RĪGAS TEHNISKĀ UNIVERSITĀTE

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Study programme "Adaptronics"

Main attributes

Title	Adaptronics
Identification code	ECA0
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 Tehnology And Energy
Head of the study programme	Oskars Krievs
Professional classification code	215101
The type of study programme	Full time, Part time, Extramural
Language	Latvian, English
Accreditation	14.09.2022 - 15.09.2028; Accreditation certificate No 2022/21-A
Volume (credit points)	270.0
Duration of studies (years)	Full time studies - 4,5; Part time studies - 6,0; Extramural - 6,0
Degree or/and qualification to be obtained	Professional bachelor degree in adaptronics / 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	Secondary education

Description

Abstract	Modern technologies are complex systems that include elements of different areas: electrical engineering, electronics, mechatronics, adaptive materials, adaptive elements and systems, their regulation, and computer control. This, in turn, requires professionals employed who have knowledge not only of their main field of specialisation and adjacent industries, but also of sectors that seem far and unrelated to the main field, such as medicine or biology. At the same time, skills and competencies are needed to interact with each other. In this context, students and future specialists need knowledge and skills in the interdisciplinary sectors. During the studies, the students get the basic knowledge of theoretical and practical principles of electrical technologies, knowledge in the design of electrical equipment and devices, automation and practical realization of automation systems. The studies provide the knowledge and skills necessary to start practical work and technician, as well as to continue studies at the higher level of academic or professional master studies.
Aim	The general aim of the study programme is to provide professional training in the field of electrical engineering and electronics, as well as enable students to acquire the basic knowledge of electrical engineering, and to develop the necessary skills for the commencement of practical work. The aim of the study programme is to provide students with the opportunity to acquire theoretical and practical knowledge, develop professional, creative, and research skills in adaptronics, electrical engineering, electronics, mechatronics, adaptive materials, adaptronic elements and systems, their regulation and management, as well as facilitate the successful integration of students in the local and international labour market in a variety of industries and fields and prepares students for further studies at the professional master level in the respective area.
Tasks	Tasks of the study programme: - to provide knowledge of mathematics, physics, computing, biology, and materials science for solving practical tasks in electrical engineering; - to teach to use computer technology skilfully and efficiently in order to solve tasks, design automatic control devices, and develop adaptive systems; - to solve practical tasks in the field of electrical engineering at the project-oriented level; - to apply knowledge of the adaptive properties of the animals and plants in the design of modern electrical technologies; - to develop an understanding of the construction and operation principles of electrical equipment and automatic control systems; - to develop skills in solving practical electrical engineering automation tasks associated with the project design; - to develop an understanding of the energy efficiency of adaptronic equipment; - to develop an understanding and knowledge of work organisation and social issues of work, as well as the principles of economic operation and innovation; - to strengthen the knowledge of foreign languages.

Learning outcomes	Upon completion of the study programme, the graduates are able: - to use theoretical knowledge of mathematics, physics, computing, biology, and materials science for solving practical tasks in the field of electrical engineering and electronics; - to use computer technology efficiently in order to solve tasks and design automatic control and adaptive systems; - to solve practical tasks of automatic control systems under specific conditions at the project level; - to recognise the adaptive properties of animals and plants that can be applied in electrical technologies; - to demonstrate an understanding of design, operation principles, and automatic control of electrical and electronic equipment; - to solve the adaptation tasks of electrical and electronic equipment under certain conditions at the project level; - to demonstrate an understanding of the aspects of energy efficiency and energy storage; - to demonstrate an understanding of the principles of work organisation, social and economic activity; - to study professional literature and exchange professional experience in foreign languages.
Final/state examination procedure, assessment	Bachelor Thesis with Project takes place at an open meeting of the State Examinations Commission, where the student defends his work and answers the questions asked by members of the commission, supervisor, reviewer and those present. The State Examination Commission appointed by the rector of RTU consists of five people: representatives of the Faculty of Electrical and Environmental Engineering, representatives of the industry and the chairman, Alnis Kaļāns (EK Sistēmas Ltd). The volume of the Bachelor Thesis with Project is 50 pages in a computer set with description and calculations, as well as two A1 drawing sheets with diagrams and solutions. The final evaluation of the Bachelor Thesis with Project is expressed in a 10-point evaluation system in accordance with the RTU Regulations of the Assessment of Learning Outcomes.
Description of the future employment	Graduates can work as electrical engineers at any enterprise, performing the duties connected with the maintenance, development and design of electrical technologies.
Special enrollment requirements	-
Opportunity to continue studies	Graduates can continue studies at professional master study programmes.

Courses

No	Code	Name	Credit points
A		**Compulsory Study Courses**	**150.0**
A1		**General Education Study Courses**	**23.0**
1	DA0055	Environment and Climate Roadmap	2.0
2	IV0001	Basics of Labour Protection	1.0
3	IV0076	Civil Defence	2.0
4	SD0002	Innovative Product Development and Entrepreneurship	9.0
5	BM0301	Fundamentals of Graphics Communication	3.0
6	DE0485	Introductive Course in Adaptronics	6.0
A.2		**Field-Specific Theoretical Basic and IT Study Courses**	**75.0**
1	DE0002	Mathematics	14.0
2	DA0129	Physics	9.0
3	DA0127	General Chemistry	3.0
4	BM0047	Robot Kinematics	4.0
5	DE0409	Fundamentals of Electrical Engineering Theory	9.0
6	DE0457	Electricity and Magnetism	3.0
7	DE0486	Elements of Adaptive Systems	6.0
8	DE0451	Basics of Regulation Theory	3.0
9	DE0075	Theory of Circuits	7.0
10	DE0057	Electrical Measurement Basics	4.0
11	DE0446	Numerical Methods for Computerization of Tasks in Electrical Engineering	3.0
12	DE0200	Legal Framework for Energy Construction and Electricity Industries	2.0
13	DE0079	Programming languages	4.0
14	DE0085	Basic Signal Theory	4.0
A.3		**Field-Specific Professional Study Courses**	**52.0**
1	DE0484	Design of Adaptive Systems	6.0
2	DE0070	Adaptive Processing of the Signals	4.0
3	DE0452	Power Electronics	6.0
4	DE0488	Digital Electronics (basic level)	6.0
5	DE0477	Industrial Sensors and Actuators	6.0
6	DE0055	Theory of Electrical Drive Systems	7.0
7	DE0476	Programming Technologies (study project)	3.0
8	DE0439	Control and Regulation of Electrical Drives	9.0
9	BM0174	Adaptive Systems in Biology	5.0
B		**Compulsory Elective Study Courses**	**51.0**
B1		**Field-Specific Study Courses**	**39.0**
		Industrial adaptronics	*39.0*
1	DE0077	Adaptive Systems in Industrial Electronics	4.0
2	DE0188	Modern production technologies	8.0
3	DE0478	Artificial Intelligence	6.0
4	DE0187	Basics of Embedded Systems	5.0
5	DE0450	Embedded Systems (course project)	3.0
6	DE0455	Autonomous Robotic System (course project)	3.0
7	DE0019	Intelligent Electronic Equipment in Robotic Systems	4.0
8	DE0489	Fundamentals of Industrial Computer Networks	3.0
9	DE0440	Application of Computers in Electrical Equipment Design	3.0
		Adaptronics in healthcare and medicine	*39.0*
1	BM0432	Introduction to Medical Engineering	3.0
2	DE0128	Analysis of Biological Signals	7.0
3	DA0058	Smart Nanostructured Materials	5.0
4	BM0048	Medical Instrumentation	4.0
5	DE0440	Application of Computers in Electrical Equipment Design	3.0
6	DE0187	Basics of Embedded Systems	5.0
7	DE0481	Biological Robots (course project)	3.0
8	DE0450	Embedded Systems (course project)	3.0
9	DE0483	Computer Vision	6.0
		Adaptronics in transport information systems	*39.0*
1	DE0196	Internet of Things for Smart Electrical Technologies	5.0
2	DE0479	Computer Modelling of Intelligent Agents	9.0

3	BM0049	Optimization Algorithms	4.0
4	BM0528	Databases for Transportation Networks	3.0
5	BM0527	WEB site design for transportation systems	3.0
6	DE0460	Web technology and web-programming in electrical transport	3.0
7	DE0455	Autonomous Robotic System (course project)	3.0
8	DE0490	Artificial neural networks technology basics in electrical transport	3.0
9	DE0480	Artificial immune systems and algorithms basics in electrical transport	3.0
10	DE0441	Embedded Systems of Electrical Transport (study project)	3.0
B2		**Humanities and Social Sciences Study Courses**	**6.0**
1	IV0383	Organization of Production	3.0
2	DE0309	General Sociology	3.0
3	DE0295	Political System of Latvia	3.0
4	IV0400	Economics	3.0
5	DE0260	Basics of Communication	3.0
B6		**Languages**	**6.0**
1	DE0337	The English Language	3.0
2	DE0405	The English Language	3.0
3	DE0338	The German Language	3.0
4	DE0482	The French Language	3.0
C		**Free Elective Study Courses**	**9.0**
D		**Practical Placement**	**30.0**
1	DE0459	Internship	30.0
E		**Final Examination**	**30.0**
1	DE0487	Bachelor Thesis with Project	30.0