STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Kauno technologijos universiteto
STUDIJŲ PROGRAMOS *"PASTATŲ INŽINERINĖS SISTEMOS"*
(valstybinis kodas – 621H24001)
VERTINIMO IŠVADOS

EVALUATION REPORT OF "*BUILDING SERVICES ENGINEERING*" (*state code - 621H24001*)
STUDY PROGRAMME
at Kaunas University of Technology

Experts' team:

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3. **Prof. Nikolaos Theodosiou,** *academic,*
4. **Prof. Wojciech Gilewski,** *academic,*
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6. **Ms Milena Medineckienė,** *students' representative*.

Evaluation coordinator -

Gintarė Petrulytė

Išvados parengtos anglų kalba
Report language – English

Vilnius
2016

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	***Pastatų inžinerinės sistemos***
Valstybinis kodas	621H24001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Statybos inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji studijų pakopa
Studijų forma (trukmė metais)	Nuolatinės (1,5) Ištęstinės (2)
Studijų programos apimtis kreditais	90 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Statinių inžinerinių sistemų magistras
Studijų programos įregistravimo data	2012-10-10

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	***Building Services Engineering***
State code	621H24001
Study area	Technological Sciences
Study field	Civil Engineering
Type of the study programme	University Studies
Study cycle	Second cycle studies
Study mode (length in years)	Full time (1,5) Part time (2)
Volume of the study programme in credits	90 ECTS
Degree and (or) professional qualifications awarded	Master of Building Services Engineering
Date of registration of the study programme	10-10-2012

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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
1.	Study Programme Development Plan – 09-11-2016

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

The mission of Kaunas University of Technology is to provide research-based studies of international level, to create and to transfer knowledge and innovative technologies for the sustainable development and innovative growth of the country, to provide open-minded creative environment inspiring leaders and talented individuals. The vision of Kaunas University of Technology is to be a leading European University with knowledge and technology development and transfer-based activities. Students and the academic staff are working in partnership in order to

improve the quality of the student experience by involving students into the process of decision making at all levels [SER, page 4].

The second cycle study programme Building Services Engineering (here in after referred to as BSE) in the field of Civil Engineering sciences is carried out by Kaunas University of Technology (here in after referred to as KTU). The aims of the BSE programme and the respective learning outcomes are clear and well defined. They are publicly available at KTU website (http://ktu.edu), student's section. Learning outcomes of each particular course (module) are linked to the learning outcomes of the study programme and are provided in the description of the course [SER, page 8].

The previous external evaluation of the second cycle study programme Building Services Engineering was performed on the 10th of October, 2012, by external assessment team provided by Centre for Quality Assessment in Higher Education (SKVC). The programme was given positive evaluation (21 points) and got 6 years of accreditation (until the end of 2018). However, following the Order of the director of the Centre for Quality Assessment in Higher Education (SKVC) No. S-142, January 29, 2016, all study programmes of state higher education institutions are supposed to be evaluated and accredited with respect to national economic, social and cultural needs, as well as taking into account demand of future development. The Centre for Quality Assessment in Higher Education wants to optimize the work of external assessment teams and plans to make evaluation of all higher education programmes at the same time according study field. Following this order and plans of the Centre for Quality Assessment in Higher Education, the present external evaluation was planned ahead of schedule.

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 *23/11/2016.*

1. **Prof. Roode Liias (team leader),** *Professor, Tallinn University of Technology, Estonia;*
2. **Prof. Rui Ramos,** *Professor, University of Minho, Portugal;*
3. **Prof. Wojciech Gilewski,** *Professor, Warsaw University of Technology, Poland;*
4. **Prof. Nikolaos Theodosiou,** *Professor, Aristotle university of Thessaloniki, Greece;*
5. **Mr Artiomas Kuranovas,** *"Trevita", director, Lithuania;*
6. **Ms Milena Medineckienė,** *student of KTH Royal Institute of Technology, Sweden.*

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

The aims of the Building Services Engineering (here in after referred to as BSE) program and its learning outcomes are clear and well defined. The program aims to prepare Masters in Building Services Engineering with specific theoretical and methodological knowledge; with knowledge of modern building services and engineering technologies; understanding interdisciplinary context and having practical skills in research, strategic planning, and effective implementation of building services engineering and decisions making policies (projects); capable to present accomplished work; collaborating with colleagues and experts of other fields; having lifelong learning skills; adapting to constantly changing conditions of engineering environment.

Learning outcomes of the study programme are revised and modified each year by the study programme coordinator in cooperation with the study programme committee, social partners and students. In case new learning outcomes are introduced, the curriculum of the programme is modified.

The aims and learning outcomes of the study programme are publicly available at KTU website, student's section. Learning outcomes of each particular course (module) are linked to the learning outcomes of the study programme and are provided in the description of the course.

The second cycle study programme Building Services Engineering is designed for individuals who have completed major (bachelor's) study programmes in Civil Engineering, Construction Technologies or Energy Engineering and want deeper studies on functioning of building services engineering and impact on humans and environment, as well as acquire design skills of these systems. The objectives are: to prepare Masters in Building Services Engineering with specific theoretical and methodological knowledge; with knowledge of modern building services and engineering technologies; understanding interdisciplinary context and having practical skills in research, strategic planning, and effective implementation of building services engineering and decisions making policies (projects); capable to present accomplished work; collaborating with colleagues and experts of other fields; having lifelong learning skills; adapting to constantly changing conditions of engineering environment [SER, page 7].

Learning outcomes of the study programme are revised and modified each year by the study programme coordinator in cooperation with the study programme committee, social partners and students. In case new learning outcomes are introduced, the curriculum of the programme is modified. This was the case of the review of the programme after the last external evaluation was performed in 2012. The formulation of aims and the learning outcomes were updated according to the descriptor of the study field of Engineering.

The quality of the final theses of the students constitutes an important evidence for reaching the learning outcomes. The final theses cover a wide area of the scientific field of building services. This can be identified by the titles of the theses. Unfortunately, the theses are not written in English and so their content cannot be easily evaluated.

The aims and learning outcomes of the study programme are based on academic and professional requirements and they cover the relevant public needs. In this way it is ensured that they cover the needs of the labour market in Lithuania. They are consistent with the requirements and qualifications that need to be offered by higher education's first cycle study programmes.

Based on all the above, it can be concluded that the name of the programme, its learning outcomes, the content of the study programme and the qualifications offered to its students are completely compatible with each other.

2.2. Curriculum design

The structure of this programme is consistent with the "Description of general requirements for degree granting first cycle and integrated studies", following which, a Master's qualification degree of this field is granted [SER, page 8].

During the previous evaluation, in 2012, the following recommendations, concerning the curriculum of the program, were introduced:

a. The program curriculum addresses the needs of two distinct groups: bachelor degree graduates of this specialization and other engineering degree graduates converting to this specialization. It is recommended that separate programs for these two groups be considered if future technological innovations lead to difficulties in addressing the learning outcome expectations of each group through a single program.
b. It is recommended that greater emphasis be placed in the curriculum on the challenges of retrofit of new technologies to existing building stock rather than design of systems for new buildings. This should be particularly reflected in the final thesis projects.
c. It is recommended that greater emphasis be placed on innovative building engineering systems in the curriculum. This may involve greater external stakeholder engagement through visiting lecturers from industry and other such involvement in the program.
d. The program is open to graduates of several disciplines. It is essential that they have a significant appreciation of the legal context in which they will practice. It is recommended that education in the relevant legal aspects (Construction Law) be strengthened for those admitted to the program who have not studied this sufficiently at first cycle studies.

Unfortunately, only a few adjustments were implemented during the time period between the two evaluations (the one of 2012 and the current one). At the same time though, new, significant and

extensive changes have been decided and are going to be implemented starting from the next semester. According to a "Study Programme Development Plan" concerning the second-cycle study program in the field of Civil Engineering Sciences – Building Services Engineering, that was provided to the evaluation team during our visit at the Kaunas University of Technology, the following changes are going to be implemented starting from February 2017:

- The program will be renamed from "Building Services Engineering" to "Sustainable and Energy Efficient Buildings". This indicates not only a change in the name of the program but also in its orientation since it the study program will focus on the energy efficiency of buildings and not generally on building services.
- The following courses will comprise the new study program:
    - Indoor environment
    - Project and construction management
    - Sustainable architecture and construction
    - Sustainable Energy Technologies
    - Innovative Building Technologies
    - Asset management and monitoring
    - Building renovation
    - Research Methods and Planning
    - Energy networks and smart grids
    - Environment and Water Resources Management
    - Safety Technologies in Heating and Ventilation Systems
    - Fire safety
- The new curriculum indicates that the changes correspond to about 50% compared to the current program.
- Another significant change is that according to the Development Plan, the new study program will be provided in English by 2018.

These significand changes that are going to be implemented as soon as the next semester unfortunately reduce the impact of the current evaluation, at least as far as the curriculum design is concerned, since some of the recommendations resulting from the evaluation of the previous program, are going to be implemented anyway and some others are meaningless due to the change of the orientation of the study program to energy efficiency of buildings.

For example, a recommendation for the existing program would be to upgrade the "Building Renovation" course from elective to compulsory since one of the goals of the program is to provide solutions for the existing building infrastructure of Lithuania. Another one would be to provide courses in English on order to attract foreign students as well. Both these recommendations will be

implemented in the new study program. On the other hand, a recommendation regarding the upgrade of courses linked to water and waste-water distribution networks seems meaningless since the orientation of the new program is on energy efficiency of buildings and not generally on building services as the existing one.

The second-cycle program has a lot of overlapping courses with the first-cycle one. This is a disadvantage of the program especially for students with a bachelor degree on Building Services Engineering.

The changes in the curriculum are, as previously mentioned, significant, but since they are considered to be in the right direction, they are expected to improve the quality of the studies and the ability of the graduates to be more easily employed. The content of the subjects are evenly spread and in a justified way across the study programme and their themes are not overlapping or repetitive between them. At the same time, the content of the subjects in consistent and compatible with the type of higher education's second cycle studies.

This restructuring of the study programme and the content and scope of the courses are in accordance with the current trends of the construction market and are appropriate for the achievement of the intended learning outcomes. At the same time, new and more efficient educational methods are introduced thus reflecting the latest achievements in science and technologies.

2.3. Teaching staff

Current composition of the staff is appropriate for efficient implementation of the Master's programme. The staff of the study programme consists of 19 permanent teachers, and most of them are full-time teachers, which is absolutely adequate compared to the number of students. The ratio between teachers and students is approximately 1:1. Students of the second cycle study programme Building Services Engineering have some common study modules with students of the study programme Civil Engineering. Therefore, the ratio of teachers and students is appropriate.

The qualification of the teaching staff is more than sufficient, meets the legal requirements and is completely adequate to ensure the learning outcomes. Scientists with a doctor's degree teach 70% of subjects of the study field, while minimal requirement for the second cycle programmes oriented to practical activities is 60%. 21% of subjects of the study field are taught directly by professors (in addition to coordination of modules). The minimal requirement under this criterion is 20% [SER, page 17].

The competences of the teaching staff are evaluated very highly by the students, the graduates and the employers. The only issues that need to be improved, according to the surveys performed by the university, refer to their practical skills and their ability to make their own decisions and solve problems. Both issues are significant for the teaching staff of such a study programme. It must be

noted that the same two issues were identified as weaknesses of the first-cycle teaching staff as well. These issues though, are not necessary obstacles for the ability of the teaching staff to ensure the learning outcomes of the programme, but it would certainly be an asset. After all the lack of extensive practical experience is a problem that characterises most of the academics in engineering compared to their colleagues who practice engineering in the field.

The institution creates conditions for the professional development of the teaching staff necessary for the provision of the programme. Two young doctors joined recently the educational and research activities while three associate professors whose research activities are related to building energy, also joined the department.

Staff mobility, and especially the willingness to take advantage of some of the available tools (Erasmus+, COST etc) is rather satisfactory, but can still be improved. During recent 5 years, teachers of the study programme had 30 international visits. The number of international mobility visits by the positions of programme teachers: assistants – 2 visits, lecturers – 1 visit, associate professors – 21 visits, professors – 5 visits. These 30 visits were made by 11 employees. This means that about 60% of the study programme teachers actively use international mobility programmes and has a network of international partners. In recent years, number of teachers preparing publications together with co-authors from foreign universities is increasing [SER, page 18]. Staff mobility needs to be increased in order to provide international experience to the teaching staff and to act as an inspiration for students, who also have mobility problems, to get involved with the international academic field.

Another issue regarding the teaching staff is the allocation of their workload. They are usually involved in more than one first-cycle study program and in second-cycle study programs. At the same time they offer their services not only to full-time students but also to part-time students as well. These two categories follow different study programs since the latter often come in the afternoons or during weekends. Some of the members of the teaching staff also offer their courses in English to foreign students. The courses offered in English though do not follow an organized pattern that would allow foreign students to study at KTU, but seem to be depended on the ability of the teacher to offer such a class. As a result of this policy, the teachers' workload is increased disproportionally to its impact since they offer their efforts to a small number of full-time students, to an even smaller number of part-time students and to a questionable number of foreign students.

Educational laboratories have fully complete technical staff which is used for carrying out laboratory work, supervision and maintenance of the infrastructure.

2.4. Facilities and learning resources

The facilities of the department that are available for the specific study programme are quite sufficient, since they can offer adequate arrangements for students' practice, and they have improved during the past few years. They are presented in detail in the SER in paragraphs 2.4.1 and 2.4.2 (pages 19 and 20). Teaching classes, laboratories, equipment, computers and specific software are described in detail in the above mentioned pages of the SER.

The nature of the field of engineering though is such, that laboratories and specific equipment, computers and software are never enough and always need to be improved and adjusted to the current developments. So, the equipment and the laboratories can be improved but their current status is adequate and well preserved.

Some of the more modern teaching tools, like BIM, have not yet been fully implemented due to the delayed implementation of the new study programme and the fact that many teachers are not yet fully acquainted with these new techniques.

Almost all the teaching materials (textbooks, books publications etc) are in Lithuanian. On one hand this can be characterised as adequate since the official language of the programme in Lithuanian and the teaching material, being in the mother tongue of the students, can easily be understood by them. On the other hand, this is restricting for the offered knowledge since these teaching materials cannot be easily upgraded in order to follow the state-of-the-art. More literature must be offered to the students in foreign languages and preferably in English. This can be easily achieved by introducing e-books available either on a low cost or even free of charge, on the internet. The language of the study programme and of the teaching materials is another reason why the teaching staff members and the students fail to take advantage of the available mobility opportunities, since they are not well acquainted with the use of foreign languages especially as far as technical terminology is concerned.

2.5. Study process and students' performance assessment

To be admitted to the second cycle study programme Building Services Engineering a person must have obtained first cycle university studies and satisfy requirements defined in the description of master's study programme. Calculation of a competitive score (CS) is presented every year in the Requirements for Admission to Master‘s Studies [SER, page 21].

Information about the second cycle study programme Building Services Engineering is published on websites, printed publications, advertised during higher education fairs in Vilnius and Kaunas, exhibitions, open days and events organized for pupils. Admission Department together with the staff of the Faculty of Civil Engineering and Architecture are active trying to attract students who are able and willing to study Master's programme.

The organisation of the study programmes, both the previous and the new one, ensures an adequate provision of the programme and the achievements of the learning outcomes.

The number of students admitted each year to the study program [SER, page 22] is totally satisfactory and if any remark should be made, that will be that they are probably too many. This is an indication that the program is well received and acknowledged by the students and by the employers of the graduates.

	2011-12	2012-13	2013-14	2014-15	2015-16
Number of students admitted at the study program	18	15	23	24	18

The average number of students admitted each year for the past five-year period is 19,6, almost 50% more than the students admitted in the respective first-cycle program.

During the last five years, according to the number of enrolled students and graduates, student drop-out rate is not high. The majority (83.3%) of Master's students have jobs and thus they allocate less time for learning and preparation of the final project. However, many students defend their final work after half a year or after a year. To reduce student drop-out process, teachers of every module arrange individual consultations and the consultation time is announced on the notice boards, and during lectures.

Students can also choose a tutor from the university's mentoring programme, (teacher or volunteer student), who helps to deepen knowledge in certain areas. Tutors can also help to improve the academic skills (to prepare written works, to prepare and deliver presentations, to carry out data analysis). Tutors consults on the chosen study subject individually or in small groups. The schedule of consultations for the current semester is formed in September and at the end of February and is published in mentoring programme section of AIS. Students can choose suitable time and to attend consultations with any of the tutors providing consultations.

The students are not willing to take advantage of the various mobility opportunities offered to them. These opportunities could advance their knowledge level, improve their communication skills and make them better students and more efficient professionals. For various reasons though (cost of living abroad, previous engagements at home, non-familiarity of traveling etc), the students, except for an extremely small number, do not choose to participate in these mobility programmes. The students should be further encouraged to take advantage of these mobility tools, by their teachers, organised offices of the University and by fellow students who already took participated in these programmes. The university could even improve the arrangements needed for the students to participate in these international programmes, for example, easier acceptance of ECTSs earned abroad etc.

The students are not significantly involved in active research. They should be encouraged by their teachers to participate in theoretical and applied research activities.

Student learning outcomes (knowledge, understanding, skills) of a module are evaluated by mark or credit applying evaluation system approved by Verification of Evaluation System of Study Results. University applies a ten point grading system which is published on the university's website. To ensure active participation of students during the whole semester and objective evaluation of learning achievements, the university applies accumulative assessment system, when the final mark of the study module consists of intermediate assessment and examination marks. Module is assessed by credit when the assessment by mark is not necessary.

The final grade of the study module is determined by summing up the intermediate assessment (tests, individual work, papers, laboratory work, etc.) and examination (during the session) marks multiplied by the weighted coefficients. A teacher determines constituents of the grade and the percentage impact on the final score who coordinates (teaches) the module. The Study Programme Committee approves his decision. The components of the final mark depend on the module. Components of the final mark of each module are entered in AIS by the end of the first month of the semester [SER, page 23].

To achieve the foreseen results of the second cycle study programme Building Services Engineering the following evaluation (learning assessment) methods are used: written examination, written intermediate assessment, conversation (interview) with the teacher, report and defence of individual and group works, report and defence of laboratory works, preparation of material for seminar, oral presentation of the work, preparation and defence of internship report, presentation and defence of final work. Learning achievement methods are chosen according to the expected study programme outcomes. It would be useful if students could also provide their opinion to the Committee of Study Programmes about the effectiveness of the assessment processes.

As far as the relation between the professional activities of the graduates and the programme providers' expectations,, based on survey of companies, at present the need for the graduates of Building Services Engineering study programme is assessed with 4.22 points (out of 5 possible points). Employers assessed the demand for these specialists for the next five years with 4.22 points (out of 5 points). It shows growing demand for specialists of this field in the labour market.

According to the opinion survey of the second cycle graduates, 42.9% of respondents work in the field of the obtained profession (heating, ventilation and air conditioning systems designers, engineers and managers).

All the above (number of admitted students, occupation of the graduates etc) indicate an overall acceptance of the study program and its outcomes.

2.6. Programme management

All necessary information and data on the implementation of the study programme, are collected regularly and are properly analysed. Taking into account the recommendations of the community of the study programme, including stakeholders, and the conclusions of the assessment, the latest scientific and technological achievements, he submits projects updating the study programme and proposals for its improvement: on goals and results of the study programme; on content of modules, methods and evaluation; on scheduling of the programme [SER, page 28].

The outcomes of internal and external evaluations are used for the improvement of the programme. Many aspects of the structure and content of the study program are going to change starting February next year. These significand unfortunately reduce the impact of the current evaluation, at least as far as the curriculum design is concerned, since some of the recommendations resulting from the evaluation of the previous program, are going to be implemented anyway and some others are meaningless due to the change of the orientation of the study program to energy efficiency of buildings.

The concept and the orientation of the new program is very interesting and adjusted to the new scientific and market trends. But the changes are going to be applied on a successful program (considering the number of admitted students and the perspectives of the graduates). This remark raises questions on the necessity and the effectiveness of these changes.

Processes of study programme administration and quality assurance is reflected in the academic information system (AIS), operating at the University to ensure sustainable management of issues of studies, including broad self-service functions for teachers and students. The purpose of AIS is registration of students and unclassified students, collection, processing, organization, storage of documents necessary for management of the study process, and submission of said documents following the procedure established at the University. The constantly updated management system of electronic document management system (DMS) contains relevant normative documents of the University – decisions of the Senate, orders, ordinances, procedures of the Rector, etc [SER, page 28].

III. RECOMMENDATIONS

1. The study program is going to change significantly (about 50%), starting on February 2017. These changes unfortunately reduce the impact of the current evaluation, at least as far as the curriculum design is concerned, since some of the recommendations resulting from the evaluation of the previous program, are going to be implemented anyway and some others are meaningless due to the change of the orientation of the study program to energy efficiency of buildings. Although the changes seem to be in the right direction, their implementation and impacts should be followed and assessed by all involved parties, the Committee of Study Programmes, the students and stakeholders.
2. The mobility of both the teaching staff and the students must increase significantly. A lot of mobility tools and opportunities are available for them to use. An increase of the mobility could advance the knowledge level, improve their communication skills and lead to more efficient professionals.
3. The use of new technologies in educational procedures must be implemented in order to advance the quality of the study program.
4. Students identified in their questionnaires, some weaknesses on the availability of computers and equipment that need to be fulfilled.
5. The academic personnel needs to encourage students to be more involved in research activities.
6. The workload of the teaching staff needs to be reconsidered since they seem to be involved in activities that are not proportional to the anticipated result of their efforts.
7. The students need more space for reading and group studies available 24/7.
8. The graduates of the programme would be interested in attending life-long learning courses in new technologies and new subjects. This will also extent the relations between current and former students and intensify the positive impacts to the study programme from feedback coming from professionals and other social partners.

IV. SUMMARY

This is a very interesting study program providing students with both the necessary theoretical and applied knowledge to become engineers specialized on building services. The program aims to prepare Masters in Building Services Engineering with specific theoretical and methodological knowledge; with knowledge of modern building services and engineering technologies; understanding interdisciplinary context and having practical skills in research, strategic planning, and effective implementation of building services engineering and decisions making policies (projects); capable to present accomplished work; collaborating with colleagues and experts of other fields; having lifelong learning skills; adapting to constantly changing conditions of engineering environment.

During the previous evaluation a number of recommendations were made concerning the curriculum of the program. Unfortunately, only a few adjustments were implemented during the time period between the two evaluations (the one of 2012 and the current one).

The curriculum of the study program is going to change though significantly (about 50%) starting from next semester. The concept and the orientation of the new program is again very interesting and adjusted to the new scientific and market trends. But since the changes are going to be applied on a successful program (considering the number of admitted students and the perspectives of the graduates), questions are raised on the necessity and the effectiveness of these changes.

The second-cycle program has a lot of overlapping courses with the first-cycle one. This has been a disadvantage of the program especially for students with a bachelor degree on Building Services Engineering. This is expected though to change with the implementation of the new study programme.

The competences and qualifications of the teaching staff are high and suitable for the specific study programme. The facilities of the department that are available for the specific study programme are quite sufficient and they have improved during the past few years.

This program is very attractive to students since the annual average number of students admitted to the program during the past five years is 19,6 which is very satisfactory for a second-cycle program.

V. GENERAL ASSESSMENT

The study programme *Building Services Engineering* (state code – 621H24001) at Kaunas University of Technology 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
	Total:	**18**

*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. Roode Liias
Grupės nariai: Team members:	Prof. Rui Ramos
	Prof. Wojciech Gilewski
	Prof. Nikolaos Theodosiou
	Mr Artiomas Kuranovas
	Ms Milena Medineckienė

<…>

V. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijos universiteto studijų programa *Pastatų inžinerinės sistemos* (valstybinis kodas – 612H24001) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
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
	Iš viso:	**18**

*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

Ši studijų programa yra labai įdomi ir suteikia studentams būtinų teorinių ir taikomųjų žinių ruošiantis tapti inžinieriais, kurie specializuojasi pastatų inžinerinių sistemų srityje. Studijų programos tikslas – parengti statybos inžinierius, gebančius projektuoti, įrengti ir dirbti su pastatų šildymo, vėdinimo ir oro kondicionavimo, vandentiekio ir kanalizacijos, dujų tiekimo ir kitomis pastatų sistemomis. Tuo pačiu studijų programa siekiama absolventams suteikti bendrųjų ir specializuotų žinių, kurių reikia inžineriniams atlikti darbus, apimančius pastatų energinį naudingumą, jų poveikį žmonėms ir aplinkai, pastatų inžinerinių sistemų šiuolaikines technologijas, taikomus skaičiavimo ir kompiuterinio projektavimo metodus.

Studijų programos sandara neseniai buvo pakeista ir atnaujinta, siekiant patenkinti esamus statybos pramonės poreikius ir įtraukti naujausias žinias. Tokia studijų programos, dalykų turinio ir apimties pertvarka atitinka statybos rinkos dabartines kryptis ir leidžia siekti numatomų studijų rezultatų. Tuo pačiu įtraukiami nauji veiksmingesni mokymo metodai, atspindintys naujausius mokslo ir technologijų pasiekimus.

Personalo kompetencija ir kvalifikacija yra aukšta ir šiai konkrečiai studijų programai tinkama. Dėstytojų kvalifikacija yra pakankama ir tinkama studijų rezultatams pasiekti. Daugiau kaip 70 proc. studijų krypties dalykų apimties dėsto mokslininkai, apgynę mokslo daktaro laipsnį, 20 proc. studijų krypties dalykų apimties dėsto lektoriai, užimantys profesorių pozicijas.

Katedros materialieji ištekliai, skirti šiai konkrečiai studijų programai, įskaitant mokymo klases, laboratorijas, įrangą, kompiuterius ir konkrečią programinę įrangą, yra visiškai pakankami ir per pastaruosius keletą metų pagerėjo.

Deja, ši studijų programa nėra patraukli studentams, kadangi per pastaruosius penkerius metus į studijų programą priimtų studentų metinis vidurkis yra tik 13,2. Šis skaičius atrodo dar mažesnis įvertinus faktą, kad beveik vienas ketvirtadalis priimtų studentų studijų nebaigia.

Kita vertus, 66 dėstytojai, materialiesiems ištekliams ir laboratorijoms gerinti skirtas viešasis finansavimas sukuria visumą, kurią galima apibūdinti kaip netinkamą tiek finansų valdymo, tiek akademine prasme.

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III. REKOMENDACIJOS

1. Studentų, pasirinkusių šią pirmosios pakopos studijų programą, skaičius yra labai mažas. Studijų programos vadovybė turi ieškoti būdų, kaip pritraukti daugiau studentų ir užtikrinti studijų programos tvarumą. Šiuo metu studijų programą vykdo 66 dėstytojai, o studentų yra mažiau nei dėstytojų.
2. Atlikus ankstesnįjį vertinimą buvo pateikta nemažai rekomendacijų dėl studijų programos turinio. Dauguma iš jų buvo faktiškai įgyvendintos, tačiau ne iki 2014 metų. Todėl atliekant šį vertinimą negalima išanalizuoti tų pakeitimų poveikio. Nors pakeitimai atrodo atlikti tinkama linkme, jų įgyvendinimą ir poveikį turėtų sekti ir įvertinti visos dalyvaujančios šalys: Studijų programos komitetas, studentai ir dalininkai.
3. Būtina žymiai gerinti dėstytojų ir studentų judumą. Yra daug judumo priemonių ir galimybių, kurias reikia išnaudoti. Aktyvesnis judumas pagerintų žinių lygį, bendravimo įgūdžius ir leistų parengti geresnius specialistus.
4. Siekiant pagerinti studijų programos kokybę, į mokymo procesą būtina įtraukti naujųjų technologijų taikymą.
5. Studentai klausimynuose nurodė keletą silpnybių, pavyzdžiui, kad trūksta kompiuterių ir įrangos. Šį klausimą reikia spręsti.
6. Reikia iš naujo apsvarstyti dėstytojų, kurie dalyvauja veikloje, neproporcingoje laukiamiems jos rezultatams, darbo krūvį.
7. Studentams reikia daugiau patalpų, kur jie galėtų skaityti ir studijuoti grupėmis 24 valandas 7 dienas per savaitę.
8. Studijų programos absolventai norėtų lankyti visą gyvenimą trunkančio mokymosi naujų technologijų ir naujų dalykų kursus. Tai išplėstų esamų ir buvusių studentų ryšius, gavus specialistų ir kitų socialinių partnerių grįžtamąjį ryšį teigiamai atsilieptų studijų programai.

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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)