INŽINERIJA*  
(VALSTYBINIS KODAS – 621H62002) 2015-12-02 EKSPERTINIO VERTINIMO  
IŠVADŲ NR. SV4-321 IŠRAŠAS**

&lt;...&gt;

**V. APIBENDRINAMASIS ĮVERTINIMAS**

Vilniaus Gedimino technikos universiteto studijų programa Elektros energetikos sistemų inžinerija (valstybinis kodas – 621H62002) 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)

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**IV. SANTRAUKA**

Šis Vilniaus Gedimino technikos universitete (toliau – VGTU) vykdomos *Elektros energetikos sistemų inžinerijos* magistrantūros studijų programos (valstybinis kodas 621H62002) išvadų vertinimas yra pagrįstas savianalizės suvestine (toliau – SAS), viešai skelbiama medžiaga ir tarptautinių ekspertų grupės vizitu.

Už kvalifikacijas, kurias įgyja VGTU absolventai, suteikiamas magistro laipsnis ir dviejų specializacijų – moderniosios elektros energetikos inžinerijos ir elektros energetikos technologijų – elektros inžinerijos magistro diplomai.

Ši studijų programa yra vykdoma kartu su Fizinių ir technologijos mokslų centro ir Perspektyvinių technologijų taikomųjų tyrimų instituto dėstytojais bei mokslininkais. Šiandien

energetika yra viena iš strategiškiausių Lietuvos ūkio šakų, turinčių stiprų poveikį bendrai šalies pažangai. Lietuvos nacionalinėje strategijoje numatyta iki 2020 m. pasiekti energetinę nepriklausomybę, o tam reikės daug energetikos srities.

Bendras įspūdis apie šios programos tikslus ir numatomus studijų rezultatus tikrai geras. Vertintojai aiškiai mato, kad programos tikslus ir numatomus studijų rezultatus palankiai vertina studentai, dėstytojai ir socialiniai dalininkai.

Programos sandara atitinka teisės aktų reikalavimus. Studijų programos struktūra yra pagrįsta universitetinėms studijoms taikomus reikalavimus. Programos, jos dalykų apimtis ir kontaktinių bei savarankiškam darbui skirtų valandų skaičius visiškai atitinka Lietuvos teisės aktų ir kitų teisinių dokumentų reikalavimus.

Rekomenduojama, kad specializacijų pavadinimai aiškiau atspindėtų jų turinį. O turinys turėtų apimti naujausius mokslo ir technologijų pasiekimus, susijusius su moderniu energetikos tinklu, energijos efektyvumu, elektra varomomis transporto priemonėmis ir elektros energijos rinkos koncepcija.

Studijų dalykai ir (arba) moduliai išdėstyti nuosekliai, jų temos nesikartoja. Tinkamai paašškinti dalykų loginiai ryšiai ir seka. Studijų turinys tinkamai parengtas ir tinkamai įgyvendinamas. Dalykų ir (ar) modulių turinys atitinka studijų rūšį ir pakopą. Numatomi dalykų studijų rezultatai labai gerai parengti ir yra sėkmingai pasiekiami studijų eigoje. Per vizitą absolventai išreiškė pageidavimą, kad būtų daugiau praktikuojamasi laboratorijose. Nepaisant to, dabartinius studentus ši programa tenkina, ir jie neketina studijų laikotarpiu vykti į užsienį, be abejo, ir dėl to, kad daugelis iš jų dirba.

Programą vykdo didelę patirtį, be kita ko, ir mokslinių tyrimų srityje, turintys dėstytojai. Šios studijų programos dėstytojai atitinka teisės aktų reikalavimus. Dėstytojų kvalifikacija ir skaičius yra pakankami numatomiems studijų rezultatams užtikrinti. Programos dėstytojai aktyviai dalyvauja moksliniuose tyrimuose apskritai. Rekomenduojama, kad administracija ir dėstytojai labiau stengtųsi pritraukti jaunimą studijuoti doktorantūrą elektros inžinerijos srityje. Būtų puiku, jei dėstytojai kartu su studentais skelbtų daugiau publikacijų. Dar pažymėtina, kad dėstytojai iš pramonės sektoriaus retai skaito paskaitas studentams, taigi ši sritis yra tobulintina.

Studijoms skirtos patalpos yra tinkamos ir jų pakanka. Studijoms skirta įranga (laboratorinė, kompiuterinė, reikmenys) yra tinkama ir jos pakanka. Studentų skaičius neviršija darbo vietų skaičiaus. Be to, buvo matyti, kad laboratorijos nuolat modernizuojamos. Kai kurių kabinetų ir laboratorijų baldai atrodo nusidėvėję, bet ekspertų grupei buvo pasakyta, kad netrukus visos *patalpos* bus perkeltos į naują centrą. Dėl to, kad IEEE duomenų bazė elektros ir elektronikos inžinieriams yra labai svarbi, reikėtų pasistengti rasti lėšų jai įsigyti.

Studijų proceso organizavimas užtikrina tinkamą programos vykdymą ir numatomų studijų rezultatų pasiekimą. Savarankiškam darbui skirtų ir kontaktinių valandų skaičiaus santykis geras. Studentų krūvis proporcingai paskirstomas savaitėje. Tačiau dėl didelio dirbančių studentų skaičiaus paskaitos vyksta tik antrą dienos pusę. Jei studentai pageidauja arba jei yra pagal mainų programą atvykusių užsienio studentų, paskaitos siūlomos ir anglų, ir lietuvių kalba. Apskritai, VGTU studijų sistema, atrodo, yra labai lanksti ir lengvai priderinama prie studentų poreikių. Rekomenduojama ieškoti studentų motyvavimo priemonių, paskatinsiančių juos dalyvauti mokslinių tyrimų veikloje. Studentams turėtų būti suteikiama daugiau informacijos apie studijų eigą. Būtų labai naudinga sukurti absolventų karjeros stebėjimo sistemą.

Studijų proceso organizavimas užtikrina tinkamą programos vykdymą ir numatomų studijų rezultatų pasiekimą (*kartojasi*). Vidinio kokybės užtikrinimo priemonės yra veiksmingos. Jos yra efektyvios ir fakulteto, ir universiteto lygiu. Apskritai atrodo, kad labai pozityvu, jog visos (suinteresuotos) šalys dalyvauja tobulinant ir prižiūrint studijų procesą. Dėl nedidelio studentų skaičiaus, kuris šiuo metu yra lygus šios studijų programos dėstytojų skaičiui, dėstytojų, studentų ir administracijos bendradarbiavimas yra geras. Rekomenduojama gerinti socialinių partnerių grįžtamąjį ryšį apie studijų procesą. Apibendrinant galima pasakyti, kad *Elektros energetikos sistemų inžinerijos* studijų programa yra perspektyvi.

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### **III. REKOMENDACIJOS**

1. Studijų eigoje labai mažai studentų skelbia straipsnius. Dėstytojai ir administracija turi skatinti juos keisti šią padėtį. Atsižvelgiant, kad tai yra magistrantūros programa, daugiau studentų turi dalyvauti mokslinių tyrimų veikloje. Studentai galėtų skelbti straipsnius kartu su dėstytojais kaip bendraautoriai.
2. Specializacijų pavadinimuose turėtų aiškiau atsispindėti jų turinys. Į turinį reikėtų įtraukti naujausius mokslo ir technologijų pasiekimus, susijusius su moderniu energetikos tinklu, energijos efektyvumu, elektra varomomis transporto priemonėmis ir elektros energijos rinkos koncepcija.
3. Administracija ir dėstytojai galėtų labiau pasistengti, kad pritrauktų jaunus žmones į Elektros inžinerijos doktorantūros programą. Doktorantūros programos absolventai gali pakeisti vyresnius dėstytojus; šis procesas turėtų būti kontroliuojamas.
4. Dėstytojai iš pramonės sektoriaus retai skaito paskaitas, taigi šioje srityje yra ką tobulinti.
5. Kadangi IEEE duomenų bazė elektros ir elektronikos inžinieriams yra labai svarbi, reikėtų pasistengti rasti išteklių jai įsigyti. Fakultetas, žinoma, negali jos nusipirkti dėl aukštos kainos,

Universitetas galbūt galėtų įgyvendinti šią rekomendaciją padedamas Elektros ir elektronikos inžinierių instituto (IEEE) Lietuvos skyriaus.

6. Reikėtų geriau supažindinti studentus su atitinkama informacija apie studijų eigą. Būtų labai naudinga sukurti absolventų karjeros stebėjimo sistemą.

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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)