Professional Education Competence Centre
Riga Technical College

First Level of Higher Professional Education

ELECTRICAL EQUIPMENT

Study Programm Self-assessment Statement

Program Director: the Head of Energetics Department, Mag.ing. Juris Silarājs

Riga

2011

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Introduction

The study program submitted for the assessment is the first level of higher professional education program in Electrical Equipment (code- 41 523) with the aquired qualification Electrical equipment specialist.

The study program was accredited on November, 04, 2009, accreditation paper No 035-1746, which is valid until December 31, 2015.

1. Quality

1.1. Study Program Aims and Tasks

Higher professional education studies comprise obtaining professional knowledge and developing skills and abilities required for a creative and consistent professional activity.

The study programm **is aimed at** providing higher professional education and preparing highly-qualified specialists for a successful career in the domain of electrical equipment for the energy sector and production enterprises, state and public organizations.

The main tasks of the specialists are related to low and medium voltage electrical maintenance and installation, management, planning and organization of these activities, as well as simple electrical equipment projects design and implementation.

1.2 Study Content and Organisation

In order to ensure meeting the aims of the study program it involves:Lai nodrošinātu studiju programmai izvirzīto mērķu sasniegšanu, tā ietver :

- 20 credit points (hereafter CP) of general education study courses (including 1 term paper),
- 55 CP of domain specific study courses (including 3 term papers),
- 16 CP of internship,
- 9 CP granted for the design and the defense of the qualification paper

The study program consists of 100 CP with the implementation period being two and a half years for full-time studies and three years for part-time studies.

The teaching methodology and modes selected and applied during the program implementation are aimed at continuous and consistent learning and connecting the previously acquired knowledge and skills with the subsequent ones. As the levels of students' knowledge, skills and perception are different, various teaching methods are implemented, the relevance of which is checked after the acquisition of a definite theme in accordance with the study course program. Interactive study methods are applied using which academic personnel formulate the aim and objectives, recommend literature sources, and the appropriate ways of information processing, which students can process autonomously applying their own techniques and at their own pace. Wherever possible, audio-visual mode of the presentation of the study material is widely used.

Students' wishes and interests are considered selecting the themes which are topical for them and match with the course content for course projects which are presented and defended during the seminars. Learning autonomously the students acquire the material independently-working with professional literature, searching for the information in databases and the world wide web, designing course reports and term papers and acquiring skills for further qualification paper design and defense. The improvement in this field has been marked by the State qualification examination committee.

Term papers (projects) are expected to be designed in the following courses: Industrial Electrical Appliances, Substation Electrical Appliances, Industrial Power Supply and the general study course Entrepreneurial Economics. The aim of the term paper design is to strengthen the theoretical knowledge, acquire research, empirical and creative skills as well as students knowledge and skills in the certain subject solving specific problems under the supervision of the academic advisor. The theme of the term paper is appointed by the academic personnel.However, the students are offered to choose the themes of course reports and term papers that correspond to the course content, contain topical problems and novelty with further defense in the format of a presentation themselves with the consequent approval by the academic advisor. Thus, the students are facilitated to learn autonomously the information that is appealing and topical for them as well as present their research activities. The possibility is very actual since many students combine their studies within leading Latvian enterprises. The term paper is defended and evaluated according to the 10 points system.

The students are required to strengthen the theoretical knowledge and prove its application, which justifies the involvement of two internship in Latvian enterprises, i.e.

Production technological internship of 5 CP (5 weeks) during the 4^{th} semester;

Qualification internship of 11 CP (11 weeks) in the 5^{th} semester.

Production-technological and qualification internships are organized at the leading enterprises of the domain (e.g. *Latvenergo Ltd, LEC Ltd, REMUS Ltd,* etc.) The internship is supervised by the academic personnel, who together with the prospective qualification paper advisor gives individual assignments, provides tutorials and controls the overall process. Thus, the actual data collection and the design of the qualification start during the internship. Every student also has the head of the internship from company employees at the workplace. At the end of the internship the student submits an internship log, a report and a reference from the head of the internship at the workplace to the department. The execution of the internship program is evaluated by the head of the internship from the academic personnel considering the reference from the employer and prospective qualification paper advisor. The assessment is *passed* or *failed.*

Upon successful completion of the theoretical and practical studies as well as internship assignments, the student is required to defend the qualification paper in accordance with the *Methodological Guidelines and Conventions for Qualification Paper Design at Riga Technical College* (hereafter RTC), which were designed in 2008, supplemented in 2011 and is accessible at RTC webpage (www.rtk.lv). The students are allowed to select the theme of the qualification paper themeselves with further approval.

The sequence of the development of the qualification paper is as follows:

- Formulating the task;
- Analysis of the problem and choosing a possible solution;
- Practical implementation of the task applying efficient solution technologies;
- Assessment of the acquired results.

The design and defense of the qualification paper demonstrate the compliance of a student's theoretical knowledge and practical skills with the qualification requirements.

The students are provided with an individual approach throughout implementation of the study program:

- The students are offered to choose the themes of course reports and term papers that correspond to the course content, contain topical problems and novelty with further defense in the format of a presentation themselves with the consequent approval by the academic advisor. Thus, the students are facilitated to learn autonomously the information that is appealing and topical for them as well as present their research activities and acquire the skills necessary for further qualification paper defense.
- The possibility is very actual since many students combine their studies within leading Latvian enterprises.
- During their internship students complete an individual assignment, upon the completion of which at the end of the internship the student submits an internship log, a report and a reference from the head of the internship at the workplace to the department.
- A theme for the qualification paper can be chosen by the student.

Term papers, the internship report as well as the qualification paper design and defense are conducted by students individually under the supervisor's guidance, which ensures an individual approach and personalised feedback.

The overall aim of the internship is to strengthen and supplement knowledge and skills acquired during the study courses as well as prepare for the qualitative development of the qualification paper.

The aims and objectives the internship are the following:

1. Production-technological Internship

Aims:

- to acquire practical knowledge and skills within the chosen profession;
- to choose a preliminary topic of the qualification paper topic and the academic advisor.

Objectives:

- to get familiarized with the structure of the electrical appliances of the company;
- to acquire the technological processes of the electrician's job and their organization at a workplace;
- to get acquainted with the construction of electrical equipment, the principles of its operation and exploitation;
- to choose a preliminary topic of the qualification paper topic and the academic advisor.
- To gather the materials required for the internship report and design it.

2. Qualification Internship.

Aims:

- to supplement practical knowledge and skills within the chosen profession;
- to specify the theme of the qualification paper and, consulting the academic advisor, design the objectives of the qualification paper;
- To become familiarised with the future potential workplace after graduation from college.

Objectives:

- to get acquainted with the problem solving processes of the electrical appliances within a company;
- to specify the theme of the qualification paper;
- to clarify the problems solved in the qualification paper;
- to conduct practical assignments in accordance with the business profile of the enterprise;
- to describe the technology applied for solving a practical assignment;
- to solve the problems of the qualification paper according to the advisor's guidelines.

Production-technological practice and qualification practice are organized at the leading enterprises in the relevant domain (*Latvenergo Ltd, LEC Ltd, REMUS Ltd, etc*.) and

abroad within the framework of ERASMUS program. The content of the study program is aimed at meeting the needs of these employers. Thus, the theoretical part corresponds to the practical needs.

In order to ensure the successful completion of all study courses of the 1st level of higher professional education program assessment system, assessment criteria and requirements have been designed. Assessment techniques are different depending on the content and the aims of the study course and can be seen in course descriptions of the program.

In order to assess the students' progress during the acquisition of the course content and upon course completion, the academic staff applies B. Bloom's taxonomy according to which:

1. Knowledge – remember, recognise, define
2. Comprehension – explain, interrelate
3. Application – generalise, organise,
4. Analysis – compare, differentiate, classify,
5. Synthesis – compose, construct, produce,
6. Evaluation – judge, weight, summarise.

At the beginning of the study course the students are informed about the assessment of their knowledge and skills. The information obtained stimulates students' learning motivation, develops their self-assessment skills and allows teachers to assess learning process in a group.

Implementation and improvement of the didactic concepts is ensured by pedagogical education of he academic staff which has been additionally acquired.

Once a month the department meetings are held, where one of the most essential discussed issues is students' successful performance, their attendance of lectures, as well as the evaluation of the session results. The results of the academic year are evaluated taking into consideration and approving the annual self-assessment statement of the study program.

1.3 Studies and Evaluation of Knowledge

When developing a course program, its integral parts are clearly set goals of the course, tasks and assessment criteria, expected learning outcomes upon the successful course completion as well as course themes and the requirement for obtaining credit points.

In order to ensure the achievement of learning outcomes, the students are familiarised with the study aims, objectives and learning outcomes as well as assessment criteria upon commencement of their studies in the 1st year as well as at the beginning of every course.

Students know about their exams, tests and other assessment modes assessment criteria in a timely manner. The obtained information stimulates students, enables self-assessment, and allows academic personnel to evaluate learning outcomes in a group. It is crucial that the requirements of the academic personnel must be clear and understandable. The above mentioned factors facilitate further collaboration between the academic staff and the students as well as prevent problem occurrence.

It is advisable to make a comparison of various problem solving variants provided in term and qualification papers. Thus, problem solving skills are being developed.

In order to pass the courses successfully, especially beginning the studies, students' prior readiness is crucial. Upon commencement of the studies, academic personnel is informed about the knowledge results of the enrolled students in order to observe whether students' selection criteria are sufficient to achieve expected learning outcomes in estimated time and of relevant quality. Having in the basis *RTC Matriculation Procedure* which was issued in accordance with the Law of Higher Education Institutions clauses 45, 46 and 83, applicants applying to study full-time are enrolled considering competition principle, summing up two centralised state exams (Latvian, Math, Physics or English) with the average mark in the General Certificate of Secondary Education (marks=points). In recent years applicants' competition in the Electrical Equipment programme budget places was the following: in the year 2009 – 2.0; in the year 2010 – 1.7; the year 2011 – 1.9. Having cooperated with the first year students, the following conclusion has been made: their background is satisfactory; though, it is always expected to be better.

Every member of the academic personnel has a compulsory tutorial once a week. They have been approved with the decision taken during the department meeting and are accessible to students electronically at RTC webpage and on the notice board next to the schedule. The students can obtain individual tutorials on the phone or by e-mail. In order to ensure the achievement of results of the study program and motivate students to study, the knowledge of the students is regularly assessed with the help of tests, practical and individual assignments and discussions. The learning outcomes are discussed with the students during the lectures as well as during the department meeting once a week where other members of academic personnel are familiarised with the progress of the students.

1.4 Study Provision and Management

Studies are provided in accordance with college regulations, which have been devised in accordance with the legislative and normative acts of the Republic of Latvia. RTC regulations

and structure determine the operation of RTC board, involving students' representatives delegated by RTC Students' board. Therefore, the students are included not only in the decision making concerning specific study programs, but also with regards to the decision making process at college on the whole.

An essential aspect of program implementation is annual students and graduates questionnaires, the results of which are included into annual self- assessment statements accessible at college webpage www.rtk.lv. The results of the questionnaires are analysed during the department meeting at the end of the academic year. Respondents' negative feedback is closely paid attention to, however, it is worth mentioning that students are mostly satisfied with the study program. In order to enhance the organisation of the study process and improve quality, students' and graduates' comments, suggestions, recommendations and proposals are considered and implemented.

Rare conflict situations are solved through discussions involving the conflicting sides and the head of the department, or, in case of the necessity of finding a compromise, on the basis of a formal application and a decision of the department meeting is confirmed by the RTC principal's order. It is worth mentioning that during the implementation of the study program *Electrical Equipment* there have not been such precedents.

One of the pre-requisites for striving for perfection, establishing traditions and college development is the introduction of the code of ethics, which has been designed by lecturer Evija Tože in 2011. It is available for all students, academic personnel and college employees at the library, from the group's monitor (from academic personnel) and study program director. The introduction of the code was reviewed by E. Tože in her article „The Introduction of the Code of Ethics to academic personnel's, employees' and students' work at Riga Technical College" – RTC scientific proceedings 9th issue, 2011.

1.5 Academic Personnel and Students Research (Creative) Activities

Currently there are 19 members of the academic staff involved in the implementation of the study program *Electrical Equipment* who have the following qualifications in the relevant fields:

- Doctors of science – 3.
- Masters – 13,
- Bachelors – 2,
- Higher professional education (1st level) – 1.

Since 2001 3 monographs have been written (A. Mutule, I. Oleinikova), 1 textbook (A. Baltiņš and others – 2003). Sice 2008 49 scientific articles have been published in different scientific sources.

The academic staff regularly takes an active part and improves their qualification in different scientific conferences, courses and other creative activities.

Since 2002 RTC has held annual International scientific practical conferences where RTC academic staff as well as its students participate publishing their findings and results in scientific article.

In the 9th issue of 2011 A-E-3 group student R. Mackaitis' and J. Silarājs published the article *Programmable Controller Communication with Frequency Converter* ISBN 978-9934-10-140-3, RTC scientific proceedings, 9th issue, published by RTU, Riga, 2011.

Students actively participate in numerous *Latvenergo Ltd,* Latvian Electrical *Engineering and Electronics Industry* Association *(LEEA), Jauda Ltd, ABB Inc* creative workshops and qualification paper competition announced by Riga Technical University Development Fund. As a result, in 2009, 5 awards were received, in 2010 – 2 , in 2011 – 1 prize winning place was obtained by R. Mackaitis and 1 award respectively. Two papers are participating in the competition held by *Latvenergo Ltd*, but the results have not been announced yet.

The study programme has been grounded in the scientific research and the academic staff are involved in research programs.

Guest lecturers A. Mutule and A. Obuševs are paprticipating in the following projects:

- ESF project Nr. 2009/0213/1DP/1.1.1.2.0/09/APIA/VIAA/027 *„A* Scientific Support Group of the Activities of a European. Strategic Energy Technology Plan" .
- Era-Net projects „Efficient Identification of Opportunities for Distributed Generation Based on Smart Grid Technology (SmartGen)"

1.6 Quality Assurance and Guaranties

Professional Education Competence Centre *Riga Technical College* has its quality management system, which encompasses all the operating activities of an educational institution and defines quality environment within the educational institution. The quality management system changes along with the changes in the environment.

It ensures

process planning, organisation, control and correction.

The internal quality system of the higher professional education study program *Electrical Equipment* has been established basing on study quality monitoring and control systems.

The following aspects are of high significance:

- the efficient evaluation of the existing achievements, the analysis of the background of self-organized and- self-managed activity;
- the calculation of internal reserves and development potential;
- the ability to promote the most essential issues, forecast precise expected results and review further activities (set development goals and tasks; select the most suitable solutions of tasks for the appropriate target audience, situation and environment);
- the ability to define the content of the required information and the procedure of data collection for further evaluation of processes operation.

The assessment demonstrates the preferred development ways of the higher educational institution (students, academic personnel, employees, physical study facilities) grounded on internal potential and needs.

Summarising the information about the gradutes' careers in 2009 – 2011, it can be seen that the majority continue their professional development in the chosen specialty (63,75% of graduates work, 15 % continue their education in the same specialty). 93 % of the present 3rd year students are having the qualification internship at the enterprises which are their potential employers in accordance with the specialty. One of the internship assessment criteria to be taken into account is the reference of a particular trainee.

In almost all the received references the students are highly evaluated. (If the evaluation is not satisfactory, the student's internship is not accepted).

It is considered that these figures confirm that the graduates have a broad range of career prospects to work successfully in the specialty acquired as well as that the educational aims of the programme are met.

2 Resources

2.1 Study Program Aims and Tasks

In the course of the study program *Electrical Equipment* implementation its resources have been continuously improved. Within the co-financed project "The Implementation of the study programme *Electrical Equipmen*t" and RTC study process quality improvement" in 2008 and with the support of Remus Ltd, energy systems automation laboratory has been established,which development was possible owing to *Augstsprieguma tīkls Ltd* relay service engineer Mārtiņš Silarājs's contribution.

As well as this, with the support of *Remus Ltd* classroom 110 and electrical machinery drive laboratory were renovated. *Remus Ltd* and *LEC Ltd* contributed to equipping a new computer classroom and electrical equipment laboratory were equipped.

The program implementation resources will be further improved. The students of the study programme *Electrical Equipment* use the technical facilities of other RTC departments RTC has developed an up-to-date electronics laboratory in Latvia, computer classrooms of ITC department are also available, and the *Organizational Psychology* classroom has been equipped with multimedia, Mathematics classroom with an interactive whiteboard.

Thus, despite other numerous requirements, both employers and professional organizations approve these resources and find them appropriate to the aims.

2.2 Study Content and Organisation

The professionalism of the academic personnel implementing the study program complies with the content of the study program. In total, 19 academic personnel are involved and their academic positions degrees and qualifications have been summarised in the table below.

No	Name, Surname	Academic Position	Scientific Degree	Study Course	CP
1.	Andris Baltiņš	Assist. professor	Master's	Electrical Machinery Industrial Electrical Appliances Lighting Installations Introduction to Specialty Electrical Appliances Maintenance Electrical Installation	2 3 1 1 3 2
2	Rasma Baļule	Lecturer	Master's	Electrical Equipment Electrical Measurements	6 2
3.	Veronika Iesmiņa	Assistant	Master's	Engineering Graphics	2
4.	Iveta Ulmane	Assist. professor	Master's	Entrepreneurial Economics Computer Studies	3 2
5	Juris Silarājs	Assist. professor	Master's	Electrical Drive Electrical Automation Programmable Controllers	2 2 2
6.	Rafails Rauhmans	Assistant	Bachelor	Electrical Networks	3
7.	Ludmila Bernharde	Assistant	Master's	Electronics	2
8.	Irina Oleinikova	Guest assist. professor	Doctoral	Substation Electrical Appliances	4
9.	Alnis Kaļāns	Assistant	Master's	Industrial Automation Componenets	3

10.	Mārtiņš Silarājs	Assistant	Master's	Power System Automation	3
11.	Anna Mutule	Guest assist. professor	Doctoral	Electrical Transmission Networks, Industrial Power Supply	2 6
12.	Margarita Viskova	Assistant	Master's	Higher Mathematics	6
13.	Inta Klotiņa	Assist. professor	Doctoral	Physics	3
14.	Jana Kuzmina	Guest assist. professor	Master's, 3 Year Doctoral Student	English	3
15.	Oļģerts Dreimanis	Assistant	1st level higher professional educ.	Labor, Environmental and Civil protection	1
16.	Sandra Stūrīte	Assistant	Master's	Labor, Environmental and Civil protection	1
17.	Lilita Jonāne	Assist. professor	Master's	Corporate Psychology	2
18.	Kristīne Rūtiņa	Assistant	Bachelor	Latvia and Europe	1
19.	Artjoms Obuševs	Guest lecturer	Master's	Computer use in the design of energy	2

To ensure qualitative acquisition of the professional study programme, a lot of attention is paid to internship, practical and laboratory assignments, work and seminar organization and management. Work descriptions, methodological materials, which ensure successful work execution are available in the college library and in classrooms.

Quality of the execution of these assignments essentially affects the final evaluation of the study course. Internship program distributed to the students at the beginning, reflect the content of internship, the documents to be submitted to the internship supervisor and evaluation criteria.

The tasks of term and qualification papers are reviewed and approved at the department meeting:

- tasks of the term paper – by the director of the study programme;
- the task of the qualification paper – by the deputy director of study and research work.

Generally speaking, the overall number of contact lectures comprising 2500 academic hours includes theory (37%), practical assignments (23%), internship (25%), and qualification paper design (15%). It is considered that such distribution is relevant for achieving the goals of the higher professional education study program.

2.3 Studies and Evaluation of Knowledge

To ensure qualitative acquisition of the professional study programme, RTC has developed an up-to-date Energy Systems Automation Laboratory (5 workplaces) equipped with ABB Enterprise equipment. Students can also use electrical engineering, electrical equipment, electrical machinery, electrical automation laboratory and for electricians' training – examination center with a computer classroom (25 workplaces with the Internet access). Theoretical studies are conducted in the classrooms equipped with multimedia and provided with the Internet access.

RTC Energy department has 3 classrooms which meets its needs.

RTC has developed the most up-to-date in Latvia electronics laboratory, computer classrooms of IT department are also available, another classroom is equipped with multimedia, where students acquire *Corporate Psychology*, classroom of Mathematics is equipped with an interactive whiteboard.

The lectures of the study course *Industrial Automation Components* are held in the classrooms of *EK sistēmas Ltd*, using its facilities. The lectures are delivered by the Chief Technical Officer Alnis Kaļāns. The study course *Power System Automation* is delivered by „Latvijas elektriskie tīkli Inc" Relay Service Engineer Mārtiņš Silarājs. Thus, during the educational excursions held during the course the students are able to get acquianted with the equipment owned by the enterprise.

2.4 Study Provision and Management

Fund allocation to education in the Republic of Latvia is insufficient. Therefore, RTC administrative and technical staff's opportunities are limited (there is only 1 laboratory technician – 0, 5 load and 1 – 0, 25 load, which, taking into consideration the amount of the equipment used, is not enough). However, it is worth mentioning that staff work with a complete involvement and enthusiasm that is why the study process results can be considered as well established and organised. This is admitted by both students and graduates in their answers in annual questionnaires.

Within the ESF co-financed project "The Implementation of the study programme *Electrical Equipmen*t" and RTC study process quality improvement" (contract No 2 2007/0082/VPDI/ESF/PIAA/06/APK/3.2.3.2./0024/0098) 12 brochures covering study courses lecture content were developed and published, as well as methodological materials prepared for practical and laboratory development.

These materials are available in RTC library. All the academic staff as well as groups and students have their own e-mail addresses which are helpful in autonomous learning. Active and regular information exchange channels for successful communication are e-mail and Skype. Study materials involve handouts, visual aids, hard copy materials, electronic version and in the format of presentations. A part of these materials is available at www.rtk.lv. The amount of the material is constantly supplemented.

In 2011 RTC the building of the study unit has been renovated as a result of which the study environment has improved considerably.

Students' Board operates in accordance with the Professional Education Competence Centre *Riga Technical College* developed Guidelines about students' board accepted at RTC Board meeting of December 02, 2008, meeting minutes No 40-2008. The Student Board operates at 16 Braslas Street Room 118, Riga, LV-1084, e-mail: brasla@rtc.edu.lv.

The library plays a significant role in the provision of the study process at Riga technical College. It operates in accordance with the internal normative acts and performs the fuctions of cultural and information centre, ensuring literature and information access, providing, library, bibliographical services, consulting students and academic personnel.

The main objective of the college library is to provide the study process with the required information resources and services in accordance with the study program requirements. The library employees regulary perform the inventory and sistematisation of the resources, the informative and bibliographical services for students, academic personnel and employees.

The library contributes to the technical education process and scientific work of the students and academic staff.

There are 27 study places, 5 computers and a photocopier in the reading room (97 m^2). The computers are connected to the Internet through the local area network. In addition, the students can access the computers with the internet connection in classrooms and dorms.

The library provides a free access to reference literature, latest publications in various branches and fiction. The library has a subscription to 28 hard copy press and media materials.

It consists of 2 books storage rooms (193 m^2) for reference literature, fiction, periodicals archive and study books and methodological materials for full-time and part- time students in technical branches, i.e. energetics, electronics, telecommunications, metalwork, information technologies, including 8000 lecture methodological notes, which were designed and published within the framework of EU projects using its funding and Latvian standards.

Photocopying is a chargeable service, according to the LR Cabinet of Ministry regulations No 1431 Riga December, 15, 2009 – „Regulations on the price list of chargeable services provided by Riga Technical College".

RTC library supplements necessary scientific literature, study books, and methodological materials for the support of the study program cooperating with study program directors and heads of departments. In 2011 there have been 35 705 units in the library, including 25 537 books, 22 032 of them being study books. Audio visual aids constitute 22, DVD 12 items respectively. The library utilises alphabetical and systematic catalogues.The library employees use the common state catalogue of 9 libraries as well as Latvian National Library and Riga Technical University subscription for the academic personnel.

Since 2009, ordering and receiving books are possble electronically applying Latvian National Library inter-library subscription.

The library stock involves books and methodological materials in foreign languages – English, German, and Russian.

RTC has a dormitory (4 Ierikļu Street –) and canteen (*Atvars Ltd).*

2.5 Academic Personnel and Students Research (Creative) Activities

Having reviewed the facilities (RTC technical facilities, library and accessibility employers' equipment) it can be concluded that students and academic staff have an access to the modern scientific and technological environment. This has been proven by a number of scientific publications and the assessment of the qualification papers.

2.6 Quality Assurance and Guaranties

Financial resources for ensuring the implementation of the study programme are seen in R.2.1., R.2.2., and R.2.3. and their usage is controlled annually by RTC Audit Commission which statements are publicized in annual reports.

3 Sustainability

3.1 Study Program Aims and Tasks

The aim of the study program *Electrical equipment* is to prepare qualified specialists in electrical engineering for industrial enterprises with highly developed energy sector as well as agricultural manufacturing and recycling enterprises, state and public organizations.

A wide range of companies determines a necessity to prepare a narrow qualification

To determine the employers' demand in the graduates, the biggest Latvian enterprises related to the energy sector were surveyed and the results are the following:

Enterprises	Number of employees in electrical engineering		Number of employees in the electrical engineering who require the 4th professional qualification level		Remarks
	2009	Forecasted 2015	2009	Forecasted 2015	
Jauda Inc	40	50	3	8	
REMUS Ltd	84	84	25	40	
LEC Ltd	163	138	45	35	With the optimistic forecast for the growth of the national economy
Latvenergo Public Ltd	2800	2800	1400	1400	To reach the necessary number and ensure the number of the electricians in the holding, on average, 20 specialists are required annually.

As the respondents participated in the questionnaire were aware of the subject to be related to RTC *Electrical Equipment* study programme, it can be concluded that their interests are taken into account.

RTC has devised its development conception for the period 2008-2014. The designed document includes the main visions and settings which is to be included and elaborated on in a more detailed RTC strategic development plan. The document has been prepared having in the basis of the forecasts of the stakeholders leading in the economy sector on the development tendencies and requirements. In the process of its preparation enterprises and associations representing their fields of business, as well as RTC administration at different levels: higher level administration, administration of specialties and program, heads of departmentsth were consulted. This document has been designed by chairman of the board of the company *Knowledge transfer and marketing Ltd* Roberts Dlohi. It is available at www.rtk.lv for a more detailed exploration.

3.2 Study Content and Organisation

The content and implementation of the study program ensure a continuous and consistent development of the study program and meet four main goals of a higher education (personality, democratic society and scientific development challenges, labor market requirements).

To achieve the abovementioned goals, the first one should be initially addressed, i.e. student's growth and becoming an open, willing to learn, socially active personality since it ensures the achievement of the subsequent ones.

A stimulating progress of a personality development and a democratic society's scientific developmet objective are realised in the course of the study process, based on the consideration of labour market needs.

It is considered that the most effective means in achieving this goal is the academic staff member's personal attitude to the student and study environment in the process of the study program implementation.

To determine the students' evaluation of the emotional atmosphere some questions have been included into the students' and graduates' questionnaires. The obtained respondents' results are encouraging.Therefore, it is believed that the student in the process of studies turns into a person suitable for a democratic society.

The academic staff, involved in the study programme, regularly improves their qualification participating in different events, including international ones related to the domain, the most important ones are presented below:

No	Activity	Name, Surname
1.	Latvian Electrical Engineering and Electronics Industry Association Conference seminar May 25, 2010 – 8 academic hours	Andris Baltiņš
2.	A visit to the Company *KWO,* a hydro accumulating power *Grimsel Hydro Power Plant* (Switzerland) on May 18, 2010.	Mārtiņš Silarājs
3.	3.1. January 18, 2010 - *Latvian Green Energy Forum* organized in cooperation with RTU, Ministry of Economics, Environmental Protection and Agriculture. 8 academic hours. 3.2. International conference in Electrical Engineering 2010 (EPE'2010) held in the Czech Republic, Brno. May, 04 – 07.	Anna Mutule
4.	Exhibition *Energy Sector 2010*	All the members of the department
5.	*Higher Professional Education in Theory and Practice: International Scientifically Practical Conference*, Riga, April 27, 2010. RTC.	All the members of the department
6.	6.1. *Labor Protection Training Modules (study programmes) in the Professional Education Institutions*, a 50-hour course. Cert. No 04-01-03/11/1707 6.2. Electrical safety course for IV(B) qualification. Study center „Komunālceltnieks" Cert. No 89	Juris Silarājs
7.	7.1. October 14, 2010 – RTU 51st International Scientific Conference 7.2. March 30, 2011 – seminar *Improving the Policy Framework for Renewable Energy Use Heating Latvia* organized in cooperation with FEI, LZA and ES-H Policy - 4 acad.hours. 7.3. International Conference of Young Scientists on Energy Issues (CYSENI'2011), which was held in Lithuania, Kaunas on May, 26.-27.	Artjoms Obuševs
8.	March 30, 2011 – seminar *Improving the Policy Framework for*	Irina Oļeinikova

	Renewable Energy Use Heating Latvia organized in cooperation with FEI, LZA and „RES-H Policy" - 4 academic hours.	
9.	2011.14.03.-2011.21.06. Educational program *Computing* RTC 120 academic hours. Cert. No 90000022223	Ludmila Bernharde
10.	*Higher Professional Education in Theory and Practice: International Scientifically Practical Conference* May 17, 2011, RTC	All the members of the department

One of the most topical problems of the higher education system in Latvia is the increase of the average age of the academic staff.

The implementation of the study programme *Electrical Equipment* involves three members of the academic staff whose age exceeds 70 years (A. Baltiņš, L. Bernharde, R. Baļule). L. Bernharde's classes are expected to be substituted in the academic year 2011/12, A. Baltiņš – starting from 2013/14. A substantial decrease of the load is expected for R. Baļule starting from 2013/14. It is worth mentioning that the qualification papers supervised by A. Baltiņš take prize winning places in annual competitions, moreover, students and graduates highly evaluate R. Baļule in their annual questionnaires.

3.3 Studies and Evaluation of Knowledge

To ensure the study programme sustainability, it is necessary to follow the labor market requirements which results in constant changes in both study courses and programs.

Introducing of the study course "Computer use in the design of energy" must be noted as the most essential, which current curriculum was developed and confirmed in October, 2011.

3.4 Academic Personnel and Students Research (Creative) Activities

The content and implementation of the study program comply with the main goals:

- personal development;
- democratic society development;
- the solution of the aimed at science development;
- observing labor market requirements.

The programme evaluation indicators are the students' points of view, the views of the administrative and academic staff, the proportion of the use of latest technologies in the classrooms and during internship.

During the study program acquisition the students are encouraged to develop professionally, i.e. to continue their studies to acquire the second level of higher professional education.

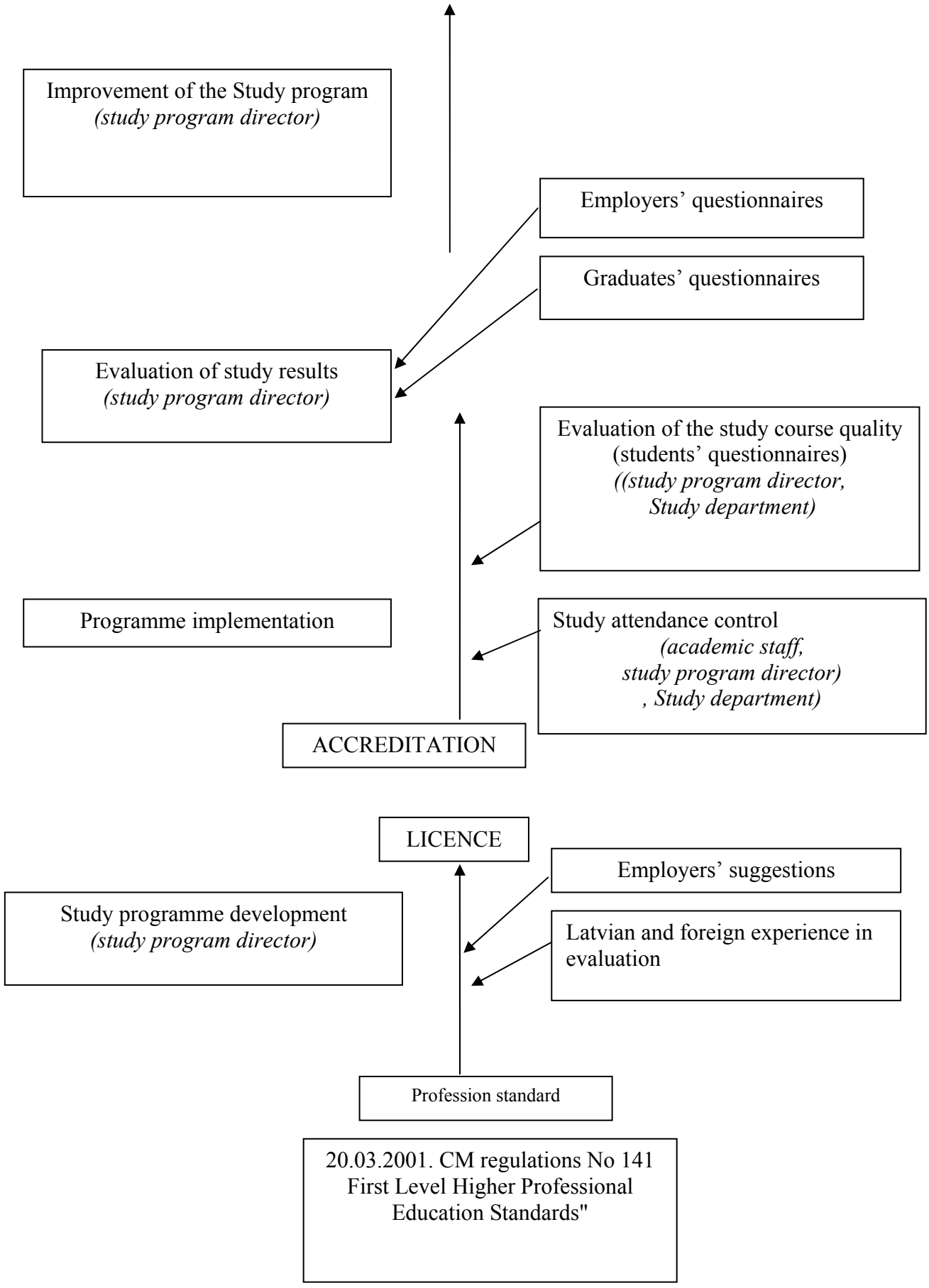
The evaluation methods of knowledge, skills and attitude are considered to be objective, related to study results and labor market requirements.

In the process of the evaluation of results both experienced employers' representatives and the leading members of RTC academic staff are involved. The state qualification examination committee consists of the following members:

No	Committee	Name, Surname	Workplace, position	Education and qualification
1.	Chairman	Dainis Vīksna	"VEF-REC Ltd. " Head of Mechanical Energy Service	Higher, engineer - electrician
2.	Assistant of Chairman	Inta Klotiņa	Head of RTC Study Department	Dr. phys.
3.	Member	Māris Kalniņš	*Augstsprieguma tīkls Ltd* Relay Service Engineer	Higher, engineer - electrician
4.	Member	Irina Oleinikova	Physical Energy Institute, a lead researcher	Higher, Dr. Sc. ing., energy branch, electrical engineering sub-sector
5.	Member	Juris Silarājs	Head of RTC Energy Department	Mg.ing., higher, engineer - electrician

Both examination results and the lacks of the students' preparation as well as their achievements are reflected in the annual reports of SQEC. The disadvantages shown are considered as tasks for the study process improvement. This document also highlights the most outstanding qualification papers and promotes them to the joint competitions with the graduates of RTU and Agriculture Academy of Latvia.

RTC Study Programme Management System is designed in the following way:



The National Development Plan of Latvia 2007 – 2013 emphasizes that the most important resource of Latvia is human resourse. Therefore, the government will ensure a certain support to the educational system and continuous education education. Higher education is the basis for the society knowledge. Thus, it is crucial to ensure the opportunities for qualitative acquisition of higher education to everybody interested. A special attention should be paid to the increase in the number of students in exact science, medicine, engineering.

The government also guarantees its support restoring the prestige of pedagogue's profession and informing the society about the variety of professions and study programs offered by higher institutions.

Analyzing the National Development Plan of Latvia 2007 – 2013, RTC conception of development strategy for 2008 – 2014was developed and accepted in 2008. The document has been prepared having in the basis of the forecasts of the stakeholders leading in the economy sector on the development tendencies and requirements. It contains the vision and main objectives for RTC for the next period. Considering the abovementioned documents RTC Energy Department Prospective Development Plan for 2008 – 2013 has been designed.

They also influence the development of the study program in different directions:

1. The improvement of the study program structure:

a) to develop the methodological materials for students in all study courses,

In 2010/11 ac.year 7 methodological materials were designed;

b) to ensure both full-time and part-time study modes,

In 2010/11 ac.year the program was acquired by both full-time and part-time students;

c) to align term paper and qualification paper content with requirements of enterprises,

It has been organized in accordance with the Law of Higher Education Institutions clause 47 (1) and 50 (3).

d) To ensure the possibility to take an academic leave and return after it without losing the previously obtained credit points,

RTC and the program ensure it;

e) To improve the system of adapting mechanism of marks transfer for the students coming to RTC from a different educational institution,

This mechanism is operating in RTC.

2. Study program expansion:

a) to identify the topical knowledge used in the domain outside the scope of the study program and ensure its acquisition.

It is being continuously implemented supplementing and redesigning study programs.

(2010/2011 ac. year - Power Supply and Use of Computers in Technical Design in Energy Sector)

3. Development of internship procedure:

a) To involve study programme graduates more in internship organization and management,

It has been achieved since many graduates work in various electrical enterprises holding managerial or top management positions;

b) To review and popularize successful internship examples;

Raimonds Mackaitis informed about the internship procedure and organization within the framework of *Erasmus* program;

c) To develop methodological materials and provide the necessary support to internship supervisors at the enterprises in pedagogical and methodological issues,

It requires more attention.

d) To organize internship and training for the academic staff in domain enterprises.

It is expected to be implemented.

4. Development of technical facilities:

a) to identify the opportunities to implement various educational material and facilities within the frameworks of joint projects,

It requires more attention.

b) to stimulate the interest of enterprises about the development of the study program technical facilities,

A considerable improvement has been achieved with the help of enterprises;

c) to design cooperation regulations to determine the conditions of use enterprise facilities in RTC study process.

Although the regulations are yet to be designed, facilities are used due to guest lecturers' activity and the leading positions of college graduates in the electrical enterprises;

d) to identify opportunities and interest of implementing joint educational facilities projects,

e) It requires more attention.

f) to coordinate study programmes with other higher educational institutions programs to ensure continuity,

It has been achieved by signing the cooperation agreement with RTU;

g) to increase the exchange of the academic staff among colleges and other higher educational institutions,

Guest assist. professor A. Mutule and asoc. prof. I. Oleinikova are involved in the implementation of the program.

5. Cooperation with enterprises:

a) Attraction of guest lecturers and presenters from enterprises;

It is being implemented.

b) Selecting a topical theme important for the enterprise to be developed in the qualification works to foster novelty of research;

It has been implemented.

c) to encourage enterprise financial support to the study programme,

It has been implemented.

d) to attract more study programme graduates to the improvement of the study program technical facilities;

It has been implemented with the help of graduates who hold leading positions in domain enterprises.

6. Communication and public relations:

a) participation in discussions on all topical processes in the country,

It has been implemented with the help of *Latvian Electrical* Engineering and Electronics Industry *Association;*

b) Internal and external competitions of students' papers,

It has been implemented.

c) the promotion of enterprises providing good internship recommending it a good potential employer;

It is conducted by practice supervisors recommending internship places to the students;

d) The promotion of studies at RTC and in other institutions,

It has been implemented by students and academic staff during RTC information days and in mass media.

Considering the plan execution, the programme implementation achievements as well as drawbacks are transparent. Adequate attention should be paid to preventive and corrective actions.

3.5 Academic Personnel and Students Research (Creative) Activities

The academic staff are involved in scientific research activities, the themes of which topical and connected with the interests of the region, the study program content and future development. The results of scientific work are published in internationally available and peer-reviewed issues.

The results of scientific research work are used practically, facilitating innovation. Therefore, the students are also able to choose different topical themes for their term and qualification papers, which are related to the interests of the region and the study programme content. The previously mentioned results of the competitions of qualification papers confirm that.

3.6 Quality Assurance and Guaranties

At the end of each academic year the study programme report is developed.

It includes evaluation of its strengths and weaknesses, development opportunities, academic resource, technical facilities, financial provision and internal self-evaluation. The report is discussed and evaluated at the Energy department meeting, and it is placed at RTC home page www.rtk.lv afterwards.

One of the issues reviewed in the self-evaluation report is the analysis and summary of the results of students' and graduates' questionnaires.

Questions of the questionnaires cover the content and implementation quality of the study programme, the level and development of the technical facilities as well as the description of the academic and the administrative staff.

To provide the continuity of the study program at the second level of higher professional education a cooperation agreement between RTC and Riga Technical University has been signed. In case of study program liquidation, restructurisation or other changes, students are entitled to continue their studies at Riga Technical University Energy and Electronics Department.

The dynamics of the students' and graduates' the development trends, graduates' employment, academic personnel qualification and age, finance and research results are regularly discussed at the department meetings.

Professional Education Competence Centre *Riga Technical College* includes a structural unit - Professional Education Competence Centre *Riga Technical College* secondary school which prepares electricians of the 3rd professional qualification level of the programme *Energy*. One of the main tasks of the Competence Centra is to ensure the preceding stages to the

educational institutions, involve students in scientific research activity, encourage academic staff further education and attract potential students.

4 Cooperation and Overlapping

4.1 Study Program Aims and Tasks

The aim of all the study programmes related to electrical equipment is to prepare qualified specialists in electrical engineering for industrial enterprises with highly developed energy sector as well as agricultural manufacturing and recycling enterprises, state and public organizations.

There are different qualification levels and program volumes (implementation periods). The program *Electrical Equipment* designed at RTC is aimed at preparing average level specialists with a clearly practical direction within a short period of time (2.5 years). It is considered that this goal is achieved The previously mentioned results of the competitions of qualification papers as well as employers' references confirm that.

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It is necessary to note that RTC graduates of the study programme *Electrical Equipment* are the only 1st level higher professional education graduates and are ready to face tough competition.

4.2 Study Content and Organisation

Having in the basis clause 47 of the Law of Higher Education Institutions, when transferred from a different institution all relevant study courses credit points and the assessment obtained in other Latvian higher education institutions study programs are considered.

Clause 59 entitles the students to acquire separate modules, subjects and or have practice or internship (partly or fully) in other Latvian higher education institutions study programs upon completion of which obtaining a certificate , which contains the information about the student, the name of the educational institution, study course or module, the data about the academic staff, the amount in credit points, the amount of work completed and the assessment result.

Within the assigned resources, different projects are implemented such as students and academic staff mobility projects within *Erasmus* program.

A-E-3 group student Raimonds Mackaitis visited the enterprise *Salon Teknopaja Oy* in Finland in 2010/2011 ac. year where he had an internship. As a result, in the qualification papers competition organized by Latvian Electrical Engineering and Electronics Industry Association,

„Jauda Inc", „ABB Ltd" and Riga Technical University Development Foundation a prize winning place was received.

The most essential aspects of the qualification work were published in RTC Scientific Proceedings ,the 9th issue of 2011.

Currently, A-E-3 group students Oskars Bērziņš and Artūrs Bērziņš are being trained at the German enterprise „HAHN Automation GmbH" within their qualification practice, A-E-2 group student Artūrs Landsbergs is being prepared for practice in the UK, at „HALL Stage Ltd.".

The knowledge and skills acquired during these practical periods, of course, will again become a basis for qualification work development.

Language skills would be desired to be improved considerably. In accordance with the academic staff's CV data, only A. Mutule, M. Silarājs, I. Oleinikova possess the required English language skills for preparation and implementation the study programme in a foreign language (I. Oleinikova also speaks French).

To facilitate the mobility, life-long learning and language skills of the academic personnel in the long- term perspective of education development, as well as contribute the college prestige and its awareness as an internationally recognised educational institution an English language course is provided free of charge this academic year.

The academic staff involved in the sudy process of RTC and attracted from other organizations in Latvia (M. Silarājs – „Latvenergo Ltd", A. Kaļāns – „EK Sistēmas Ltd", A. Mutule, I. Oleinikova, A. Obuševs - LR SA Institute of Physical Energy) are involved in RTC methodological and scientific work.

The main goal of their involvement in the implementation of the study programme Electrical Equipment is comprehensive use of their opportunities, not only delivering of the particular study course.

4.3 Studies and Evaluation of Knowledge

The internal evaluation of the study program operational results attracts other Latvian study program / higher education academic staff.

I. Oleinikova and A. Mutule deliver similar courses at Riga Technical University. They are also involved in the qualification papers evaluation committee.

The best papers are evaluated by Latvian Electrical Engineering and Electronics Industry Association, „Jauda Inc", „ABB Ltd" and Riga Technical University Development Foundation in the competition of the qualification papers, where the committee includes RTU and RTC leading members of the academic staff.

4.4 Study Provision and Management

Throughout the time RTC Department of Energy has established very good partnerships with different employer organizations, especially due to the fact that many graduates of the study programme, are employed by these organizations and hold leading positions now.

Their help is very essential in solving any problem, in also ensuring places of practice outside the borders of Latvia.

4.5 Academic Personnel and Students Research (Creative) Activities

Currently there is no research (creative work) conducted in cooperation with other Latvian or foreign / higher education study programmes students and academic staff. In the nearest time these activities are supposed to be planned and implemented together with RTU, Faculty of Electrical and Power Engineering.

4.6 Quality Assurance and Guaranties

In the competition of the qualification papers organized by Latvian Electrical Engineering and Electronics Industry Association „Jauda Inc", „ABB Ltd" and Riga Technical University Development Foundation committee the Head of the Energy Department J. Silarājs is involved to evaluate RTU and RTC students' papers.