



CENTER FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

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**EVALUATION REPORT**

**STUDY FIELD**

**ELECTRICAL ENGINEERING**

at Šiauliai State College

**Expert panel:**

1. Prof. Dr. Laszlo Tamas Koczy (panel chairperson) *academic,*
2. Prof. Dr. Toomas Rang Marko Čepin, *academic,*
3. Prof. Dr. Žilvinas Nakutis, *academic,*
4. Dr. Matthew Armstrong, *academic,*
1. Dr. Andrius Šablinskas, *representative of social partners'*
2. Mr. Ruben Janssens, *students' representative.*

**Evaluation coordinator – Ms. Natalija Bogdanova**

Report language – English

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## Study Field Data\*

Title of the study programme	<i>Automatics and Electrical Engineering</i>
State code	6531EX002
Type of studies	College studies
Cycle of studies	First
Mode of study and duration (in years)	Full-time, 3, Part-time, 4
Credit volume	180
Qualification degree and (or) professional qualification	Professional Bachelor of Engineering Sciences
Language of instruction	Lithuanian
Minimum education required	Secondary
Registration date of the study programme	2002-08-30

*\* if there are **joint** / **two-fields** / **interdisciplinary** study programmes in the study field, please designate it in the foot-note*

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# I. INTRODUCTION

## 1.1. BACKGROUND OF THE EVALUATION PROCESS

The evaluation of study fields is based on the Methodology of External Evaluation of Study Fields approved by the Director of Centre for Quality Assessment in Higher Education (hereafter – SKVC) 31 December 2019 Order [No.V-149](#).

The evaluation is intended to help higher education institutions to constantly improve their study process 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) *site visit of the expert panel to the higher education institution*; 3) *production of the external evaluation report by the expert panel and its publication*; 4) *follow-up activities*.

On the basis of the external evaluation report of the study field SKVC takes a decision to accredit study field either for 7 years or for 3 years. If the field evaluation is negative such study field is not accredited.

The study field and cycle are **accredited for 7 years** if all evaluation areas are evaluated as “exceptional” (5 points), “very good” (4 points) or “good” (3 points).

The study field and cycle are **accredited for 3 years** if one of the evaluation areas was evaluated as “satisfactory” (2 points).

The study field and cycle are **not accredited** if at least one of evaluation areas was evaluated as “unsatisfactory” (1 point)

## 1.2. EXPERT PANEL

The expert panel was completed according to the Experts Selection Procedure (hereinafter referred to as the Procedure) approved by the Director of Centre for Quality Assessment in Higher Education 31 December 2019 [Order No.V-149](#). The site-visit to the HEI was conducted on-line by the panel on 9<sup>th</sup> December 2020.

**Prof. Dr. Laszlo Tamas Koczy (panel chairperson)**, professor of Széchenyi István University, Department of Information Technology, professor of Budapest University of Technology and Economics, Department of Telecommunications and Media Informatics, Hungary;

**Prof. Dr. Toomas Rang**, Professor Emeritus of Thomas Johann Seebeck Department of Electronics; Tallinn University of Technology, Estonia;

**Prof. Dr. Žilvinas Nakutis**, professor of Kaunas University of Technology, Department of Electronic Engineering, Lithuania;

**Dr. Matthew Armstrong**, senior lecturer of Newcastle University, School of Electrical & Electronic Eng., U. K.;

**Dr. Andrius Šablinskas**, Sales Director at Schneider Electric Lietuva, Lithuania;

**Mr. Ruben Janssens**, student of Ghent University, study programme in Computer Science Engineering, Belgium.

### 1.3. GENERAL INFORMATION

The 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 the site-visit:

No.	Name of the document
1	SVK_Elektrical_Engineering 2020_subjects descriptions.pdf

### 1.4. BACKGROUND OF STUDY FIELD/STUDY FIELD PLACE AND SIGNIFICANCE IN HEI

Šiauliai State College (hereinafter referred to as the College) is a state higher education institution, acting as a public institution carrying out first cycle college studies. The College has long experience, was established in 2002 with the reorganisation of higher technical and medical schools. In 2018, the Professional Bachelor's Diploma was awarded to 10,000th student.

The main unit of study and science in the field of electrical engineering is the Engineering Sciences Department (hereinafter referred to as the Department). It has a Study Programmes Committee in the Field of Electrical Engineering (hereinafter referred to as the Committee) to ensure continuous monitoring and improvement of the quality of study content.

Until 30.06.2020, the Department carried out two study programmes in the field of electrical engineering: Electrical Energetics and Automatics and Electrical Engineering.

The assessment of the Electrical Energetics programme took place in 2015, the study programme was accredited for 6 years. In 2016, following discussions with the social stakeholders and on the basis of the newly adopted Description of Engineering Study Fields Group (LT, EN), it was decided to discontinue the implementation of the programme, thus optimising the number of study programmes in the field. The Electrical Energetics programme was deregistered on 7 September 2020. The Automatics and Electrical Engineering Programme of 2017 (hereinafter referred to as the Programme) has been approved as Interdisciplinary, with Electrical Engineering as the main field and Electronic Engineering as the other. An external assessment of the Programme took place in 2012. The Programme was accredited for a period of 6 years (until 31 August 2018, assessment conclusions). The accreditation period is extended until it is assessed and accredited in accordance with the established procedure together with other study programmes in the same field.

## II. GENERAL ASSESSMENT

*Electrical Engineering* study field at Šiauliai State College is given **positive** evaluation.

*Study field and cycle assessment in points by evaluation areas.*

<b>No.</b>	<b>Evaluation Area</b>	<b>Evaluation of an area in points*</b>
1.	Study aims, outcomes and content	4
2.	Links between science (art) and study activities	3
3.	Student admission and support	4
4.	Studying, student performance and graduate employment	4
5.	Teaching staff	3
6.	Learning facilities and resources	4
7.	Study quality management and publicity	4
	<b>Total:</b>	<b>26</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 evaluated very well in the national and international context, without any deficiencies;

5 (exceptional) - the field is exceptionally good in the national and international context/environment.

## III. STUDY FIELD ANALYSIS

### 3.1. STUDY AIMS, OUTCOMES AND CONTENT

*Study aims, outcomes and content shall be assessed in accordance with the following indicators:*

**3.1.1.** *Evaluation of the conformity of the aims and outcomes of the field and cycle study programmes to the needs of the society and/or the labour market (not applicable to HEIs operating in exile conditions)*

*(1) Factual situation*

Electrical and electronic engineers have significant employment opportunities both in Šiauliai region and in Lithuania. According to Šiauliai City Economic Development and Investment Attraction Strategy 2018–2024, the main constraint on economic development in Šiauliai city is the lack of high-quality human resources that all companies face. It is now easier for companies to find unskilled workers. Business representatives identified a need for more than 30 % of electronics and automation specialists in the next five years.

The Programme is intended to prepare qualified electrical engineers for different types of companies using electricity to carry out the installation, operation and repair and modification of electrical equipment, automatic control systems and the efficient operation in free market conditions. The Programme enables the development of an autonomous personality in society and involved in practical activities, dealing with the development of renewable energy sources that are relevant to society, automated solutions that increase job efficiency and generate economic benefits.

The Programme provides a college education, a professional bachelor's degree in engineering sciences and is the only programme in the College in electrical engineering study field.

The objective of the Programme and intended learning outcomes are formulated to cover all areas necessary for the electrical engineer: learn the basic laws of electrical engineering, constructions of electrical equipment, the selection of conductors, protective equipment, safe installation, operation and repair of electrical equipment, the calculation of distribution and private electricity networks and the implementation of projects. Learning aims and outcomes cover the full life cycle from design to operate and maintain. Social and environment outcomes (organize activities of the company (branch), while understanding responsibility for the results of engineering activities, assess the cost-effectiveness and environmental impact of engineering solutions) are mentioned as well.

The Programme has been updated based on expert comments, surveys of the social partners, students and graduates. In 2017 the Programme was approved as an interdisciplinary, which is the only one in Lithuania combining electrical and electronic engineering fields.

*(2) Expert judgement/indicator analysis*

The evaluation of the Study Programme confirms the needs of society and labour market and high demand for engineering graduates in Lithuania and Šiauliai region. Aims and outcomes, have being regularly discussed with the social partners and alumni. Evidences were given during the site visit discussions. Šiauliai State College (SSC) has very close cooperation links with the municipality (financial support for research projects – INOSTART) and regular cooperation with social partners – roundtables, conferences, which reflects the needs of Šiauliai region society and positively contribute to the update of Study programme and learning outcomes.

**3.1.2. Evaluation of the conformity of the field and cycle study programme aims and outcomes with the mission, objectives of activities and strategy of the HEI**

*(1) Factual situation*

The aim and intended learning outcomes are formulated according to the College's Mission – “Flexibly and quickly respond to changes in the labour market, to prepare qualified specialists, to educate creative, educated, dignified, ethically responsible, independent and entrepreneurial personality”. Responding to changing labour market needs, the aim of the renewed Programme and the intended learning outcomes of the studies are directed not only at the preparing of electrical engineers having knowledge and skills related to common electrical engineering issues, but also at the development of broader skills needed by a modern specialist, in particular the application of modern process monitoring and control technologies, the design of systems using devices such as programmable logic controllers, frequency converters, servo gear control devices, programmable instrument panels, network analysers, modern communications used in these electronic devices.

The Programme has acquired more elements of the interdisciplinary programme, covering not only the field of electrical engineering, but also integrating the field of electronic engineering.

Considering the College development in relation to the region College Strategic Action Plan 2019–2021 was prepared and approved on 14 June 2019 by a resolution of the College Council. The aim of the Programme and the intended learning outcomes are in line with the priority objective of the College Strategic Action Plan 2019–2021 to provide quality conditions for individuals to obtain a professional bachelor's degree and prepare for professional activities.

*(2) Expert judgement/indicator analysis*

The evaluation team elaborated on the content of Courses and related modules and found that expected learning outcomes are in accordance with the content of lectures and practical

exercises of related study fields. The critical recommendations from the previous evaluation report have been elaborated and suitable actions have been considered.

There is evidence from the SER, description of study plan, study subjects and site visits that renewed Programme and the intended learning outcomes of the studies are directed not only at the preparing of electrical engineers having knowledge and skills related to common electrical engineering issues, but also at the development of broader skills needed by a modern specialist, in particular the application of modern process monitoring and control technologies, the design of systems using devices such as programmable logic controllers, frequency converters, servo gear control devices, programmable instrument panels, network analysers, modern communications used in these electronic devices. In this way, the Programme has enough elements of the interdisciplinary programme, covering not only the field of electrical engineering, but also integrating the field of electronic engineering.

### *3.1.3. Evaluation of the compliance of the field and cycle study programme with legal requirements*

#### *(1) Factual situation*

The Programme belongs to the Engineering Sciences Fields Group, Electrical Engineering Study Field and is consistent with the LR Law on Higher Education and Research, regulating the type of college studies (higher education college studies) and cycle (first – professional bachelor). The Programme complies with Description of General Study Implementation Requirements. Scope of Programme is 180 credits. The main study field subjects – 124 credits (legal act requires no less than 120; interdisciplinary studies set by the College – 37 credits (legal act requires 30-40 credits; subjects of general and digital competences (self-) development – 19 credits (legal act requires 15-25 credits); practices and other practical training – 39,4% (legal act requires not less than one-third of the programme scope). Studies are organized as full-time and part-time. Credits in the study plan are awarded based on the number and scope of outcomes pursued in the subject and the planned student workload. Each study subject focuses on the specific intended learning outcomes of the Programme. Each learning outcome of the Programme is achieved by studying from 2 to 8 subjects. During one semester students study not more than 7 subjects including individual subject practices. The scope of subjects in credits takes into account entire students workload, which consists of contact hours (participation in lectures, laboratory work, consultations, practice, etc.) and self-study hours (working in the library, homework, writing course project, drafting a presentation, preparation for a control test or exam, interest in scientific innovations, participation in applied scientific activities, etc.). The scope of one credit is 25–30 hours. Approximately 50% of time is contributed to contact and self-study work, consultations. Less time is allocated to part-time studies for contact work and more for consultations. Subjects are periodically being attested According to Description of Study Subjects Attestation Procedure (2020).

*(2) Expert judgement/indicator analysis*

The analysis of programme scope, detailed full time and part time study plans presented in the SER (see information in factual description) confirms the Programme compliance with the legal requirements.

**3.1.4. Evaluation of compatibility of aims, learning outcomes, teaching/learning and assessment methods of the field and cycle study programmes**

*(1) Factual situation*

Methods of studies cover various types (lectures, laboratories, group work, practical seminars, consultations) and consider student independent work and working in the team. Active teaching methods (seminars, group and laboratory work, working in a virtual environment, etc.) are also being used to correspond to the essential student-oriented learning provisions.

*(2) Expert judgement/indicator analysis*

During the evaluation period, more than 50% of students study in part time studies and at the same time are working. Before Covid-19 ~10-20% of study content was already in remote. Currently, most of the content is uploaded to google classroom. Practical laboratory works partly were changed by simulation (electronic workbench) tasks. Examination is also planned remotely.

Recent trends in industry point out that hybrid type of work will remain in the future. During the site visit, SSC representatives stated that they understand new reality and will continue to develop content for remote studies (SSC estimation 40-60%) for full time students also. Therefore the panel suggests the recommendation – to continue further development of hybrid study (in-class lectures and various remote interactions) methods for future full time (FT) and part time (PT) studies. This would attract more students to study, increase the rate of participation of students and involvement in the study process.

**3.1.5. Evaluation of the totality of the field and cycle study programme subjects/modules, which ensures consistent development of competences of students**

*(1) Factual situation*

All the major and important topics are covered by compulsory or elective courses in pursuit of gradual deepening of knowledge and improvement of abilities.

In the first semester of full-time study of Physics subject, the student acquires basic knowledge of the nature and laws of electricity; in the second semester, theoretical knowledge and practical skills in the subjects of Theoretical Electrotechnics and

Electromechanical Converters are deepened by analysing, calculating and testing electrical circuits and electrical devices-drivers, generators and transformers. In the third semester, the subject of Electric Drives deepens the ability to perform practical work on the test equipment for electric drives. In the fourth semester the subject of Consumer Electricity Networks, students calculate the basic parameters of electrical equipment and networks and draw up electricity grid plans and diagrams. Students learn about medium and low voltage switchgear and create electricity supply circuits in the fifth semester subject Electric Distribution Networks. In the fifth and sixth semesters, the subject of Automation of Technological Processes applies the acquired knowledge and skills necessary for the design work.

*(2) Expert judgement/indicator analysis*

A list of full time study subjects and practices was provided to the panel in the document SVK\_Electrical\_Engineering 2020\_subjects descriptions.pdf . Current industry and technology trends show that there is an integration between energy management and automation. Therefore communication, data collection, IT, IoT, cloud solutions should be more explicitly expressed in the content of most subjects of electrical engineering and electronic engineering study fields. Communications of Automation Systems, Information Technologies subjects are present in the study plan. Background principles for students is given, however some principles of applications should also be included into the content of certain related subjects. Attention should be focused not just to the design of the electrical network. Issues related to operation and maintenance (like energy efficiency, power quality (harmonics, short and long-time voltage quality issues, etc.) of electrical and automation equipment are very important as well. These issues should be included in the content of Distribution and consumer electricity networks, electrical drive control systems subjects.

As a modern engineer, student should also have understanding about organization and its business activities, manufacturing processes and quality management (regularly update content of Engineering Economy subject (as already done after recommendations of social partners) and propose other elective subjects on business, quality management (Lean), project management in the future).

**3.1.6. Evaluation of opportunities for students to personalise the structure of field study programmes according to their personal learning objectives and intended learning outcomes**

*(1) Factual situation*

The programme enables students to personalize their studies by choosing subjects according to their preferences and needs. In the field of electrical engineering, students can choose between Electric Drives Control Systems and Electric Distribution Grids (6 credits), and in the field of electronic engineering, Building Monitoring and Control Systems or Construction of Automation Modules (5 credits). In the final year, students can study Programmable Logic Controller Systems or Basics of Robotics (4 credits). To develop general competences,

students can choose between 5 optional subjects (6 credits) and a professional foreign language (6 credits): English, French, German or Russian. Students have the possibility to personalize their studies under Erasmus+. Students can choose 30 credits for the semester at foreign higher education institutions.

*(2) Expert judgement/indicator analysis*

Number of elective subjects is enough and relevant to the market need required competencies (6 specialization subjects). In the field of electrical engineering, students can choose between Electric Drives Control Systems and Electric Distribution Grids (6 credits); in the field of electronic engineering – Building Monitoring and Control Systems or Construction of Automation Modules (5 credits). In the final year, students can study Programmable Logic Controller Systems or Basics of Robotics (4 credits). There are 5 general subjects: basics of Management / Communication Psychology (3 credits) and Philosophy of Technology / Basics of Law / Engineering Research (3 credits).

During site visit interviews, it was found that students are aware about elective subjects in electrical engineering and electronic engineering fields (networks, distribution vs automation). Some choose subjects from the electrical field. Some understand the importance of automation and choose subjects related to the automation.

**3.1.7. Evaluation of compliance of final theses with the field and cycle requirements**

*(1) Factual situation*

Requirements for graduation projects, their development and defence are governed by The Description of Procedure of Graduation Project Development, Defence and Assessment (2019) comply with requirements. Excellently were assessed 33% projects.

The topics of the Final Projects are aligned with the College's Priority Applied Research fields: 1) Research of the efficiency and qualitative parameters of the electricity networks, testing of electrical products at high voltage 2) Application of IoT technologies in industry; application of mechatronic systems in logistics.

Real existing facilities are selected for final project tasks: industrial, administrative or residential electricity grids, technology lines and equipment.

*(2) Expert judgement/indicator analysis*

Students choose topics of final papers considering the aims and learning outcomes of the Programme. Topics are relevant to the electrical and electronic problems in the industry. Analysis and proposed solutions have application value and are relevant to the final practice. Final works in electrical engineering are design of electrical network. The issue is relevant in the industry and it reveals student's ability to prove his theoretical and practical knowledge gained throughout study process.

During the site visit interviews, participants explained that final works are being selected based on several criteria. Part time students usually choose concrete final works related to their challenges at work. Usually they choose more standard topics. During the study process, there is a big focus on electrical studies. Automation appears later in the study process. Therefore, students choose final works about electrical issues more frequently due to more knowledge and less complexity. Also, students with better study results choose advanced final works related to power quality, mechatronics, etc. It was noticed that the scope and topics of theses in electronic engineering and automation is much wider. Very positive aspect is that final works related to Inostart projects usually are real products and tested live.

There is a couple of recommendations to bring quality of final works into the next level and expand student's ability to use certain tools. It was noticed that the description part in final paper is too broad, most of information is very well known. Theoretical calculation part could be tested and verified with simulation tools / CAD programs (3D/4D, BIM (building information model) in order to show student's ability to apply theory and use appropriate tools. Also it is recommended to consider wider scope of tasks and problems in the final works related to electricity networks (power quality issues, increase energy efficiency, and similar). Final works should also reflect that the students understand not only the principles of electricity, but also the principles of communication, industrial protocols, and capability to configure such systems. When selecting products, it is often emphasized that one or another component is cheap. But the price for industrial facilities is not the main criterion. Therefore, the reliability, resilience of the system, also should be assessed in the final works.

#### ***Recommendations for this evaluation area:***

- Continue development of remote study content.
- Consider student awareness about manufacturing process and quality management process within industrial business organization, when updating the Programme.
- Extend the scope of final thesis issues to cover wider area of relevant topics in electrical engineering and strengthen engineering verification phase of design process.

### **3.2. LINKS BETWEEN SCIENCE (ART) AND STUDY ACTIVITIES**

***Links between science (art) and study activities shall be assessed in accordance with the following indicators:***

***3.2.1. Evaluation of the sufficiency of the science (applied science, art) activities implemented by the HEI for the field of research (art) related to the field of study***

*(1) Factual situation*

Applied research activities in the College are developed in accordance with a plan approved by the Director of the College which aims to increase the productivity of applied research, the impact of the activities on student achievement and the social partners in the region.

Students and teaching staff participate in different industry type seminars, lectures and events. In 2017–2019, the Programme field subject teachers prepared and presented 16 papers in republican and international conferences. The College publishes a periodic scientific journal “Professional Studies: Theory and Practice”.

Research and experimental development (thereafter – SR&ED) activities in the College are carried out in a targeted manner according to the priority research fields. Teachers participate each year in competitions organised by Šiauliai City Municipality (INOSTART, STEAM, etc.), offer various research programmes and the City Municipality finances their implementation.

In cooperation with innovation-intensive Šiauliai companies (JSC Vonin, JSC Aukstata, JSC EICautomation, JSC EICenergy, JSC Elektrosauga Equipment Center), the Programme Teachers implemented engineering and IT solutions together with students, such as modernisation of the energy parameters of buildings and data collection system; designing, manufacturing and optimization of the mobile logistics robot; design and implementation of recording system of requesting and actual work time of the equipment maintenance specialist; creation and optimization of an automated modular system for distribution, transfer and storage of goods, etc. During the analysed period, the Programme field subjects’ teachers carried out 15 applied researches, 11 of which are directly related to ongoing field studies.

## *(2) Expert judgement/indicator analysis*

Close cooperation with municipalities (Inostart projects 3000eur/project) and regional social partners is a very positive aspect. SSC updates knowledge on current business trends, products and solutions and expands network with industry professionals. SSC together with local social partners participate in a project funded by Agency for Science, Innovation and Technology (MITA) on Industry 4.0 theme under the tool “Intelligence. Joint Research - Business Projects: „Development of Universal Logistics Robot Based on the Principles of Mechatronics, Internet of Things, Multiagent Technologies, Storage and Cloud Computing”. Outcome of this project should be a prototype.

SSC has provided evidence about cooperation with other foreign applied science institutions in Tallinn and Lubeck. Due to competition with other local HEI’s for research funding, SSC does not cooperate with other universities. Some years ago, they had a successful joint project with Lithuania Institute of Energy (LEI) – night of researchers.

Number of scientific papers and publications in the electrical engineering field and participation in national and international scientific conferences is not up to desired level and would benefit from increasing efforts. Classic scientific research is done in other study fields (ex. IT), therefore was not included in this SER.

Explanation and reasons were provided during site visit interviews with teaching staff. Due to teaching and wide practical activities (ex. Integration of industrial robots in LT and LV), there is no time and motivation for scientific reports. SSC targets for practical issues and applied research with social partners.

Teaching staff understand that scientific achievement is not at a desired level, but due to limited resources they focus on cooperation with local industrial companies (some teachers are partly employed in local companies) on applied type research projects. SSC considers this situation as good enough for the college level.

### *3.2.2. Evaluation of the link between the content of studies and the latest developments in science, art and technology*

#### *(1) Factual situation*

SSC states that the content of the programme is improved continuously. Teachers acquire new knowledge through development of scientific articles, project activities, internships, seminars, conferences, working in innovative companies, and become familiar with the innovations in the subject they teach and teaching methods. There are provided details in SER, what subjects and what knowledge should get electrical and electronic engineer and what amendments were implemented in the study program (added topics covering modern electric drives, diagnostics and repair of modern industrial equipment, programming, automatic control, actuators, sensors and various industrial protocols).

#### *(2) Expert judgement/indicator analysis*

The course content follows the evolution of the course materials. SSC involvement in Agency for Science, Innovation and Technology (MITA) projects and other R&D activities (Šiauliai city and district companies applied research projects and consultation courses taught for companies: Automatic Control of Building Engineering Systems, Problems With the Deployment of European Installation Systems And Smart Homes; Quality Assurance of New Remote Communication (Telecommunications) Engineering Systems) has positive impact in the field of evolution of education. The update of course content is also coming after regular meetings with social partners, participation in applied researched projects, practical conferences and seminars.

Improved classical research and cooperation with other HEI could benefit for further development of study content.

### *3.2.3. Evaluation of conditions for students to get involved in scientific (applied science, art) activities consistent with their study cycle*

*(1) Factual situation*

4% of Programme students participated in the national student's conference of engineering and informatics sciences "Applying New Technologies" (2018) as authors of reports/articles. Annually, 7% of students published scientific research results at the international scientific-practical conference "Business, New Technologies and Smart Society" (2019 and 2020). During the analysed period 11 students published 7 scientific works and published in SSC conference proceedings. Teachers, together with the students of the Programme carried out 82% of all third-party financed applied research of the Programme during the self-assessment period.

*(2) Expert judgement/indicator analysis*

Students provided to the panel evidence about involvement in the research during the site visit. They are encouraged and motivated by teachers to be involved in the research. Some students know that there is extracurricular activity with robotics and are aware of Inostart project funding for scientific activities. Main reason for low engagement with research – students who work (applicable both to FT and PT studies) do not have time for scientific activities.

***Recommendations for this evaluation area:***

- More visible research activity is advisable, including not only applied research and development, but also long-term scientific research (with links to the application possibilities).
- Closer collaboration in the electrical engineering field of science with other local and international universities and research institutes could affect the level of research results.
- Enhance the possibilities for interested students to be involved in scientific research, both applied and basic. Support extracurricular activities within the study field.
- Improve access to EE field related scientific and professional information materials, for example IEEE data bases.

### **3.3. STUDENT ADMISSION AND SUPPORT**

***Student admission and support shall be evaluated according to the following indicators:***

***3.3.1. Evaluation of the suitability and publicity of student selection and admission criteria and process***

*(1) Factual situation*

Admission is organized and carried out by Lithuanian Higher Institutions Association for Organizing Joint Admission (LAMA BPO). The principles and other criteria for composition of

the competition score of higher education college studies entrants are set by the Order of the President of Rectors' Conference of Lithuanian University Colleges.

Students with at least a secondary education are admitted. Points based system admissions process is in place. Points are calculated in accordance with the Ministry of Education and Science legal requirements.

Number of preferences according to priority vs Percentage of choosing as Priority I is increasing, despite significantly decreasing number of applications (SER table 3.2).

Lithuanian magazine "Ratings" published by the PI "Journalist Research and Consultation Group", publishes summarised results of study fields that allow young people to choose high-quality studies. In 2018, the College Programme was identified as the best in ranking of fields.

The Programme teachers are actively cooperating with secondary education and vocational schools in the region, where they presented projects, read papers on "Internet of Things: Today and Tomorrow", and implement STEAM initiatives. The Programme is also publicized in the media and at various events: Your PIN, Career Days, Catch the Entrepreneurship Idea, Business and Achievements Exhibition Šiauliai'19 and more. Teachers together with students each year organize workshops, competition for secondary school pupils. In order to improve the results of the entrants, teachers help prepare for various tests and the State Mathematics Exam, preparatory consultations for the Mathematics Exam are organized for senior pupils. These classes attract a lot of interest from pupils (more than 50 pupils attended in 2019).

#### *(2) Expert judgement/indicator analysis*

Admission procedure is fully in accordance with national legislation regulations. The suitability and publicity of selection and admission criteria and process for the students are well defined and clearly developed.

Unfortunately, for several years in a row, engineering studies, including the electrical and electronic engineering study programmes, are getting fewer students in Lithuania, this also applies to SSC. The number of secondary school graduates choosing Physics and Informatics state exams is low (around 7%), and this is a necessary subject when targeting engineering studies.

Administration highlighted main distinguishing points for admission compared to other colleges: high ratings of employability of graduates, students, who were admitted had high entrance scores (motivated students), multidiscipline program.

There is positive effort to attract more students by focusing on cooperation with secondary and vocational schools to attract more pupils to study engineering studies. The programme is also being advertised in various events (PIN, Career Days, Catch the Entrepreneurship Idea, Business and Achievements Exhibition Šiauliai'19).

Students usually prefer geographical location (close distance to home and work). They are also being motivated by state scholarship for regional colleges (200 EUR), renewed accommodation conditions. Some students stated that during admission they considered other Lithuanian and foreign HEI but chose SSC due to geographical location and good feedback on study quality.

### ***3.3.2. Evaluation of the procedure of recognition of foreign qualifications, partial studies and prior non-formal and informal learning and its application***

#### *(1) Factual situation*

The order of crediting achievements has been developed in line with the principle of European Higher Education Area (hereinafter EHEA). Crediting of learning outcomes is made according to description of the Procedure for Crediting Learning Outcomes (2018): subjects studied in higher education institutions in other countries and practices performed are credited according to the agreed study content without restrictions, if no violations of the requirements of the agreement are found regarding the subjects studied. Learning achievements in the following learning areas are assessed and recognized: working; improving competences at various learning events; participating in various organizations and groups activities; volunteering, community service; non-formal education; study abroad (workplace, courses, internships); informal study. The credits recognized in the Programme during the analysed period are presented (Crediting learning outcomes received at Lithuanian higher education institutions, vocational training centres, higher and polytechnic schools, on return from Erasmus+, non-formal and informal learning).

#### *(2) Expert judgement/indicator analysis*

The principles for the evaluation and recognition of partial studies, acquired qualifications, non-formal and self-learning competencies are functioning well.

Some students during the visit provided evidence about recognition of credits from other HEI's in Lithuania without any problems.

### ***3.3.3. Evaluation of conditions for ensuring academic mobility of students***

#### *(1) Factual situation*

Erasmus mobility is at or slightly above target, but the trend is decreasing (Erasmus+ exchange programme aims at 4% student mobility from the total number of students). 8% of outgoing Programme's students in 2017–2018 (SSC students – 3.4%), the share of outgoing students decreased to 4.5% between 2018 and 2019, but overall, the Programme's student mobility rates remain higher than the College's – 3.9% – or Lithuanian higher education institutions (3.7%).

Students see studying abroad as an excellent opportunity to improve foreign professional language, acquire new academic experience and get to know foreign culture. In 2020, no students left due to the announced quarantine in Lithuania (one student won the competition for graduate practice). It is noted that students take more advantage of the opportunity to go abroad for a practice/graduate practice than to go to partial studies. Survey of 2017 College graduates showed that 80% of respondents consider the conditions for travelling abroad under exchange programmes as excellent.

The Programme has 23 international cooperation partners in 9 countries of the European Union and 7 partners in institutions in other foreign countries. The most popular country for practice is the United Kingdom (Staffline Group PLC (Sainsbury's Distribution Center). Close links are being developed with the University of Thessaly in Greece, Dicle University in Turkey and Iskenderun University of Technology.

During the self-assessment period, 5 students came to the Programme for partial studies, and there were no students from abroad for full field studies. Three students from Dicle University (Turkey) came to other study programmes and attended electrotechnics and electronics subjects as well as other classes of the Programme teachers.

#### *(2) Expert judgement/indicator analysis*

The Programme's student mobility rate is higher (4,5%) than the College's – 3.9% – or Lithuanian higher education institutions (3.7%). Manager of the department said that the recommendation from the previous SER to increase mobility for students and teachers was the hardest to implement. It has been noticed that part time students have lower motivation due to the risk of losing a working place. It was noticed that students prefer to visit for practice rather than study for a longer time.

SSC is promoting full and partial studies in the Erasmus+ programme. They should continue analyse motivation of students and execute corrective measures: provide language courses, support career planning, promote psychological support (there is regularly working psychologist in the College) and provide information about existing financial aid from various funds. Students could be aggregated into small groups to foreign universities.

In “new normal” most probably, that hybrid (remote and in-class) type of studies will be used. This could attract those students, who prefer shorter stay abroad – theory, various seminars can be studied remotely, while exams, practical part could be taken during the visit to foreign HEI.

### ***3.3.4. Assessment of the suitability, adequacy and effectiveness of the academic, financial, social, psychological and personal support provided to the students of the field***

#### *(1) Factual situation*

Student Support Management (2020) procedure describes the implementation and administration of student support. The types and forms of support are following: *academic support* provision of information on the Programme, flexible study schedule, possibility to study according to individual study schedule, mentoring by teachers, advice given by departments on study and career issues. Incentive (incentive and one-off scholarships), social, study *scholarships*, financial aid for people with disabilities are available for students. Students can receive *state-subsidized loans* to pay the cost of their studies or to pay for part of their studies or for living expenses. *Accommodation services* for students are offered in two newly renovated and modernised dormitories having 393 places. *Psychological support*. The project won by the Lithuanian Student Union, funded by the State Fund for the Improvement of Public Health, made it possible to have regularly working psychologist in the College. Consultation with a psychologist can be received not only on personal issues, but also on issues related to studies: time planning, effective learning, lack of motivation, public speaking. Consultations are free of charge. *Personal support*. Students can express themselves in various artistic, cultural, sporting and scientific activities: dance studio “Kolegos”, student music band “Studijozai”; they are encouraged to participate actively in traditional College, Faculty and Department events. Students' self-governing body is Students Representative Body, which brings together the most active students, initiates various events: students initiation ceremonies, semi-diploma (medium), Halloween, Christmas events, celebration of International Student’s Day, etc. Students take part in concerts, student and teacher works exhibitions, have excellent conditions for training and successfully compete in various sports competitions. For the personal development of students, the College offers lectures on a wide range of topics and invites students to attend seminars and training on entrepreneurship and creativity.

### (2) *Expert judgement/indicator analysis*

Existing support (by type, quantity and quality) for the students is very good. Conducted surveys showed that 58% students know where to get help. However, 85% of first year students have not attended any meeting in the college. Engagement of students is low due to adaptation issues. SSC makes great effort and appoints a mentor (curator) for first year students, who provides help and support on academical, financial, personal topics. There are game activities to increase student engagement and improve adaptation in the college. Lots of information is being provided by email and verbally, but the share of students who know where to get help is not at the desired level.

Part time students are busy and ask help only if big problems occur. They mentioned that in order to establish good relations – the first meeting is important (explanation of rules in the college, provide excursions and similar forms of information).

### **3.3.5 Evaluation of the sufficiency of study information and student counselling**

*(1) Factual situation*

Information about the studies is provided by the Department, teachers, and administrative staff. Group mentors introduce first year students with the study system (study plan, study schedule, lecture schedules, session schedules, elective subjects, outcomes assessment procedures, study fees) and support options. Introductory days are organized for the first year. Consultation meetings for full-time students' monitors are held, attendance at classes, interim assessments and other relevant study issues are discussed on a monthly basis. A sense of autonomy of the student is encouraged, while ensuring adequate guidance and support from the teacher. There also are other means and forms to inform students, like College website, information stands. Students are also consulted by specialists in administrative departments. The College's Student Admission and Career Center conducts student consultation and provides information on career management issues, and organises seminars for students, events on progressing careers: on preparing for the labour market, lifelong learning, career decision making, opportunities for further studies at Lithuanian and foreign universities.

*(2) Expert judgement/indicator analysis.*

The site visit showed that there is enough study information and student counselling available. The fact was supported by the statements from students, and by the detailed information provided by the staff. Student council focuses more on leisure extracurricular activities. They cooperate with other colleges. During Covid-19 student council is organizing remote events for students.

***Recommendations for this evaluation area:***

- Continue promotion of engineering studies in Šiauliai region. Keep working with secondary schools (STEAM classes, various competition, support for Mathematics and Physics studies and exam preparation, involvement of social partners, common (student and pupil) extracurricular activities, etc.).
- Intensify international mobility of students. The possibility of partial semester trips / remote learning should be taken into consideration. SSC could promote students travelling in small groups together.
- Evaluate why surveys show average shares of students (58%) knowing where to apply in case help is needed. Continue mentoring for first year students.

### **3.4. STUDYING, STUDENT PERFORMANCE AND GRADUATE EMPLOYMENT**

*Studying, student performance and graduate employment shall be evaluated according to the following indicators:*

*3.4.1. Evaluation of the teaching and learning process that enables to take into account the needs of the students and enable them to achieve the intended learning outcomes*

*(1) Factual situation*

Study process in the Programme is organized in semesters according to full-time and part-time study plans. Ways of organizing studies and forms of schedule are stated in the SER. They cover class work, and independent work.

There is possibility to study on a temporary basis pursuant to the Individual Study Plan due to serious issues (illness, childcare, work). During the self-assessment period, two students of the Programme could study according to an Individual Study Plan.

The Study Regulations (2020) describe the main (dominant) forms of schedule: day, session, session / remote. Remote means of communication (Google Meet, Zoom, email, distance education environments Google Classroom) is also established.

There are various types of teaching methods used (involving lectures, practices, seminars, demonstrations, discussion, conversation, surveys, group learning). Active work methods (practical and laboratory activities, practices, teamwork, simulation, excursions, work in a virtual environment, analysis of exercises, drawings, examples and cases, etc.) are also used.

Assessment methods are chosen while considering the outcomes of study subject and assessment criteria. The methods to be used to assess the achievements are decided by the teachers preparing the subject programme and the prepared subject assessment strategy is approved by the Committee. Every teacher introduces students to the aims and learning outcomes of the subject during the first lecture and informs students about the assessment system and criteria. Final assessment of the practice learning outcomes consists of the components of the practical activities in the host institution and the public defence of the practice report. For example, the final assessment of Pre-graduation Practice consists of 40% assessment of the company's practice supervisor, 40% of the quality of the practice report and 20% of assessment of the defence of the practice report. Public defence of practices report mostly takes place at the Department. Recently the Study Regulations (2020) has established a cumulative assessment system. This was done in order to implement student-centred studies and to ensure continuous active student work throughout the semester, academic honesty and objective assessment of learning achievements. The subject's learning outcomes during the semester are evaluated through interim assessments (control tasks, tests, written surveys, folders of the tasks solved (drawings made), defence of laboratory, individual, design works, presentations of written works, etc.) and final assessment (examination or project).

After completing the Programme and obtaining a Professional Bachelor's Degree of Engineering Sciences, graduates can work both in Lithuanian and in foreign manufacturing companies.

For the graduates who wish to improve their knowledge, universities offer opportunities to study in supplementary or bridging study programmes. Then graduates can pursue a second cycle education in Lithuania or foreign countries.

One graduate of the 2016 edition of the Electrical Energetics Programme has become a doctoral student, while the College has no data on the other graduates continuing their studies.

#### *(2) Expert judgement/indicator analysis*

75% of part time (PT) students are working during studies. FT students start to work in the 2<sup>nd</sup> year. Students appreciate PT studies due to flexible study schedule and personalized studies. Dropout rate of students is low. Personal consultations (on subjects such as mathematics, physics) and other academic support are provided for FT and PT students, who have issues. Students expressed appreciation of this support during site visit.

Master studies are not possible in SSC. The closest HEI to continue studies in Kaunas University of technology. Representatives from universities are visiting SSC for the promotion of secondary studies. SSC is coordinating study plans with universities in order for more subjects to be recognized and bridging of further studies simplified.

Some students reflected about studies in other HEI. They enjoy friendly attitude of the College teachers and their willingness to help overcoming individual challenges of students'.

Students recognize the importance of master studies due to a better position for career.

### *3.4.2. Evaluation of conditions ensuring access to study for socially vulnerable groups and students with special needs*

#### *(1) Factual situation*

The HEI aims to ensure social integration, human rights and equality for all, and to eliminate discriminatory segregation of individual groups. HEI has a Student Support Department, which provides consultations to students with special needs. There were no students with special needs in the Programme during the assessment period.

Students can also seek psychological help if they experience emotional difficulties, lack of motivation when there is disagreement with others, difficulty in making decisions, depressing thoughts, etc. (see point SER 3.4 for details).

*(2) Expert judgement/indicator analysis*

SSC ensures access to study for socially vulnerable groups and students with special needs. Students are aware about available support and where to contact. During the interview, no student applied to support, so there is no practical feedback about quality of support.

**3.4.3. Evaluation of the systematic nature of the monitoring of student study progress and feedback to students to promote self-assessment and subsequent planning of study progress**

*(1) Factual situation*

Teachers and students have regular discussions with implementation of student-centred studies. Interim assessment is available in the electronic exam sheet. Students have the possibility to repeat subjects, re-pass exams, postpone a session, and take a break from studies. Number of debtors is low – six students during the analysed period. One student of the Programme did not complete studies due to academic failure during the analysed period. Studies are more often terminated for personal reasons. Overall, in full-time studies, on average 10% of Programme students do not finish their studies.

The Programme students' averages are partially lower in the first year – range of learning averages 6.85-7.40 (for comparison IV year learning averages 7.94-8.62) during analysed period. This happens due to adaptation to higher education institutions and to the new conditions of the study as well as a lack of self-study skills. In higher years, the increase in student learning averages is linked to the increasing motivation of students to acquire special knowledge and professional skills.

*(2) Expert judgement/indicator analysis*

It is positive that students are encouraged to evaluate the achieved results by providing examples of assessment tasks, self-testing tasks, tests, comparing the experimental result obtained with the theoretical result available in the literature.

Keep monitoring of student progress during the semester and keep assisting students in dealing with delays or non-achieved results.

**3.4.4. Evaluation of the feedback provided to students in the course of the studies to promote self-assessment and subsequent planning of study progress**

*(1) Factual situation*

The feedback on the assessment of students' achievements provides an opportunity to continually study and reflect on the effectiveness of cooperation in the study process and to anticipate the prospects for improving the study process. Feedback takes various forms: comments are written in the student's work or works are commented generally to all students

with the possibility to consult individually with the teacher at the end of the lecture or during consultations; during the semester the student is given the information about what progress or regression he/she is doing.

Each interim assessment (control tasks, tests, etc.) is followed by a discussion of learning outcomes. Topics of discussion (positive and negative): the strengths of students' work, mistakes made, laws and rules to avoid mistakes as well as inaccuracies. Students are given feedback; teachers advise on further studies.

*(2) Expert judgement/indicator analysis*

The feedback about the studies is collected and evaluated regularly. Student representatives are informed about the results. Results of surveys are applied to update study programs, improve the organization of the study process, and strengthen the composition and skills of the academic staff.

**3.4.5. Evaluation of employability of graduates and graduate career tracking in the study field**

*(1) Factual situation*

Graduates are employed immediately after the finish of studies or even during studies (the number of working graduates of the 2016 field graduate's edition was 72%, in 2017 - 77%, and in 2018 - 91%. About 64% percent of 2018 graduates were already employed on their graduation day). This confirms the high need of employees in the electrical engineering field in the Šiauliai region.

According to the data provided by STRATA, about 50% of the Field graduates are in highly qualified employment 12 months later after completing their studies: in 2018 – 48%, 2016 – 54 %. System shows that 100 % of 2017 graduates were in low-skilled jobs (most probable inaccuracy).

SSC gathers information from graduates about satisfaction with the Programme, opinion about the quality study, professional and personal skills they gained.

*(2) Expert judgement/indicator analysis*

During the site visit the administration explained why there is a high number of graduates in low skilled jobs. Requirements from employers are high. So usually graduates start low and then make a career. This could imply that due to high demand for specialists in this field, demand for quality of graduates could be lower from the employee side. There is no statistical data about graduates who are self-employed.

College is not collecting longer period statistics about employers and their salary changes. Alumni commented that the salary in Šiauliai region for graduates from SSC or KTU would be the same in the same position.

Longer time perspective (3-5 years) career tracking, variations of remuneration, further development of graduates should provide more accurate trends, also could give more clear indications, both to SSC and future students.

Alumni and social partners confirm that SSC graduates have good practical skills in pneumatics, hydraulics, automation simulation. Graduates have better practical skills and lower theoretical knowledge compared to graduates from VGTU or KTU. Graduates from KTU have better knowledge in electronics.

Recent recommendations of social partners / indicate higher employee demand for production, project and inventory management, managerial competencies, ability to work with clients and in a team, developing communication, presentation skills. These recommendations were included in the content of Engineering Economy, Communication Psychology, Management Basics subjects.

Rather big number of working students could also be understood twofold: positive – early practical skills, better understanding of needed skills and knowledge. However – quality of studies can deteriorate due to lack of time for studies (for FT students).

### *3.4.6. Evaluation of the implementation of policies to ensure academic integrity, tolerance and non-discrimination*

#### *(1) Factual situation*

The Code of Academic Ethics (2019) and other documents and procedures are in place and set out in which instances of dishonesty a teacher must respond in principle and report to the Academic Ethics Committee. Penalties to students for cheating, plagiarism and dishonesty during assessment are applied in accordance with the Description of Procedure for Awarding Incentives and Imposing Disciplinary Measures to Students (2020). Student study results are confidential information processed in accordance with the Description of Personal Data Protection Procedure (2018).

The Description of Procedure of Graduation Project Development, Defence and Assessment (2019) stipulates that Student must prepare the original work in accordance with the principles of academic honesty, and the Graduation Project confirms this with an academic honesty declaration. Students get introduced to ways of protecting intellectual property, rights and responsibilities for the publication of intellectual property results, the problem of plagiarism, and patents in elective subjects Basics of Law and Engineering Research. There were no violations of the Code of Academic Ethics (2017-2019). There were three cases in 2017 and one in 2018 for violations of academic ethics discussed at the College.

#### *(2) Expert judgement/indicator analysis*

Above mentioned policies and documents, which ensure academic integrity, tolerance non-discrimination, honesty, intellectual property and rights are in place. They have been continuously updated and cover wide scope. It is very positive and important, that preventive measures are taken – administration staff, academic group curators and lecturers explain legal provisions to students and provide consultations.

### *3.4.7. Evaluation of the effectiveness of the application of procedures for the submission and examination of appeals and complaints regarding the study process within the field studies*

#### *(1) Factual situation*

The order of appeals and complaints application and investigation is governed by the Student Appeals Regulations (2020). They define a transparent, objective process: the possibility for the student to appeal against decisions of an administrative / academic nature taken by the subject teacher or the learning outcomes crediting coordinator.

The formal appeal procedure does not apply to decisions taken by collegiate bodies, such as Study Subject Learning Outcomes Assessment Commission or the Qualification Commission of Graduation Projects.

During the self-assessment period, no appeals and complaints were received from the students of the Programme.

#### *(2) Expert judgement/indicator analysis*

Regulation of student appeals regulation is in place and up to date. The appeal subject and procedure are clear and well defined. As there were no appeals and complaints received during the assessment period, it hard to assess effectiveness of process and protection of the student, who appeals.

### ***Recommendations for this evaluation area:***

- Promote Master studies to the students, continue to work with universities on recognition of modules, bridging modules and promotion for SSC students.
- Collect longer period statistics about carrier and further development of graduates, changes in remuneration (for example tracking records in social and professional networks like LinkedIn).
- Continue implement actions of 2019 social partners recommendations on assessment of competences of trained specialists for the Programme. Keep similar assessments and implementation in the future.

### 3.5. TEACHING STAFF

*Study field teaching shall be evaluated in accordance with the following indicators:*

**3.5.1.** *Evaluation of the adequacy of the number, qualification and competence (scientific, didactic, professional) of teaching staff within a field study programme(s) at the HEI in order to achieve the learning outcomes*

*(1) Factual situation*

There are 19 teachers involved in the Programme, 10 (3 associate professors and 7 lecturers) of whom teach study field subjects. Teachers' qualifications and fields of scientific interest are in line with the content of the subjects they teach and facilitate the achievement of the aims of the Programme and the intended learning outcomes of studies. The SER reports that all lecturers have obtained at least a master's degree in a field related subject. Three staff members teaching in 2019-20 have a Ph.D. The average age of teachers is 50.4 years (almost half younger than 45 years). 90% of the field subjects' teachers are permanent staff of the College, working for more than 3 years and with a minimum workload of 0.5 of full-time post.

The workload of a full-time teacher during the academic year of 2020-2021 is 1524 working hours. Hours allocated for contact work with students and supervising students self-study work for one full-time post is about 50%. Remaining hours are allocated for non-contact, scientific work, publicizing of academic activities, competence improvement, etc.

The most significant articles and methodological works published by the Programme field teachers are presented in SER Table 5.2.

Professional practice is managed by teachers working in organisations and holding key positions related to the field subject that they teach. The practice supervisors have at least three years of experience in teaching or practical activities in the field of study of electrical and electronic engineering.

Teachers' scientific potential is being developed at the College: one lecturer is studying at Kaunas University of Technology in doctoral studies and one lecturer is a PhD student at Šiauliai University. Studying teachers have favourable conditions to attend lectures at universities, do laboratory work and account.

The academic staff implementing the Programme complies with the description of the Description of Engineering Study Fields Group and the Description of General Requirements for the Implementation of Studies.

*(2) Expert judgement/indicator analysis*

Currently there are three (3) teachers that teach considerable amount of electrical and electronic engineering subjects. Therefore, there can be a certain potential risk of execution of the study program at the average or longer term in case of teacher absence. It is highly recommended to increase number of teachers giving electrical and electronic engineering

subjects in 2-4 years. As was stated in 2.1., due to high load for studies and practical activities (ex. integration of industrial robots in LT and LV industrial companies), there is not enough time for publishing of scientific reports. The level of publications is not at the desired level (no publications in high cited journals; most of publications in national proceedings of Colleges). Teaching staff usually uses peer review publications in local journals. There is no evidence about participation in international conferences and published articles, despite available funding for publications and conferences. As a result of it, there are a very small number of associates and no full-time professors in this study field.

It is positive, that scientific potential can be developed at the College by the lecturer, who is studying at Kaunas University of Technology in doctoral studies related to the study field.

Lecturer, who is PhD student at Šiauliai University is studying in the field of Economy, thus not directly related to EE field.

50% of the field of study teachers speak English at least at B2 level and 60% speak Russian at least at level B2. SSC should motivate and demand teachers to improve English language skills.

### *3.5.2. Evaluation of conditions for ensuring teaching staffs' academic mobility (not applicable to studies carried out by HEIs operating under the conditions of exile)*

#### *(1) Factual situation*

Teachers are encouraged to improve their competences and share best practices in foreign higher education institutions. The International Relations and Project Management Department announces Erasmus+ programme selection contest for teachers once a year (Description of the Procedure of Selection of the College Students, Teachers and Administrative Staff to Participate in the Erasmus Exchange Programme, 2016). If a need / possibility arises for a teaching or teaching (learning) visit to a foreign institution, an individual selection is made. All lecturers once a year have opportunities to apply for academic mobility. During the self-assessment period, the field subject teachers carried out 9 Erasmus+ exchange visits to 6 foreign institutions and 2 internships. Around 70% of field subject teachers at least once had Erasmus+ visit.

Foreign representatives (14 teachers (16 visits) visited College for academic activities.

#### *(2) Expert judgement/indicator analysis*

During the visit it was mentioned that improving teaching staff mobility is one of the hardest tasks from previous SER recommendations. Administration of SSC puts a lot of effort, but teachers are not very motivated because of personal reasons or risk of losing their job in other companies. The fund for science suggests good opportunities to visit international conferences. SSC also organises English courses for teaching staff. Academic mobility of teaching staff is implemented mostly using Erasmus+ visits. During the visits, the Programme

teachers got acquainted with the work of students in virtual laboratories, visited new Industrial Internet of Things, industrial automation laboratories, discussed student practice and teacher's internship conditions and other interdisciplinary aspects of communication. During the internship at Fraunhofer Institute of Intelligent Analysis and Information Systems, the received information has been used in the joint business and College project "Development of Universal Logistics Robot Based on the Principles of Mechatronics, Internet of Things, Multiagent Technologies, Storage and Cloud Computing".

There is a statement in the SER, that "The College is the first in terms of the ratio of doctors of science in regard to all academic staff and has a high position in terms of competition in the international study area – is the third among the twelve state colleges". However, the experts are in opinion that there is not enough evidence for contribution to the scientific research and international study area in electrical and electronic engineering study field.

### *3.5.3. Evaluation of the conditions to improve the competences of the teaching staff*

#### *(1) Factual situation*

SSC have staff competencies development and training system, described in the Quality Manager's Human Resources Management (2020) procedure, which includes the teachers' competences development strategic directions, competences development planning, organisation and implementation monitoring, evaluation and recording activities. The need to develop competences of a teacher in the College is planned annually taking into account the Department's annual activity plans, the teacher's tenure workload plans and the teacher's expressed desire to develop competences, career expectations and motivation. Expenditure on the competence development is financed from the state budget, the revenue generated by the College and the Erasmus+ programme and other funds raised by the College (for projects and various programmes) or from other sources. The teacher coordinates the participation to the competence development event with the direct superior. The College pays the entrant fee and internship expenses, provides administrative assistance to teachers (search and analysis of invitations, filling in applications and other formal procedures). Particular attention is paid to Doctoral candidates.

#### *(2) Expert judgement/indicator analysis*

Conditions for the improvement of the qualification of the teaching staff is well organised and supported by the SSC. Teaching staff are encouraged to express career expectations and upskill. They participate in seminars, conferences, and courses and has practical internships. There is financial support for books and other sources. Teaching staff have courses of educology once per year. They are being trained, how to set goals and tasks and how to evaluate achievements. During site visits, it was mentioned that development level is mainly based on personal motivation.

### ***Recommendations for this evaluation area:***

- Increase number of teaching staff for the subjects in the field of electrical engineering (average term action).
- Increase involvement and quality of scientific research and publications in the highly reputed national and international periodicals and conference proceedings related to the electrical engineering study field.
- Increase number trips to reputed scientific and professional events (funding is available) in addition to Erasmus+.
- Invite qualified visitors from abroad to deliver lectures and share good research practices (use remote possibilities).

## **3.6. LEARNING FACILITIES AND RESOURCES**

***Study field learning facilities and resources should be evaluated according to the following criteria:***

***3.6.1. Evaluation of the suitability and adequacy of the physical, informational and financial resources of the field studies to ensure an effective learning process***

### ***(1) Factual situation***

Classrooms and laboratories are detailed listed in SER Table 6.1. Part of the laboratories and study rooms are annually supplemented with new hardware and software at the College. The College participated in 2017–2019 EU financed investment project No. 09.1.1-CPVA-V-720-04-0003 “Modernisation of the Šiauliai State College Biomedical and Technological Sciences Study Base and Renovation of Wellness Facilities”. After implementation of this project, the Technological Processes Automation laboratory has been upgraded; a modern technological production line has been acquired to simulate storage, product feeding, distribution, sorting and processing processes that can be modelled and simulated by a computer.

Updated Electrical Drive laboratory, six stands with modern electric drive control systems – frequency converters, servo drive controllers, and graphical control panels (HMI).

A new IoT laboratory has been launched to work with the low power wireless networks Sigfox, LoRaWAN, NB-IoT. It is intended to install an automated logistics processes laboratory (see Table 6.2). The tools and equipment used are enough for the current number of students and are suitable for achievement of learning outcomes.

In addition to theoretical and practical classes, professional work practices are organized during the studies (SER Annex 1). There is a quite comprehensive list of social partners, where students can gain practical skills.

In 2019, 51 067 books were stored in the College Library stock. The library contains enough literature to achieve the learning outcomes and to implement the Programme.

Electronic resources account for 26% of the library's total information resources. Subscriptions are made to the online book collections of Vilnius Gediminas Technical University and Kaunas University of Technology publishers, which have access to more than 100 subscribed online books, electronic periodicals are subscribed too. Subscribed international databases - EBSCO Publishing, Emerald Management eJournals Collection, Taylor & Francis, etc. - can be used thanks to EZproxy software.

Subscribed foreign language databases in 2019 provide access to 16,559 electronic journals, which account for 24% of the library's total information resources and 1,751 electronic books. The library founts have more than 50 textbooks in English for Electrical engineering field studies, 13 of which are available remotely and are more recent editions than 2010.

#### *(2) Expert judgement/indicator analysis*

Due to Covid-19 and local travel restrictions, the learning facilities were presented in video movies. The quality of movies and information was very good and informative. Experts appreciated efforts of all people, who were involved in this.

Laboratories are well established, and continuously updated with full or partial support of EU financial funds and contribution of local social partners.

The observation about laboratory facilities from both video movies and description in SER is following:

- Electrical energy supply laboratories are at the sufficient level to achieve outcomes of related subjects. There was no information about laboratory exercises on power quality, communication networks, SW for power measurement and analysis. It is recommended to consider them as further upskill and development.
- Laboratory of electric machines and drives is up to date and equipped with modern equipment. Laboratory with renewables updated, and suitable also for vocational training.
- Very good level of automation laboratories: equipped with Festo SW, Schneider Electric programmable logic controllers and SW, ready for IoT solutions. Exercises include practical applications relevant in industry: RFID for storage, distribution and sorting of parts.
- A new IoT laboratory has been launched to work with the low power wireless networks Sigfox, LoRaWAN, NB-IoT.
- There is module Building Monitoring and Management Systems, where practical laboratories are very important. Recommendation to equip laboratory with building management, KNX, Dali training sets for further development.

The library appears to be well resourced, with access to various printed and digital reading collections. Printing, scanning and binding services are provided to students. The accessibility to international sources is up to date however, rather partial. Large paying digital database IEEE Xplore is not available, not even the most important IEEE Transactions can be found (main reason – high costs). The textbooks on electrical subjects are mainly of national origin only.

### *3.6.2. Evaluation of the planning and upgrading of resources needed to carry out the field studies*

#### *(1) Factual situation*

After conducting self-assessment of the Programme and identifying strengths and weaknesses of the Programme, a plan for the implementation of the is drawn up. Plan of infrastructure development is provided in SER (Develop a new IoT laboratory to work with low-power wireless networks, Expand prototype creation, Upgrade computer equipment). The library fund has been replenished, there are more than 50 books in English for electrical engineering field, 13 of which are available remotely (later than 2010 edition). Teachers add reference sources in English to their list of recommended literature for their subjects

#### *(2) Expert judgement/indicator analysis*

Development plan considers recommendations of social partners, employers' needs and student feedback. There are legal and financial procedures about planning and requesting renewal of resources. The plan given is achievable and does not require significant financing. Positive aspect contribution of social partners to the improvement of learning facility infrastructure.

### ***Recommendations for this evaluation area:***

- Continue renewal of the laboratory equipment, based on latest technology developments (both in electrical engineering and electronic engineering).
- Continue purchasing and upgrading of software, simulation tools (as Matlab/Simulink and other) to be use for remote exercises and virtual laboratories..
- Consider cooperation with other HEI's of Lithuania to get access to the international databases (especially the IEEE sources).

### 3.7. STUDY QUALITY MANAGEMENT AND PUBLICITY

*Study quality management and publicity shall be evaluated according to the following indicators:*

#### *3.7.1. Evaluation of the effectiveness of the internal quality assurance system of the studies*

##### *(1) Factual situation*

The HEI has an internal quality management system in accordance with the requirements of ISO 9001:2015. Study management and decision making are regulated in the College's Statute: the system of study quality management focuses on continuous improvement of activities, ensuring that the study process, the quality of study programmes meet legal requirements and the expectations of students and other social stakeholders. Description of Study Programme Development, Assessment and Update Procedure (2020) describes process of revision, renewal and quality assurance of study programme. Documented solutions are made available through the College's internal document management system "Kontora", are published in the internal document (DRAC) database (<http://kvr.d.svako.lt>) and are available on the website [www.svako.lt](http://www.svako.lt).

Description of Study Programme Development, Assessment and Update Procedure (2020) also regulates the procedures for the external evaluation of the study programme. The self-assessment workgroup is composed of the 3 teachers working in the field, a student and social partner. The results of the self-assessment were discussed at the extended meeting of the Committee, a summary of the self-assessment was presented at the extended meeting of the Department.

The quality management system of the College covers all levels of study implementation. This system is implemented on an annual cyclical process, where previous semester or study year achievements are the basis for quality improvement.

##### *(2) Expert judgement/indicator analysis.*

The quality assurance has been implemented at the College and particularly at the study field in a similar way compared to other HEI. There are recently updated and issued documents related to study quality. Study management and decision-making is structured in the Quality Manual (6th edition, 2020), described in procedures, and is based on internal regulatory documents: Study Regulations (2020), council regulations, regulations of faculties and departments, committee and staff activities, etc. The division of responsibilities for the implementation and monitoring of the Programme, as well as the decision-making is structured very clearly.

To provide, how the procedure works, there is an example given of cancelation of Electrical Energetics programme. By supplementing with new subjects, the Automation Study program was updated. Supplementation was done with subjects of Electrical Energetics programme (Relay Protection and Automation of Electricity Networks, Electric Distribution Networks,

Electricity Generation Technologies). Changes were made considering legislation and comments of social stakeholders. Existing intended learning outcomes have been updated and created the new ones. The title of the study Programme has been changed in order to clearly reflect the content in the title of the study Programme and to link the title to the objective of the Programme and the intended learning outcomes of field of studies.

### *3.7.2. Evaluation of the effectiveness of the involvement of stakeholders (students and other stakeholders) in internal quality assurance*

#### *(1) Factual situation*

The collegiate management bodies of the College are composed of representatives of all parties interested in the quality of studies, the social partners and social stakeholders are involved in the Programme's implementation processes as well. The functions and responsibilities of the members of the group are divided according to the fields of activity, experience, scientific interests, possibilities for achieving the aims and objectives of the Programme. In 2020 the composition of the Committee has been renewed by Dean's Order and it is comprised of 6 members, as follows: 3 Department teachers, 1 student and 2 social partners. The proposals of the Committee are discussed and approved at the meeting of the Department and approved in accordance with the procedures established by the College.

The Department has its cooperation partners, whose representatives are invited to review, final paper committees. Close contact and ongoing cooperation with partners are maintained through student practices, conferences, seminars, joint projects, events. The partners can suggest topics for graduation papers, accept students for practices, also offer opportunities for improving practices, etc. Social partners are invited in committees for review of final papers.

Problematic issues arising during the development, implementation and update of the Programme are discussed with the employers. Student interest is represented in the Students Representative Body, student representatives work in all management bodies, Academic Ethics, Dispute Resolution Commission.

#### *(2) Expert judgement/indicator analysis*

There is evidence about involvement of social partners into study field related activities. There are a decent number of regional companies and relations established with SSC. During a site visit, one social partner mentioned that this cooperation should be more developed, but there is a lack of contribution from other social partners.

Suggestion to include mechatronics – came from industry companies (robotics, support and technical knowledge). BMS related topics were also included after common activities with social partners (response from Alumni during site visit).

Recommendations of social partners for the Programme improvement and implementation indicates higher employee demand for production, project and inventory management, managerial competencies, soft skills.

Employees ask to promote understanding of the whole system of machine operation, linking the knowledge of automation engineers to the management of widely used technological processes.

Students are included and participate in the study field committees (information is publicly available – <https://svako.lt/uploads/svako-inzinerija-komitetai-2020.pdf>).

During the site visit discussions with students, there was not enough information in order to understand how the process is functioning in the real life. Students that were present in the meeting indicated that they know where to go with complaints and that they have the feeling that college listens to them and encourages their input. However, they did not seem very well informed about the quality assurance processes and that they are represented in the study field committee. Together with the low response rates for student surveys, this indicates that not all students are well aware about the quality assurance processes and possibility to contribute to it.

### *3.7.3. Evaluation of the collection, use and publication of information on studies, their evaluation and improvement processes and outcomes*

#### *(1) Factual situation*

Quality of the studies, data of teachers' qualifications, scientific, project, expert and consultation activities are continuously monitored in the Department.

Data on student admittance and reasons for drop, results of finishing studies, relevance and practical applicability of graduation topics, career monitoring of graduates, information on student scientific research outcomes is also tracked and analysed.

Feedback from students is also collected in various surveys. There is provided example about changes in the program, where students opinion was taken into account (Measurements Practice was changed to the Practice of Electrical Installations in the first study year, number of laboratory work has been increased in the subjects related to specialty (LT), and topics on renewable energy management and the programming of related sensors and controllers have been included in the content of the subjects). Information on changes in the quality of the Programme, its assessment and results are made public at the meetings of the Department, the Deanery, the Faculty Council, at the Committee's meetings, on the College's website and at organised round-table discussions. The College has developed and is constantly improving computerised systems to manage study information: databases of staff, students and employers, free elective subjects, record of internships, calculation of study fees, study plan development, electronic exam sheets systems (with student information function).

*(2) Expert judgement/indicator analysis*

There are established procedures of data collection, evaluation, improvement planning and execution of measures. There is a regular collection of feedback from various stakeholders. During the site visit the panel observed that engagement of students in this process is not very high. Students provided some information about surveys, but they could not indicate any execution of measures. Thus, the panel recommend intensifying awareness of student feedback on facilities, teachers and subjects.

**3.7.4. Evaluation of the opinion of the field students (collected in the ways and by the means chosen by the SKVC or the HEI) about the quality of the studies at the HEI**

*(1) Factual situation*

The implementation of quality assurance of studies is monitored through periodic surveys and is available publicly <https://www.svako.lt/lt/studentams/studijos/studiju-kokybe>.

Objectivity of the assessment of subjects, practicality of teachers, possibilities to consult, introduction to subject results, topics, methods, assessment of the clarity and understandability subject, resources of a subject were available and enough rated very high >80% in the last three years. 60% of the Programme students agree that they have studied independently throughout the semester.

Student Admission and Career Centre conducts an annual survey of enrolled students

(<https://apklausa.svako.lt/>) on the motives and expectations of choosing studies to become established in the labour market, as well as monitors graduates' careers, etc.

Overall, 63% of students at the College rate a programme of study as well chosen. 58% of students know where to turn for help in the event of difficulties, and most lectures skip rarely. 85% of respondents of the first-year students acknowledged that in the first semester they have rarely or have not at all attended the events organised by the College (response rate 4,6%).

*(2) Expert judgement/indicator analysis*

SSC during analysed period regularly collected opinion from the students two time per year. Answers are publicly available. The results of surveys are good or very good. The panel recommend encouraging and motivate students in order to increase participation rate. It was observed in SER and during site visit that engagement of students in the surveys is not very high, therefore it is hard to estimate reliability of results. Positive that students, who participated in the meeting were aware about SER and the reason they were invited to the interview. No one of them have read SER evaluation and did not know what recommendations from previous SER were implemented. In this case, an executive summary would be very

helpful both for students and social partners to get acknowledged with the SER. Also, student organizations could be involved in spreading information about quality of studies and measures, which have been taken.

***Recommendations for this evaluation area:***

- Improve the feedback system and student's and employer's quality surveys. Response rates could be higher, and students could be better informed about the quality assurance processes and the possibilities for student participation. Cooperate with student organizations for spreading of information.
- Have regular updates on execution of SER actions and improve communication with various stakeholders.

## **IV. EXAMPLES OF EXCELLENCE**

*Core definition: Excellence means exhibiting exceptional characteristics that are , implicitly, not achievable by all.*

- The study field is focusing on an explicitly practical oriented programme, has close contacts with Šiauliai municipality, regional companies, professional organisations, and have joint applied science projects with them (Inostart, Project funded by Agency for Science, Innovation and Technology (MITA) on Industry 4.0 theme under the tool "Intelligence. Joint Research - Business Projects: "Development of Universal Logistics Robot Based on the Principles of Mechatronics, Internet of Things, Multiagent Technologies, Storage And Cloud Computing".
- Lithuanian magazine "Ratings" published by the PI "Journalist Research and Consultation Group", publishes summarised results of study fields that allow young people to choose high-quality studies. In 2018, the College Programme was identified as the best in ranking of fields.
- The Programme teachers are actively cooperating with secondary education and vocational schools in the region, where they presented projects, read papers on "Internet of Things: Today and Tomorrow", and implement STEAM initiatives. The Programme is also publicized in the media and at various events: Your PIN, Career Days, Catch the Entrepreneurship Idea, Business and Achievements Exhibition Šiauliai'19 and more.
- A very good level of automation laboratories.

## V. RECOMMENDATIONS

1. Continue development of remote study content.
2. Consider student awareness about manufacturing process and quality management process within industrial business organization, when updating the Programme.
3. Extend the scope of final thesis issues to cover wider area of relevant topics in electrical engineering and strengthen engineering verification phase of design process.
4. More visible research activity is advisable, including not only applied research and development, but also long-term scientific research (with links to the application possibilities).
5. Closer collaboration in the electrical engineering field of science with other local and international universities and research institutes could affect the level of research results.
6. Enhance the possibilities for interested students to be involved in scientific research, both applied and basic. Support extracurricular activities within the study field.
7. Improve access to EE field related scientific and professional information materials, for example IEEE data bases. Consider cooperation with other HEI's of Lithuania to get access to the international databases.
8. Continue promotion of engineering studies in Šiauliai region. Keep working with secondary schools (STEAM classes, various competition, support for Mathematics and Physics studies and exam preparation, involvement of social partners, common (student and pupil) extracurricular activities, etc.).
9. Intensify international mobility of students. The possibility of partial semester trips / remote learning should be taken into consideration. SSC could promote students travelling in small groups together.
10. Evaluate why surveys show average shares of students (58%) knowing where to apply in case help is needed. Continue mentoring for the first-year students.
11. Promote Master studies to the students, continue to work with universities on recognition of modules, bridging modules and promotion for SSC students.
12. Collect longer period statistics about carrier and further development of graduates, changes in remuneration (for example tracking records in social and professional networks like LinkedIn).
13. Continue implement actions of 2019 social partners recommendations on assessment of competences of trained specialists for the Programme. Keep similar assessments and implementation in the future.
14. Increase number of teaching staff for the subjects in the field of electrical engineering (on average term action).
15. Increase involvement and quality of scientific research and publications in the highly reputed national and international periodicals and conference proceedings related to the electrical engineering study field.

16. Increase number trips to reputed scientific and professional events (funding is available) in addition to Erasmus+.
17. Invite qualified visitors from abroad to deliver lectures and share good research practices (use remote possibilities).
18. Continue renewal of the laboratory equipment, based on latest technology developments (both in electrical engineering and electronic engineering).
19. Continue to purchase and upgrade of software, simulation tools (as Matlab/Simulink and other) for remote exercises and virtual laboratories.
20. Improve the feedback system and student's and employer's quality surveys. Response rates could be higher, and students could be better informed about the quality assurance processes and the possibilities for student participation. Cooperate with student organizations for spreading of information.
21. Have regular updates on execution of SER actions and improve communication with various stakeholders.

## VI. SUMMARY

The study aims, outcomes and content are developed on a very good level. Administration is proactive in monitoring market needs, planning of program and interacting with social partners. The college, being HEI, should not underestimate the expectation of society for bringing and helping to adapt new technologies in the country, not only serving today's needs of regional industrines.

The links between science and study activities should be improved. More visible research activity is advisable, including not only applied research and development, but also long-term research and collaboration with national and international HEI's. Due to competition with other local HEI's for research funding, SSC does not cooperate with other local universities.

Student admission and support is developed on a very good level considering the situation in the field of engineering sciences in Lithuania. Continue to work with secondary schools.

Studying, student performance and graduate employment area is well elaborated. The practical knowledge of SSC graduates is like graduates from other colleges and higher compared to graduates from universities.

It is highly recommended in the average term (2-4 years) to increase number of teachers giving electrical and electronic engineering subjects (currently 3 teachers give big amount of subjects). In case of teacher absence, there can be a potential risk of execution of the study program at the average term or longer. Few people bring a big load and focus to studies, so there is less time for scientific activities is dedicated. Scientific publications are not at a desired level.

The learning facilities and resources are well developed. It is advisable to get access to IEEE sources in cooperation with other HEI.

Study quality system is in place, but engagement and improvement of quality surveys is needed. Set up regular and transparent follow up on self-evaluation and evaluation report activities with all stakeholders.

### Expert panel:

1. Prof. Dr. Laszlo Tamas Koczy (panel chairperson) *academic*,
2. Prof. Dr. Toomas Rang, *academic*,
3. Prof. Dr. Žilvinas Nakutis, *academic*,

4. **Dr. Matthew Armstrong**, *academic*,
5. **Dr. Andrius Šablinskas**, *representative of social partners'*
6. **Mr. Ruben Janssens**, *students' representative*.