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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 Study
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 Electrical and Environmental Engineering
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)	160.0
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	<p>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).</p>
Special enrollment requirements	None
Opportunity to continue studies	<p>The graduates can proceed with their studies in academic or professional master programmes where applicants with a degree of Bachelor in Engineering are admitted.</p>

Courses

No	Code	Name	Credit points
A		Compulsory Study Courses	102.0
A.1		General Education Study Courses	14.0
1	SDD700	Innovative Product Development and Entrepreneurship	6.0
2	ICA301	Civil Defence	1.0
3	IDA304	Occupational Safety and Environmental Protection	2.0
4	EES731	Introduction to the Speciality and Industry Research	2.0
5	ΚVK732	Chemistry for Engineers	3.0
A.2		Field-Specific Theoretical Basic and IT Study Courses	39.0
1	EES721	Computer Application in Power Engineering	3.0
2	EES262	Digital Electronics and Computer Architecture	3.0
3	DMF101	Mathematics	9.0
4	DMS212	Probability Theory and Mathematical Statistics	2.0
5	MFA101	Physics	6.0
6	DIM205	Supplementary Mathematics (for electrical engineering)	2.0
7	EEE223	Fundamentals of Electrical Engineering Theory	6.0
8	EEE215	Theory of Circuits	5.0
9	EEE202	Electron Devices	3.0
A.3		Field-Specific Professional Study Courses	49.0
1	EES719	Introduction to the Dynamics of Intelligent Electric Power Systems (with a Study Project)	4.0
2	EES725	Basics of Power Supply	3.0
3	EES724	Renewable Energy Sources (with a Study Project)	4.0
4	EES747	Electrical Installation and Lightning Protection of Residential and Industrial Buildings (with Study Project)	4.0
5	EES733	Power Stations and Substations	2.0
6	EES734	Maintenance of Power Stations and Substations	2.0
7	EEM212	Electrical Machines	4.0
8	EES738	Power System Planning and Operation	2.0
9	EES225	Basic Signal Theory	3.0
10	EES742	Power Systems	5.0
11	EES729	Mathematical Modelling of Power Systems	3.0
12	EES744	Legal Framework for Energy Construction and Electricity Industries	1.0
13	EES722	Design of Electric Power Objects	3.0
14	EES743	Structural Engineering of Overhead and Cable Power Lines	2.0
15	EES737	Economics of Electricity	2.0
16	EES730	Operation of Electrical Networks	2.0
17	EEM794	Fundamentals of Electrodynamics	3.0
B		Compulsory Elective Study Courses	20.0
B.1		Field-Specific Study Courses	12.0
1	EES745	Modern Artificial Lighting Systems	2.0
2	EES741	Electrical Safety	2.0
3	EES732	Electricity Generation and Transmission	4.0
4	EES735	Energy Management and Accounting Systems	2.0
5	EES739	Industrial Power Supply	2.0
6	EET795	Semiconductor Converters in Power Engineering	3.0
7	EEM410	Electrical Machines Designing Calculation	2.0
8	BGE114	Fundamentals of Geomatics	2.0
9	EEM315	Electrical Machines Operation and Repair	2.0
10	DMS212	Probability Theory and Mathematical Statistics	2.0
11	EES726	Residential Building Energy Management	3.0
12	EEM795	Fundamentals of Electrical Devices Diagnostics	2.0
13	EEM796	Renewable Energy Electromechanical Converters	2.0
14	EEM231	Electrical Apparatuses	3.0
15	EES727	Fundamentals of Control Systems	2.0
B.2		Humanities and Social Sciences Study Courses	4.0
1	HPS120	Basics of Communication	2.0
2	HSP375	Sociology of Management	2.0
3	HSP378	Politology	2.0
4	HSP380	United Europe and Latvia	2.0
5	IĀS721	International Project Management	4.0

6	IVZ756	Startup Entrepreneurship	2.0
B6		Languages	4.0
1	HVD101	The English Language	2.0
2	HVD216	The English Language	2.0
3	HVD262	Basic Course of German	3.0
4	HVD108	The German Language	2.0
5	HVD226	The German Language	1.0
C		Free Elective Study Courses	6.0
D		Practical Placement	20.0
1	EES728	Practical Placement	20.0
E		Final Examination	12.0
1	EES723	Bachelor Thesis with Project	12.0