



RĪGAS TEHNISKĀ UNIVERSITĀTE

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Study programme "Smart Power Systems"

Main attributes

Title	Smart Power Systems
Identification code	ECR0
Education classification code	42522
Level and type	Professional Bachelor (First Cycle) Studies
Higher education study field	Power and Electrical Engineering, Electrical Technologies
Head of the study field	Oskars Krievs
Deputy head of the study field	Pāvels Gavrilovs
Department responsible	Faculty of Computer Science, Information Technology and Energy
Head of the study programme	Aleksandrs Dolgicers
Professional classification code	-
The type of study programme	Full time, Extramural
Language	Latvian, English
Accreditation	14.09.2022 - 15.09.2028; Accreditation certificate No 2022/21-A
Volume (credit points)	240.0
Duration of studies (years)	Full time studies - 4,0; Extramural - 5,0
Degree or/and qualification to be obtained	Professional bachelor degree in energy and electrical engineering / electrical engineer
Qualification level to be obtained	The 6th level of European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF); the 6th level of professional qualification
Programme prerequisites	General or vocational secondary education

Description

Abstract	The study programme is aimed at meeting the requirements of the Latvian and external labour markets with the necessary specialists in the field of electric power systems and networks as well as energy handling. The programme is capable of identifying the needs of the power industry and offers to apply smart technologies for economical and efficient use of electric power, integrating the knowledge obtained in the study process in the field of modern electric power systems in such a way as to enable the student, after obtaining the degree, to both start practical work in the field and continue their studies at a higher level in the academic or professional (with the possibility of obtaining the qualification of Leading Electrical Engineer) master programme.
Aim	The aim of the study programme is to prepare a new generation of graduates in the field of electric power systems and networks, electric power transmission and distribution, their modes, stability, and reliability, actively implementing smart technologies, namely: <ul style="list-style-type: none">• optimal control technologies applicable to the energy market as well as to generation, transmission, distribution, consumption, and energy-saving;• expertise in energy demand and saving, efficient energy use techniques in construction, manufacturing, the primary sector, and the transport industry;• Development of various control systems and energy efficiency models and their integration.
Tasks	The main task is to prepare well-qualified specialists for successfully addressing future problems: <ul style="list-style-type: none">• Monitoring and supervision of operating modes for all the participants involved in energy generation, transmission, and consumption (producers, traders, large and small consumers);• Swift reaction to changes in various power system parameters and reliable power supply in transmission and distribution networks, with a large share of wind and solar energy produced;• Achievement of effective and modern decentralized control of a "distributed" power system;• Awareness-building among passive consumers (the small consumers of renewable energy resources), making them into active participants of the demand-response process as prosumers, to ensure effective implementation of gains.
Learning outcomes	The graduate of the study programme will be able to do the following: <ul style="list-style-type: none">• Identify, substantiate and formulate the problems related to ensuring stable operation of the power system, based on knowledge about the physical foundations of the processes taking place in the electric equipment of electric power systems, industrial enterprises, and other enterprises;• Identify potential emergency modes, calculate their parameters and the potential adverse impact, to both analyse the operation of the existing emergency automation and synthesize new emergency automation algorithms and devices;• Effectively use computing equipment for solving various problems, designing, and control and monitoring of processes;• Show understanding and ethical responsibility for the potential impact of scientific results and professional activity on the environment and society;• Observe labour protection rules;• Develop practical skills, familiarizing themselves with the rules for the technical operation of electric equipment, organization, and technology of repairs;• Evaluate and ensure information about valid state standards and regulatory material;• Communicate, consult, cooperate, and argue the goals and results of smart energy.

Final/state examination procedure, assessment	<p>At the conclusion of the study programme, the students have to write a bachelor's thesis with a design project portion. The bachelor's thesis has to be related to theoretical, experimental, or practical analysis of specified electric power systems and their elements (power transmission lines, power plants, and substations, generating equipment, electric wiring, electric system control and protection elements, electromechanical converters, and electric apparatus), evaluation of various implementation alternatives and possibilities both analytically and experimentally. The bachelor's thesis is defended at an open meeting of the National Examination Commission. The thesis is assessed by a commission composed of a chairman, a secretary, and at least three ordinary members. The bachelor's thesis and its defence reflect the knowledge and skills of the student in doing the following:</p> <ul style="list-style-type: none"> • Preparing a qualification paper with an engineering study about the operating principles of an electric power system and its equipment as well as their implementation alternatives and possibilities; • Executing technical documentation; • Defending their solutions.
Description of the future employment	The obtained knowledge, skills, and competences allow the graduates of the programme to start work at enterprises of the electric power engineering and energy construction fields. The programme prepares high-level specialists in the specialized field of smart power systems (including electric power supply, control of electric networks and systems, or electric machinery and apparatus).
Special enrollment requirements	None
Opportunity to continue studies	The graduates can proceed with their studies in academic or professional master programmes where applicants with a degree of Bachelor in Engineering are admitted.

Courses

No	Code	Name	Credit points
A		Compulsory Study Courses	153.0
A1		General Education Study Courses	21.0
1	SD0002	Innovative Product Development and Entrepreneurship	9.0
2	IV0759	Civil Protection	2.0
3	IV0343	Occupational Safety and Environmental Protection	3.0
4	DE0396	Introduction to the Speciality and Industry Research	3.0
5	DA0008	Chemistry for Engineers	4.0
A.2		Field-Specific Theoretical Basic and IT Study Courses	59.0
1	DE0220	Computer Application in Power Engineering	5.0
2	DE0229	Digital Electronics and Computer Architecture	5.0
3	DE0002	Mathematics	14.0
4	DE0300	Probability Theory and Mathematical Statistics	3.0
5	DE0347	Supplementary Mathematics (for electrical engineering)	3.0
6	DA0101	Physics	9.0
7	DE0075	Theory of Circuits	7.0
8	DE0081	Electron Devices	4.0
9	DE0908	Fundamentals of Electrical Engineering Theory of Direct Current Circuits	3.0
10	DE0907	Fundamentals of Electrical Engineering Theory of Alternating Current Circuits	6.0
A.3		Field-Specific Professional Study Courses	73.0
1	DE0403	Introduction to the Dynamics of Intelligent Electric Power Systems (with a Study Project)	6.0
2	DE0058	Basics of Power Supply	4.0
3	DE0397	Renewable Energy Sources (with a Study Project)	6.0
4	DE0406	Electrical Installation and Lightning Protection of Residential and Industrial Buildings (with Study Project)	6.0
5	DE0410	Power Stations and Substations	3.0
6	DE0392	Maintenance of Power Stations and Substations	3.0
7	DE0413	Electrical Machines	6.0
8	DE0414	Power System Planning and Operation	3.0
9	DE0085	Basic Signal Theory	4.0
10	DE0394	Power Systems	7.0
11	DE0223	Mathematical Modelling of Power Systems	5.0
12	DE0200	Legal Framework for Energy Construction and Electricity Industries	2.0
13	DE0217	Design of Electric Power Objects	5.0
14	DE0400	Structural Engineering of Overhead and Cable Power Lines	3.0
15	DE0395	Economics of Electricity	3.0
16	DE0399	Operation of Electrical Networks	3.0
17	DE0052	Fundamentals of Electrodynamics	4.0
B		Compulsory Elective Study Courses	30.0
B1		Field-Specific Study Courses	18.0
1	DE0391	Modern Artificial Lighting Systems	3.0
2	DE0402	Electrical Safety	3.0
3	DE0412	Electricity Generation and Transmission	6.0
4	DE0416	Energy Management and Accounting Systems	3.0
5	DE0404	Industrial Power Supply	3.0
6	DE0082	Semiconductor Converters in Power Engineering	4.0
7	DE0411	Electrical Machines Designing Calculation	3.0
8	BM0390	Fundamentals of Geomatics	3.0
9	DE0398	Electrical Machines Operation and Repair	3.0
10	DE0047	Residential Building Energy Management	4.0
11	DE0415	Fundamentals of Electrical Devices Diagnostics	3.0
12	DE0408	Renewable Energy Electromechanical Converters	3.0
13	DE0059	Electrical Apparatuses	4.0
14	DE0401	Fundamentals of Control Systems	3.0
B2		Humanities and Social Sciences Study Courses	6.0
1	DE0260	Basics of Communication	3.0
2	DE0258	Sociology of Management	3.0
3	DE0288	Politology	3.0
4	DE0279	United Europe and Latvia	3.0
5	IV0342	International Project Management	6.0

6	IV0254	Startup Entrepreneurship	3.0
B6		Languages	6.0
1	DE0337	The English Language	3.0
2	DE0405	The English Language	3.0
3	DE0067	Basic Course of German	4.0
4	DE0338	The German Language	3.0
5	DE0141	The German Language	2.0
C		Free Elective Study Courses	9.0
D		Practical Placement	30.0
1	DE0407	Practical Placement	30.0
E		Final Examination	18.0
1	DE0393	Bachelor Thesis with Project	18.0