



## RĪGAS TEHNISKĀ UNIVERSITĀTE

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### Study programme "Adaptronics"

#### Main attributes

Title	Adaptronics
Identification code	EGA0
Education classification code	47522
Level and type	Professional Master (Second 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	Leonīds Ribickis
Professional classification code	-
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
Variant 1	
Volume (credit points)	90.0
Duration of studies (years)	Full time studies - 1,5; Part time studies - 2,0; Extramural - 2,0
Degree or/and qualification to be obtained	Professional master degree in adaptronics / leading electrical engineer
Qualification level to be obtained	The 7th level of European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF); the 7th level of professional qualification
Programme prerequisites	Professional bachelor degree in adaptronics and qualification of electrical engineer
Variant 2	
Volume (credit points)	120.0
Duration of studies (years)	Full time studies - 2,0; Part time studies - 3,0; Extramural - 3,0
Degree or/and qualification to be obtained	Professional master degree in adaptronics / leading electrical engineer
Qualification level to be obtained	The 7th level of European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF); the 7th level of professional qualification
Programme prerequisites	Professional bachelor degree or equivalent education in electrical engineering, energy, mechatronics, electronics and qualification of electrical engineer
Variant 3	
Volume (credit points)	150.0
Duration of studies (years)	Full time studies - 2,5; Part time studies - 3,0; Extramural - 3,0
Degree or/and qualification to be obtained	Professional master degree in adaptronics / leading electrical engineer
Qualification level to be obtained	The 7th level of European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF); the 7th level of professional qualification
Programme prerequisites	Bachelor degree of engineering science in electrical science, energy, electronics and automatics or comparable education

#### Description

Abstract	<p>Professional master study programme is the next level after obtaining professional bachelor degree in the area of electrical engineering, power engineering, mechatronics, electronics and other neighbour areas. The students get the basic knowledge and skills in the interdisciplinary sectors - electrical engineering, electronics, mechatronics, adaptive materials, adaptive elements and systems, their regulation, and computer control, as well as in the sectors that seem unrelated directly to the main field, such as medicine or biology. At the same time, students study to apply mutually the obtained knowledge and skills.</p> <p>The study programme provides lectures, practical classes, laboratory works and projects to obtain an overall knowledge in electrical engineering and adaptronics and skills in the fundamentals of scientific work, as well as knowledge in the study courses of economics, sociology and pedagogics.</p> <p>Students of the study programme obtain the knowledge, skills and competencies necessary for overall working in the area of electrical engineering and adaptronics – for the design, realisation, improvement, exploitation and control of different adaptive systems, as well as the formation of basic for the further studies at a higher level.</p>
Aim	<p>The aim of the study programme is to provide the students with an opportunity to improve their theoretical and practical knowledge, develop professional, creative and scientific skills for work with modern adaptive systems in the field of electrical engineering, electronics, power engineering, automation of mechatronic systems, that provides effective skills in design, planning, realisation and control of new technologies and systems, and allows successfully join the local and international labour market in different industrial areas or continue education for additional professional competences or doctoral study programme.</p>

Tasks	<p>The tasks of the study programme:</p> <ul style="list-style-type: none"> <li>- to develop effective skills in computing techniques both for solving tasks and creating adaptive systems;</li> <li>- to teach how to solve practical electrotechnical tasks at the project level;</li> <li>- to promote the creative application of knowledge of the adaptive properties of animals and plants in the design of modern electrical technologies;</li> <li>- to teach how to solve automation tasks of electrical and electronic equipment in various production spheres;</li> <li>- to provide an overview of work organization, social issues and principles of economic activity;</li> <li>- to facilitate the interaction of the academic staff and students in the performance of scientific research work and in the practical use of the obtained results in accordance with international standards and trends in the field of quality management;</li> <li>- to facilitate international exchange and participation of academic staff and students in projects.</li> </ul>
Learning outcomes	<p>The graduate of the study programme:</p> <ul style="list-style-type: none"> <li>- is able to design, practically implement and operate new systems adaptable to external conditions, using modern electronic equipment, semiconductor energy converters, drive systems and various types of sensors;</li> <li>- is able to evaluate the possibilities of applying the properties of environmental objects (representatives of animal and plant kingdom) for the design and development of modern electrically adaptive technologies;</li> <li>- is able to use computer equipment, compiling programs for automation of technological processes;</li> <li>- is able to design, create and operate new computer control systems for electrotechnical equipment of all sectors of the economy with the properties of energy saving and rational use;</li> <li>- is able to conduct research with scientific value in the fields of electrical engineering and electronics and their management, substantiate it and analyse the results;</li> <li>- is able to analyse practical challenges and evaluate the appropriate theoretical approach in the field of development and operation of electrical and electronic equipment;</li> <li>- is able to assess the level of knowledge of applicants/students and to implement scientific and pedagogical activities accordingly.</li> </ul>
Final/state examination procedure, assessment	<p>Master Thesis 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 Master Paper is 50 pages with descriptions, schemes and figures, considering the investigation of some electrical equipment operations, as well as proposals for the technical implementation of such equipment. The final assessment of Master Paper is expressed in accordance with the RTU Regulations of the Assessment of Learning Outcomes. Mastering of the study programme is completed with State examination, which is evaluated by a ten-point system and a part of which is the defence of the Master Thesis.</p>
Description of the future employment	<p>The graduates of the study programme can be employed as a highly qualified specialist in the field of electric technologies, their automation, design of adaptive systems at any enterprise, research and educational institution.</p>
Special enrollment requirements	-
Opportunity to continue studies	After the master studies, the graduates can continue their studies for PhD.

## Courses

No	Code	Name	C.p. [1]	C.p. [2]	C.p. [3]
<b>A</b>		<b>Compulsory Study Courses</b>	<b>9.0</b>	<b>39.0</b>	<b>39.0</b>
1	DE0673	Interfacing of Sensors and Signal Conditioning	9.0	9.0	
2	DA1122	Adaptive Systems in Biology		5.0	5.0
3	DE0077	Adaptive Systems in Industrial Electronics		4.0	4.0
4	DE0477	Industrial Sensors and Actuators		6.0	6.0
5	DE0486	Elements of Adaptive Systems		6.0	6.0
6	DE0455	Autonomous Robotic System (course project)		3.0	3.0
7	DE0671	Embedded Systems (course project)		3.0	3.0
8	DE0489	Fundamentals of Industrial Computer Networks		3.0	3.0
9	DE0669	Adaptive Control of Cyber-Physical Systems			9.0
<b>B</b>		<b>Compulsory Elective Study Courses</b>	<b>36.0</b>	<b>36.0</b>	<b>27.0</b>
<b>B1</b>		<b>Field-Specific Study Courses</b>	<b>32.0</b>	<b>32.0</b>	<b>23.0</b>
0	DE0669	Adaptive Control of Cyber-Physical Systems	9.0	9.0	
1	DE0674	Development of a Large-range Robotic Motion Simulator Virtual Reality Project (study project)	15.0	15.0	15.0
0	DE0227	Large Range Robotic Motion Simulator Adaptive Virtual Reality and Artificial Intelligence Technology	8.0	8.0	8.0
<b>B5</b>		<b>Pedagogical and Psychological Sciences Study Courses</b>	<b>4.0</b>	<b>4.0</b>	<b>4.0</b>
1	IV0007	Project Quality and Risk Management	4.0	4.0	4.0
<b>D</b>		<b>Practical Placement</b>	<b>15.0</b>	<b>15.0</b>	<b>39.0</b>
1	DE0670	Internship (Adaptronics)	15.0	15.0	15.0
2	DE0105	Industrial Internship			7.0
3	DE0205	Technological Internship			8.0
4	DE0663	Practical training			9.0
<b>E</b>		<b>Final Examination</b>	<b>30.0</b>	<b>30.0</b>	<b>45.0</b>
1	DE0672	Master Thesis in Adaptronics	30.0	30.0	30.0
2	DE0658	Engineering Design Project			15.0
<i>K.p.[*] kredītpunkti studiju programmas variantā</i>					