STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

KAUNO TECHNOLOGIJOS UNIVERSITETO

STUDIJŲ PROGRAMOS *ŠILUMOS ENERGETIKA IR TECHNOLOGIJOS (valstybinis kodas – 612E30001)*

VERTINIMO IŠVADOS

EVALUATION REPORT

OF *THERMAL ENERGY AND TECHNOLOGY* (*state code – 612E30001*)

STUDY PROGRAMME

at KAUNAS UNIVERSITY OF TECHNOLOGY

1. **Prof. George Yadigaroglu (Chair of the Review Panel),** *academic*
2. **Prof. Andres Siirde,** *academic*
3. **Dr. Simon Walker,** *academic*
4. **Dr. Rolandas Urbonas,** *representative of social partners*
5. **Ms Julija Baniukevič,** *students' representative*

Evaluation Coordinator: Ms Eglė Grigonytė

Išvados parengtos anglų kalba

Report language – English

Vilnius
2015

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	***Šilumos energetika ir technologijos***
Valstybinis kodas	612E30001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Energijos inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė (4 metai), ištęstinė (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. ISAK-565.

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	***Thermal Energy and Technology***
State code	612E30001
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 studies (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	19th May 1997, under the Order of the Minister of the Ministry for Education and Science of the Republic of Lithuania No. ISAK-565.

CONTENTS

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 Order No. 1-01-162 of 20th 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 following main 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 documents have been provided by the HEI during the site-visit:

No.	Name of the document
1.	Samples of examination papers
2.	Samples of semester and diploma project reports ("theses")

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

The mission of Kaunas University of Technology (hereafter, KTU) is defined in a way similar to those of European leading universities. The SER states that "Mission of Kaunas University of

Technology is to provide research-based studies of international level," that "Vision of Kaunas University of Technology is to be a leading European university," and that the "Structure and staff activities of the University are oriented towards research and innovations in the area of fundamental sciences and technologies." KTU seems to be well linked internationally. The Review Panel notes with satisfaction that "Funds from international research programmes comprise 25 percent of KTU's annual research budget; 46 percent of R&D capital comes from foreign companies (2013)." The structure of the University resembles that of similar institutions in Europe and overseas. The study programmes have been converted from the former Diploma to the European Bachelor-Master's scheme.

According to the SER, the preparation of engineers in thermal engineering started at the Technical Faculty of Lithuania University (later Vytautas Magnus University, Kaunas University) in 1922. Similar programmes continued at Kaunas University (which in 1950 was named as Kaunas Polytechnic Institute, and since 1990 has its present name, KTU).

The SER states that "the study programme *Thermal Energy and Technology* is aimed to provide comprehensive knowledge of thermal engineering, develop abilities and practical skills to design and implement thermal systems and processes, and take the role of engineering activities management." Specializations are offered in: Thermal Power Engineering; Refrigeration Engineering; Petroleum, Gas and Biofuel Engineering.

The core-study programmes at KTU are similar to those of other leading European universities; specializations differ.

The Programme is designed to satisfy the educational needs of a well defined industry, i.e. certain areas of thermal energy engineering such as central heating, refrigeration, thermal applications related to renewable energies, fuels, etc. The future employers are well identified based on the current and forecasted situation in this sector of the economy. It is estimated that the industry of Lithuania will need at least 20 to 30 graduates of this study programme per year.

In general, the SER is comprehensive and detailed. It gives a detailed description of the situation in the Programme, but provides relatively little "evaluation" (criticism, approval…). It tends to often show compliance with applicable Regulations rather than assess the quality or discuss the situation. Occasionally, the SER states that requirements are met without specifying numbers, etc.

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

As the Panel reviewed both the first and second cycle programmes in the thermal engineering area at KTU and certain meetings were common for both programmes, the reader will find a number of identical or quasi-identical sections in the two corresponding reports.

1.4. The site visit of the Review Panel

The Review Panel (or Panel) met with the Evaluation Coordinator and SKVC staff at the SKVC headquarters in Vilnius the morning of Monday, October 12 for an introductory meeting. In the afternoon of October 12 the Panel had an internal meeting to discuss the SERs and to prepare the forthcoming visits. At the end of the day, it moved to Kaunas.

On Tuesday and Wednesday, the Panel visited the *Department of Thermal and Nuclear Engineering* to evaluate both the first and second cycle programmes in *Thermal Energy and Technology* and *Thermal Engineering*, respectively. The Panel had meetings with senior management and faculty administration staff, the teaching staff, students, alumni, and employers and social partners. The schedule of the visits is given in the following Table. At the end of each day, after a private Panel discussion, the Chair of the Panel summarized the first impressions to the university community.

The members of the Review Panel had during their visits and the various meetings professional, open and cordial discussions with the administrative and teaching staff. They are indebted to the Department for the hospitality extended to them and to SKVC and the Coordinator for the good organization of the evaluation.

12th October, Monday	**SKVC office, A. Goštauto St. 12, Vilnius**
10.00 – 12.00	Introductory meeting at SKVC to discuss: 1. Higher Education System in Lithuania; 2. Evaluation and Accreditation of Study Programmes; 3. Methodological Guidelines. Visits. Final Reports.
13.20 – 16.00	Panel meeting, discussion about the SERs, preparation for the visits, etc.
13th October, Tuesday	**Visit at Kaunas University of Technology**
09.00 – 10.15	Meeting with senior management and faculty administration staff (evaluation of four study programmes: *Thermal Energy and Technology, Thermal Engineering, Nuclear Energy (BA), Nuclear Energy (MA))*
10.20 – 11.05	Meeting with staff responsible for the preparation of the SER (evaluation of *Thermal Energy*

	and Technology study programme)
11.30 – 13.00	Meeting with teaching staff (evaluation of two study programmes: *Thermal Energy and Technology, Thermal Engineering*)
13.05 – 13.50	Meeting with students (evaluation of *Thermal Energy and Technology* study programme)
15.00 – 15.30	Review of students' term and final papers (theses), examination material (evaluation of *Thermal Energy and Technology* study programme)
15.35 – 16.20	Meeting with alumni (evaluation of *Thermal Energy and Technology* study programme)
16.25 – 17.10	Private Team discussion and finalisation of the visit
17.10 – 17.25	Introduction of general remarks of the visit to the University community
14th October, Wednesday	**Visit at Kaunas University of Technology**
09.00 – 09.45	Meeting with staff responsible for the preparation of the SER (evaluation of *Thermal Engineering* study programme)
09.50 – 10.35	Meeting with students (evaluation of *Thermal Engineering* study programme)
10.40 – 12.10	Visiting classrooms, lecture halls, libraries, laboratories, other facilities (studios, teaching spaces, computer rooms, etc.) (evaluation of four study programmes: *Thermal Energy and Technology, Thermal Engineering, Nuclear Energy (BA), Nuclear Energy (MA))*
13.20 – 13.50	Review of students' term and final papers (theses), examination material (evaluation of *Thermal Engineering* study programme)
13.55 – 15.25	Meeting with employers and social partners (evaluation of two study programmes: *Thermal Energy and Technology, Thermal Engineering*)
15.30 – 16.15	Meeting with alumni (evaluation of *Thermal Engineering* study programme)
16.20 – 17.05	Private Team discussion and finalisation of the visit
17.05 – 17.20	Introduction of general remarks of the visit to the University community

1.5. The Review Panel

The Review Panel was composed according to the *Description of the Review Panel 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 *13-14/10/2015*.

1. **Prof. George Yadigaroglu (Chair of the Review Panel)**

Professor emeritus at ETH-Zürich, Switzerland.

2. **Prof. Andres Siirde**

Professor at Tallinn University of Technology, Estonia.

3. **Dr. Simon Walker**

Reader at Imperial College London, United Kingdom.

4. **Dr. Rolandas Urbonas**

Deputy Director at Lithuanian Energy Institute, Lithuania.

5. **Ms Julija Baniukevič**

Doctoral candidate of Physical Sciences at Vilnius University, Lithuania.

II. PROGRAMME ANALYSIS

Introductory general remarks

The SER states that "the study programme *Thermal Energy and Technology* is aimed to provide comprehensive knowledge of thermal engineering, develop abilities and practical skills to design and implement thermal systems and processes, and take the role of engineering activities management."

The Review Panel was impressed by the extremely close collaboration between industry and the Programme. This evidently results in graduates that were immediately employable by the industry that was eager to hire them. All stakeholders, faculty, students, alumni and employers were very pleased with this position. The Programme contains the engineering subjects that all partners see as useful within the scope of thermal engineering.

However, the Panel became concerned that from a broader, educational point of view this was encouraging and concealing some failings and lost opportunities. The Programme has set itself very limited aims, of meeting the very limited and constrained needs of a single, rather narrow industrial sector, and indeed meeting them in a rather narrow geographical area. It is doing this very well, but in doing so the Panel believes it is failing to "educate" students, in the true and full, broader meaning of this term. At age 18, the students are entering a very focused programme, with essentially a single pre-determined destination, while the Panel would rather wish that they were starting a more stimulating and broadening phase of their lives, which would fit them for a much more varied range of later opportunities.

2.1. Programme aims and learning outcomes

A great amount of effort is devoted in the SER to define intended learning outcomes at programme as well as study subject levels and link these to the contents of the subjects. Addressing the slightly lower-level issues of Programme design, the top-level intended learning outcomes as defined broadly (A1, ..., F5, Table 2.1 of the SER) fail to consider the fact that the education provided in the first two years of study implicitly aims at producing "general Mechanical" engineers in the first place and address directly the specialization provided in the later years. As such, they are also too general and occasionally repetitive or obvious. For example, intended learning outcomes A1 and A3 state: "Knows and understands scientific and mathematical principles underlying thermal engineering" and "Has systematic understanding of scientific and mathematical principles and the key aspects and concepts of thermal engineering." In this case the only difference between top-level intended learning outcomes is "knows" versus

"has systematic understanding." In addition, the words "mathematical principles" are not properly used.

The details of the subjects taught can be found, however, in the list of contents, the *Syllabus*, of the particular subjects in the Appendix giving the *Study Modules.* The Review Panel felt that it would have been better to concentrate the effort on the more detailed definition of the table of contents of the subjects and their relationship to providing to the students the knowledge and skills required for thermal engineering. This would have enabled comparisons of this particular curriculum to similar international ones.

Subject to the general observations above and the Introductory General Remarks:

The Programme aims and intended learning outcomes are usually well defined and are publicly accessible in both English and Lithuanian, although improvements in defining details and more specific intended learning outcomes would be welcome.

The Programme aims and intended learning outcomes are based appropriately on the academic and professional requirements, public needs and the needs of the labour market. With the limitations (breath of education) noted above, the Programme meets very well the needs of the closed circle: faculty-students-alumni-local industry-employers.

The Programme aims (though limited) and intended learning outcomes as defined are consistent with the type and level of studies and the level of qualifications offered. Best international practice would involve broader and more demanding programme aims.

The name of the Programme is somewhat broad but the Programme itself does not cover all aspects of thermal engineering that is a very broad discipline. As stated above, the Programme is designed to meet the needs of a subset of national industries and as such, its intended learning outcomes, content and the qualifications offered are fully compatible with each other.

2.2. Curriculum design

The volume of the study programme consists of 240 ECTS, which is in compliance with the Order of the Minister for Education and Science of the Republic of Lithuania 09/04/2010 No. V-501. The duration of full-time studies is four years, while for part-time studies is six years. Out of 240 ECTS of the study programme, 165 ECTS are for special subjects in the study field (should be no less than 165 ECTS), 15 ECTS are for general university study subjects (should be no less than 15 ECTS) and 45 ECTS for subjects elected by the student (should be no more than 60 ECTS) and 15 ECTS

for the practices (should be at least 15 ECTS). The final degree thesis contains 15 ECTS (should be at least 12 ECTS). The number of subjects taught per semester shall not be more than seven according to the regulations. For the Programme the maximum taught number of subjects is six. The Panel concludes that the design of the curriculum meets the legal requirements.

The study subjects are spread evenly over semesters and their themes are generally not repetitive. The scope of the Programme is sufficient to ensure the achievement of the intended learning outcomes.

The content of the subjects is consistent with the particular aims and the type of the studies as discussed above. The Programme subjects fit well with the specialization in thermal energy and technology and provide the theoretical knowledge and practical skills necessary for the specialists in the current labour market. However, certain subjects, in particular specialization study subjects seem not to be taught at the level at which they are in institutions of higher learning in other countries. This is evident in the choice of the topics of the final degree projects (oriented often towards day-to-day, ordinary engineering applications), in some samples of the examination questions provided to the Panel (that were based on memorization of properties rather than calling for independent thinking), and in the choice of laboratory exercises that were conducted partly with vocational-education level equipment.

There are naturally interactions between the study subjects, with common issues touched upon as is proper and scientifically appropriate, but their themes are generally not repetitive.

Generally, the content and methods of the study subjects are appropriate for the achievement of the intended learning outcomes and the scope of the Programme is sufficient to ensure achievement of the intended learning outcomes within the limits about the specialization of the Programme noted above.

The Programme meets the needs of the stakeholders mentioned above within its niche, but cannot necessarily address all the latest achievements in science and technologies. By design, it may not provide the broader educational basis and the independent and innovative-thinking abilities needed to address new areas of thermal technologies as also stated in the Introductory General Remarks.

The Review Panel would encourage the Faculty to re-examine the offering and their tables of contents and possibly offer, rather than *Specialization Subjects*, a number of electives from which the students could build individual specializations. Indeed some subjects in a

specialisation area could fit under more than one heading and the students may be unnecessarily prohibited from following a course of interest for their specialization.

2.3. Teaching staff

According to the Order of the Minister for Education and Science of the Republic of Lithuania 09/04/2010 No. V-501, "at least half of the subjects in the study field must be taught by scientists or scholars." According to the SER, the Programme teaching staff (co-ordinators of the subjects) consists of 10 professors, 24 associated professors and five lecturers (academic position). In the Programme all but one subject are taught by scientists (i.e. persons having doctoral degree). The Panel concludes that the teaching staff meets the legal requirements.

The number of teaching staff currently is sufficient and adequate to ensure the achievement of the intended learning outcomes.

According to the SER, 31 % of the Programme teachers are above 61 years old, including six out of ten professors (60 %). 67 % of teachers are above 50 years old (and 100 % of professors). The number of the teaching staff is adequate for the short term, but their average age is high and a sizable fraction of the teachers is very near retirement without clear plans for renewal; teaching staff turnover may not be sufficient to ensure an adequate provision of the Programme.

All core subjects' co-ordinators have one to three other teaching staff (doctoral student, lecturer or associate professor). In core selective study subjects several subject co-ordinating teachers have other teaching staff.

The *Department of Thermal and Nuclear Energy*, which is co-ordinating the Programme, has five doctoral students. In the discussions with the teachers of the Programme, it was found that only five teachers of the *Department of Thermal and Nuclear Energy* were accredited to have doctoral students, (i.e., according to the rules, in the last five years had published three articles in journals referred to in the Thomson-Reuters WoS database). The SER authors group stated that rather soon the number of such teachers will reach ten, since a number of their publications are submitted/accepted in journals. On the other hand, none of the Department staff (also taking into account age limitations) is currently eligible to participate in doctoral-degree defence committees, where the requirement is to have in the last five years five articles published in journals referred to in the Thomson-Reuters WoS (with some additional qualifications). These observations (based on information provided in the SER and its annexes) show that rather limited research is done, as also reflected in the small number of publications.

The University provides opportunities for staff professional development (traineeship or work as associated researcher at foreign study and research institution, traineeship at industrial enterprises and organizations; courses, seminars, and other events for professional development). The SER states that "all lecturers of the programme developed their qualification in the period of the last 5 years by using the above mentioned means." No details were provided regarding the extent and the scientific level of these activities. The SER states as "Weakness" that "not all the teachers are internationally active and do not participate in international academic exchange programmes." The Panel recommends more visits to European educational institutions, sabbaticals abroad and similar activities that go beyond the simple enhancement of teaching skills.

There is limited involvement of the teaching staff in research activities, as witnessed by the not very long list of publications of the faculty where, there are not many publications in international peer-reviewed journals and, in particular, few publications in the subjects taught by the teachers are found by a detailed examination of the list of publications of the teachers. During the laboratory visits there was not much evidence of faculty research in the laboratories.

Review Panel's recommendation: the necessary renewal of the faculty could be an opportunity to hire new younger staff members with broad interests in general and strong research interests in particular. The Department is facing the challenge of creating the conditions for attracting such individuals, in particular from other institutions of higher learning to avoid excessive in-breeding.

2.4. Facilities and learning resources

The Department is located in partly renovated, pleasant facilities. The premises for studies are adequate both in their size and quality.

Most of the laboratories are situated in the new campus, except for the Fuel Combustion Laboratory and the Laboratory of Fuel Engineering Systems that are still located in the old facilities. These two laboratories are also used for research by the staff of the Department. The equipment of these includes solid- and gas-fuel small-scale boilers; there is also relatively new measuring equipment like fuel gas analyzer, a temperature controller etc.

The Review Panel could find in the laboratories "Machine Elements Educational Laboratory, Laboratory of Strength of Materials" new, modern equipment of the company GUNT. These were commercially available set-ups used for a range of trainings from vocational to university level. The

SER mentions as a "weakness" that "there are still some laboratories at which facilities are not enough updated to the sufficient level."

The teachers of the *Thermal Energy and Technology* and *Thermal Engineering* programmes had prepared 30 textbooks and other teaching materials that the Panel could partly see when visiting the library of the Faculty.

The library is well equipped and has access to electronic media. There is room for the students to study. The teaching materials are generally adequate and accessible.

In summary, the laboratory equipment is a mix of modern and some older, but pedagogically valid equipment. The "academic" level of the equipment varies. The library is well equipped and has access to electronic media. The students have access to a sufficient number of software packages. There is room for the students to study. The students have access to outside companies for practical training. The teaching materials are generally adequate and accessible.

2.5. Study process and students' performance assessment

The admission requirements are those of the Lithuanian system with a threshold of two and apparently provide the Department with well qualified entering classes. The number of students is uneven: it had declined in 2013 to strongly increase again in 2014 (the numbers of entering students between 2010 and 2014 were: 12, 15, 22, 11, 55). The SER states that the staff of the Programme use various means and methods to attract students such as leaflets, videos and other materials and information for presentations at annually organized higher school fairs, participation of lecturers in Open Days events, visits to motivate high school children, etc.

As witnessed by satisfied students, graduates and employers, the study process is effective in delivering the necessary intended learning outcomes to the graduates of the Programme.

As there is not much research in the Department, the students do not have many opportunities to perform research work, except for their projects. The SER states that there are possibilities for students to take part in the applied research projects and present their research results at the local conferences, but mostly students are involved only when they prepare final works. The Panel recommends presenting the students' works systematically in internal seminars and possibly at other outside conferences.

The students have opportunities to participate in student mobility programmes (in particular Erasmus), but they almost do not take advantage of these; the SER states that only five

participated in Erasmus programme during the evaluation period. The SER states that the reason of not participation is “that Lithuanian students are employed in companies and unwillingly leav[e] for [a] whole semester.”

KTU ensures an adequate level of academic and social support as summarized in the SER. During the site visit the Panel did not identify any problems.

The students’ assessment system is announced at the beginning of the semester and it is publicly available at the KTU web-page. There are unlimited possibilities to repeat examinations (with an extra fee). The Panel learned from the students and alumni that they consider examinations as fair and adequate.

The graduates of this Programme are absorbed easily by the industry. Both employers and employees were satisfied with the Programme. They felt that their education provided them the right tools and the professional activities of the majority of the graduates met the Programme providers’ expectations.

2.6. Programme management

In general programme management seemed appropriate. In particular: responsibilities for decisions and monitoring of the implementation of the Programme are clearly allocated. The management of the Programme is carried out in accordance with the Statute of KTU approved by decision Nr. XI-1194 of 30 October 2010 of the Chairman of the Parliament and the “Temporal Academic Regulamin” of KTU. The Programme administration and quality assurance are managed by the Vice-Rector for studies with the help of the Department of Academic Affairs. The Programme is constantly improved and updated by the Study Programme Committee for Electrical and Electronical Engineering, Environmental Engineering and Energy Engineering Study Programmes which has eleven members including three representatives of employers and three representatives of students. There is a designated Manager of the Programme who carries responsibility for the content and quality of the study programme.

According to the SER, the responsibilities for decisions and monitoring of the implementation of the Programme are clearly allocated and information and data on its implementation are regularly collected and analysed.

The outcomes of internal evaluations of the Programme are used for the improvement of the Programme. Constant quality evaluation of the Programme is carried out in compliance with KTU Guide of Quality. The Study Programme Committee mentioned above cooperates with the

Senate Studies and Academic Culture Committee and the Department via the Co-ordinator of the Programme and takes into account their proposals in decisions regarding renewal of the Programme or study subjects and preparation of new ones. Changes of the Programme are discussed and approved by the Faculty Council consisting of 15 members.

The Study Programme Committee presents its proposals which are agreed with the Faculty Council to the Department of Academic Affairs which summarizes propositions and presents them for approval to the Reactor's Office and the University Senate.

The Study Programme Committee certifies study subjects. It appoints reviewers for assessment of the prepared methodological and educational materials and makes recommendations regarding their status.

The proper conduct of the Programme and its improvements are ensured by the Programme Manager – a professor of the *Department of Thermal and Nuclear Energy*. The quality of study subjects is assured by the teachers/coordinators of these subjects.

The process of the Programme administration and its quality assurance are available in the University Academic Information System.

There are systematic student evaluations of the subjects and teachers for all subjects, but the Department is not satisfied with the very low response rate (about 10% of students taking the subject).

The Panel recommends that ways be found to increase the participation in the subjects' evaluations by the students. It also recommends that the (anonymous) evaluation results be presented to the class by the teacher and discussed.

The evaluation and improvement of the Programme processes involve stakeholders, and indeed more generally the close connections that evidently exist between the faculty and the relevant local industry are notable and good. For example, the problem of low numbers of entering students was addressed cooperatively with industry (an employer tuition reimbursement programme was implemented); employers take active part in the event "Career days" organized by KTU; the study process is continuously improved in cooperation with the energy and industrial companies, scientific research centres, professional associations and foreign partners; etc.

The internal quality assurance measures for the Programme are described in the SER as effective and efficient. They seem, however, to rely mainly on bureaucratic measures and may be missing in-depth academic-quality assessments of the subjects, teachers and teaching methods.

III. RECOMMENDATIONS

Recommendations were made throughout this report; they are repeated here:

1. The Review Panel recommends revising the study programme aims and intended learning outcomes and make these much more specific and related to the study programme.

2. The Review Panel would encourage the faculty to re-examine the offering and their tables of contents and possibly offer, rather than fixed-contents *Specialisation Subjects*, a number of electives from which the students could build individual specializations. Indeed some subjects in a specialization area could fit under more than one heading and the students may be unnecessarily prohibited from following a course of interest for their specialization.

3. The Panel recommends more staff visits to European educational institutions, sabbaticals abroad and similar activities that go beyond the simple enhancement of teaching skills.

4. The Panel notes and recommends that the necessary renewal of the faculty could be an opportunity to hire new younger faculty with broad interests in general and strong research interests in particular. The Department is facing the challenge of creating the conditions for attracting such individuals, in particular from other institutions of higher learning to avoid excessive in-breeding.

5. The Panel recommends that ways be found to increase the participation in the subject evaluations by the students. It also recommends that the (anonymous) evaluation results be presented to the class by the teacher and discussed.

6. The Panel recommends that the teaching staff be involved in research, so that the number of persons accredited to guide doctoral students and the corresponding research increase. This will also provide more research opportunities for the students.

7. Ways should be explored to encourage the students to participate in greater numbers to educational programmes abroad.

IV. EXAMPLES OF EXCELLENCE

The Review Panel found a perfect match and very good links between the needs of the local and national industries and the offerings of the Programme. All the stakeholders, teaching staff, students, alumni, employers were very happy with the Programme. (Additional discussion on this matter can be found in the *Introductory General Remarks.)*

V. SUMMARY

The Self-evaluation Report is complete and detailed. It shows that the teaching staff are aware of certain weaknesses and limitations and tries to find solutions. The SER has a rather formal and bureaucratic attitude in showing compliance with a multitude of national regulations and provides a limited evaluation of the academic quality of the Programme, of the teaching staff and of the subjects.

The Department hosting this Programme has a structure and operates in ways similar to those of other European institutions of higher learning. The Programme is formally also similar in content and structure to those of other European universities.

The Programme meets the regulatory requirements.

The Programme is very functional in meeting the needs of a specific sector of local / national industry (district heating, heating and cooling, etc. and related areas), but it is rather narrow. It seems unlikely to encourage students to raise their educational horizons, as a university education in principle should.

The Review Panel was disappointed to learn that only about 1/3 of the staff met the criteria allowing accreditation to supervise doctoral students. The staff are clearly able to teach the limited-objective subject that they provide, but the lack of research activities contributes to the failing above.

The fact that 31 % of staff are over 60 years old, and 66 % are aged over 50, is not optimal. There is strong in-breeding of the teachers, as their great majority has studied and spent their entire academic career at KTU. A vigorous and effective recruitment activity is needed to diversify and broaden the backgrounds of the staff and ensure that the Programme is able to deliver its current relatively narrow objectives as well as enlarge its scope to meet future challenges. The Programme does not fit the top-level mission of KTU of “research-based studies of international level.” Recruitment, properly executed, could become the instrument for introducing breath into the Programme, raising the educational level and bringing research to the Department.

The very closed circle of teachers (KTU graduates), students, alumni, local employers (also mainly KTU graduates) are very pleased with the Programme and its products. The whole activity is, however, introspective, with local industry staffed by alumni, who then recruit essentially the entire output of the Programme. Although this works perfectly under the present

conditions and fully satisfies a need, the Programme, as structured today will not be able to meet different future challenges in a rapidly changing world.

VI. GENERAL ASSESSMENT

The study programme *Thermal Energy and Technology* (state code – 612E30001) at Kaunas University of Technology 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	2
3.	Teaching staff	2
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	3
6.	Programme management	3
	Total:	**15**

*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: Review Panel leader:	Prof. George Yadigaroglu
Grupės nariai: Panel members:	Prof. Andres Siirde
	Dr. Simon Walker
	Dr. Rolandas Urbonas
	Ms Julija Baniukevič

KAUNO TECHNOLOGIJOS UNIVERSITETO PIRMOSIOS PAKOPOS STUDIJŲ PROGRAMOS *ŠILUMOS ENERGETIKA IR TECHNOLOGIJOS* (VALSTYBINIS KODAS –612E30001) 2016-01-29 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-45 IŠRAŠAS

<...>

V. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijos universiteto studijų programa *Šilumos energetika ir technologijos* (valstybinis kodas – 612E30001) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	2
2.	Programos sandara	2
3.	Personalas	2
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	Iš viso:	**15**

* 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)

<...>

IV. SANTRAUKA

Savianalizės suvestinė (toliau – SS) apima reikiamus aspektus ir yra išsami. Joje atsispindi, kad akademinis personalas žino tam tikras programos silpnybes ir apribojimus bei bando rasti tinkamus sprendimus. Kita vertus, SS yra daugiau formalaus ir biurokratinio pobūdžio, parengta orientuojantis į atitiktį šalies teisės aktų reikalavimams, tuo pačiu joje yra pateikiamas ribotas programos kokybės, akademinio personalo ir studijų dalykų vertinimas.

Studijų programą vykdančios katedros struktūra ir veikimo principai yra panašūs kaip ir kitose Europos aukštojo mokslo institucijose, kurioms būdingas aukšto lygio specialistų rengimas. Formaliai studijų programa savo turiniu ir sandara taip pat yra panaši į kitų Europos universitetų.

Programa atitinka teisės aktų reikalavimus.

Ši studijų programa yra labai funkcionali, nes atitinka konkretaus vietos ir (arba) šalies pramonės sektoriaus poreikius (rajono šildymo, šildymo ir vėsinimo bei kitas susijusias sritis), vis dėlto tuo pat metu ji yra gana siaura. Nepanašu, kad programa skatintų studentus plėsti jų išsilavinimo apimtį, kaip tai turėtų užtikrinti universitetinės studijos.

Ekspertų grupė nusivylė sužinojusi, kad tik 1/3 dėstytojų atitinka kriterijus vadovauti doktorantams. Akivaizdu, kad dėstytojai gali dėstyti tam tikros apimties studijų dalykus, tačiau mokslo tiriamosios veiklos stoka apriboja aukščiau aptartą pasinaudojimą galimybe.

Nėra optimalu, kad 31 procentas dėstytojų yra vyresni nei 60 metų, o 66 procentai – virš 50 metų. Akademinis personalas yra itin homogeniškas, kadangi didžioji dauguma dėstytojų studijavo ir visą savo akademinės karjeros laiką praleido Kauno technologijos universitete. Reikėtų aktyvesnės ir efektyvesnės priėmimo į darbą politikos, siekiant užtikrinti dėstytojų kvalifikacijos įvairovę bei garantuoti, kad studijų programoje būtų pasiekiami esami siauri uždaviniai bei tuo pat metu didinama programos aprėptis priimant ateities iššūkius. Ši studijų programa neatitinka Kauno technologijos universiteto misijos: „moksliniais tyrimais grįstos tarptautinio lygio studijos“. Tinkamai vykdomas akademinio personalo įdarbinimas galėtų prisidėti prie programos apimties didinimo, išsilavinimo lygio kėlimo ir mokslo tiriamosios veiklos katedroje aktyvinimo.

Labai uždaras dėstytojų ratas (Kauno technologijos universiteto absolventai), studentai, absolventai, vietos darbdaviai (taip pat dažniausiai Kauno technologijos universiteto absolventai) yra labai patenkinti šia studijų programa ir jos rengiamais specialistais. Vis dėlto, visa veikla yra itin introspekcinė, kuomet vietos pramonėje dirba tik programos absolventai, kurie atitinkamai samdo tik baigusiuosius šią studijų programą. Nors minėtoji sistema dabartinėmis sąlygomis ir veikia puikiai bei visiškai tenkina rinkos poreikius, ilgalaikėje perspektyvoje tai nepadės susidoroti su ateities iššūkiais greitai kintančiame pasaulyje.

<…>

IV. IŠSKIRTINĖS KOKYBĖS PAVYZDŽIAI

Ekspertų grupė pastebėjo, kad programoje rengiami specialistai labai gerai atitinka vietos ir šalies pramonės poreikius, tarp jų yra užsimezgę glaudūs ryšiai. Visi socialiniai dalininkai: dėstytojai, studentai, absolventai ir darbdaviai yra labai patenkinti šia studijų programa (papildoma informacija šiuo klausimu pateikiama *Įvadinėse bendrosiose pastabose)*.

<…>

III. REKOMENDACIJOS

Rekomendacijos yra teikiamos visose vertinimo išvadose, o šiame skyriuje jos yra pakartojamos:

1. Ekspertų grupė rekomenduoja peržiūrėti studijų programos tikslus ir numatomus studijų rezultatus, kad jie būtų konkretesni ir labiau susiję su studijų programa.

2. Ekspertų grupė rekomenduoja peržiūrėti studijų dalykus, įskaitant ir jų turinį, bei siūlyti ne nustatytus specializacijos dalykus, o laisvai pasirenkamuosius dalykus, kad studentai specializuotųsi atsižvelgiant į individualius poreikius. Iš tikrųjų, kai kurie specializacijos dalykai galėtų būti įtraukiami į daugiau negu vieną specializaciją, kitu atveju yra ribojamos platesnės ir individualios studentų pasirinkimo galimybės.

3. Ekspertų grupė akademiniam personalui rekomenduoja daugiau vizitų į Europos aukštojo mokslo institucijas, daugiau kūrybinių atostogų užsienyje ir panašių veiklų, kurios apimtų daugiau nei paprastas dėstymo įgūdžių tobulinimas.

4. Ekspertų grupė rekomenduoja atnaujinti dėstytojų kolektyvą ir priimti naujų jaunų dėstytojų, kurių domėjimosi laukas yra platus, įskaitant ir siekį įsitraukti į mokslo tiriamąją veiklą. Katedra susiduria su sunkumais sukuriant sąlygas ir pritraukiant tokius asmenis, ypatingai iš kitų aukštojo mokslo institucijų, turint siekį išvengti tos pačios aukštosios mokyklos dominavimo.

5. Ekspertų grupė rekomenduoja ieškoti būdų, kaip padidinti studentų dalyvavimą vertinant studijų dalykus. Taip pat rekomenduojama, kad dėstytojas pristatytų (anoniminio) vertinimo rezultatus studentams ir juos aptartų.

6. Ekspertų grupė rekomenduoja dėstytojams aktyviau dalyvauti mokslo tiriamojoje veikloje, kad būtų daugiau asmenų, galinčių vadovauti doktorantams, ir atitinkamai aukštesni taptų dalyvavimo moksliniuose tyrimuose rodikliai. Tokiu būdu ir studentai turėtų daugiau galimybių dalyvauti moksliniuose tyrimuose.

7. Išnagrinėti būdus, kaip skatinti studentus aktyviau dalyvauti tarptautinėse mainų programose.

<…> _____

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)