RĪGAS TEHNISKĀ UNIVERSITĀTE

Reģ.Nr.90000068977, Ķīpsalas iela 6A, Rīga, LV-1048, Latvija

Tālr.:67089999; Fakss:67089710, e-pasts:rtu@rtu.lv, www.rtu.lvwww.rtu.lv

Study programme "Smart Electronic Systems"

Main attributes

Title	Smart Electronic Systems
Identification code	ECV0
Education classification code	42523
Level and type	Professional Bachelor (First Cycle) Studies
Higher education study field	Information Technology, Computer Engineering, Electronics, Telecommunications, Computer Control and Computer Science
Head of the study field	Agris Ņikitenko
Deputy head of the study field	Jurģis Poriņš
Department responsible	Faculty of Computer Science, Information Technology and Energy
Head of the study programme	Dmitrijs Pikuļins
Professional classification code	2152 01
The type of study programme	Full time
Language	Latvian, English
Accreditation	29.11.2023 - 30.11.2029; Accreditation certificate No 2023/44-A
Volume (credit points)	240.0
Duration of studies (years)	Full time studies - 4,0
Degree or/and qualification to be obtained	Professional bachelor degree in electrical engineering / electronics 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	The study programme prepares specialists - engineers who are able to work in the field of development, installation, operation, and research of smart electronic systems. The professional specialization study courses of the study programme are combined in four modules: smart embedded systems, signal processing, and wireless communication systems, analogy and radio frequency (RF) equipment and systems, electronic hardware design. The study program develops students' professional competence in digital and analogue system design, embedded system and field-programmable gate array (FPGA) programming, analogy and discrete signal processing, implementation of modern wireless communication systems, electromagnetic field analysis, and antenna design.
Aim	To provide professional bachelor's level education in the field of electronics, preparing specialists who understand the development trends of the field and are able to work in the field of analysis and development of smart electronic systems, as well as to prepare for further studies in academic or professional master's study programmes.
Tasks	The tasks of the study programme: - to provide competitive education in accordance with the level of professional bachelor studies and international standards in the field of electronic systems; - to develop and strengthen the foundations of fundamental sciences necessary for the acquisition of theoretical study courses in the field; - to ensure the acquisition of basic theoretical study courses in the field of electronics at the level necessary for the acquisition of specialized study courses and innovations in the field; - to ensure the acquisition of specialized knowledge characteristic to the study field and the ability to apply it for the formulation and solution of tasks in various types of smart electronic systems; - to provide students with knowledge about the use of computer tools in the analysis, programming, modelling and design of electronic systems; - to ensure the development and changes of the content of the study program, implementation of the study process, scientific research work, in accordance with changes in the fields of electronic system design, international practice, science; - to provide students with comprehensive knowledge and develop competence in accordance with the requirements of the market for electronics engineers, preparing students for practical work in the design and maintenance of smart electronic systems; - to develop students' skills to obtain, select and analyse the information necessary for the implementation of professional activities, as well as to use them for decision-making and solving the problems of the respective field; - to provide students with the basics of professional ethics, allowing to assess the impact of professional activities on the environment and society; - to promote students' interest in further professional development by providing knowledge and skills for independent studies to increase their academic and professional qualifications.

Learning outcomes	Graduate of the study programme: - knows the content of the basic theoretical study courses in the field of electronics at the level necessary for the acquisition of specialized study courses and innovations in the field; - is able to work with scientific, technical and methodological literature available in English; - is able to use theoretical knowledge to formulate and solve specific tasks in the fields related to smart electronic systems; - is able to perform experimental data processing in the analysis of electronic circuitry and system operation features; - is able to develop circuits of digital, analogy and RF electronic equipment and systems, make prototypes, perform their testing, analysis, and improvement; - is able to systematize information related to professional activities, to summarize, interpret and analyse the results of measurements and calculations, to prepare summarized reports; - is able to apply current technologies and software to the design process of smart electronic systems; - is able to design electronic equipment and systems, perform their operation modelling, management software development; - is able to develop printed circuit boards and corresponding technical documentation; - knows at the level of understanding standards and technical regulations of the electronics industry; - knows at the level of understanding the principles of wireless communication system design; - knows at the application level electrodynamics and antenna theory; - is familiar at the application level with analogue and digital circuitry; - knows at the application level the theory of analogy and discrete signal processing; - knows at the application level the programming of microcontrollers, programmable logic circuits in high-level languages; - understands the importance of lifelong learning, is able to plan and implement their professional development.
Final/state examination procedure, assessment	The study programme is concluded with the state examination, where the elaboration and defence of a bachelor's thesis including a project in a public session of the State Examination Commission (SEC) is a constituent part of this examination. At the same time, the acquisition of key fundamental, theoretical and field-specific professional knowledge is tested. The SEC consists of at least five members. The chair and at least half of the panel are composed of representatives of professional organisations or employers from the industry. Students' knowledge, skills and competence are assessed collegially by the SEC on a 10-grade scale.
Description of the future employment	AS "SAF Tehnika", SIA "Mikrotīkls", VAS "Latvijas Valsts Radio un Televīzijas Centrs", SIA "Lattelekom", SIA "TET", SIA "Latvijas Mobilais Telefons", SIA "Tele2", VAS "Elektroniskie sakari", AS "Alfa", AS "HansaMatrix", SIA "HansaMatrix Innovation", Accenture Latvijas filiāle, SIA "UAVFactory", SIA "Citrus Solutions", AS "Draugiem Group", SIA "Intelligent Systems", SIA "AERONES", SIA "Vizulo", SIA "Regula Baltija", SIA "Baltic Scientific Instruments".
Special enrollment requirements	English language proficiency equivalent to at least CEFR B2 level.
Opportunity to continue studies	Graduates of the study programme can continue their studies in master's study programmes, for example, in the professional master study programme "Smart Electronic Systems".

Courses

No	Code	Name	Credit points
A		**Compulsory Study Courses**	**126.0**
A1		**General Education Study Courses**	**23.0**
1	DE0344	Introduction to Electronics and Telecommunications Branch	6.0
2	SD0002	Innovative Product Development and Entrepreneurship	9.0
3	DE0492	Research Seminars in the Field of Electronics	3.0
4	IV0001	Basics of Labour Protection	1.0
5	DA0055	Environment and Climate Roadmap	2.0
6	IV0759	Civil Protection	2.0
A.2		**Field-Specific Theoretical Basic and IT Study Courses**	**57.0**
1	DE0003	Mathematics	13.0
2	DE0347	Supplementary Mathematics (for electrical engineering)	3.0
3	DE0300	Probability Theory and Mathematical Statistics	3.0
4	DA0101	Physics	9.0
5	DE0354	Fundamentals of Materials Science	3.0
6	DE0069	Computerization of Mathematical Tasks in Electrical Engineering	4.0
7	DE0351	Fundamentals of DC Circuits	3.0
8	DE0177	Digital Electronics and Computer Architecture	5.0
9	DE0189	Fundamentals of AC Circuits	5.0
10	DE0348	Electricity and Magnetism	3.0
11	DE0498	Circuit Theory (special course)	6.0
A.3		**Field-Specific Professional Study Courses**	**46.0**
		Smart Embedded Systems	*7.0*
1	DE0115	Embedded Systems Architecture and Peripherals	4.0
2	DE0496	Embedded Systems Architecture and Peripherals (study project)	3.0
		Signal Processing and Wireless Communication Systems	*14.0*
1	DE0206	Signal Theory	5.0
2	DE0501	Signal Theory (study project)	3.0
3	DE0493	Digital Signal Processing	3.0
4	DE0495	Digital Signal Processing (study project)	3.0
		Analog and RF Equipment and Systems	*20.0*
1	DE0202	Electron Devices	5.0
2	DE0093	Active Electronic Systems	4.0
3	DE0089	Analogue Electronics	7.0
4	DE0114	Electrodynamics and RF Devices	4.0
		Electronic Hardware Design	*5.0*
1	DE0239	Laboratory Exercises in Electronics	5.0
B		**Compulsory Elective Study Courses**	**57.0**
B1		**Field-Specific Study Courses**	**45.0**
		Smart Embedded Systems	
1	DE0500	Electronic Control System Design	6.0
2	DE0219	Fundamentals of Digital Electronic Systems Design using HDL	5.0
3	DE0494	Fundamentals of Digital Electronic Systems Design using HDL (study project)	3.0
4	DE0362	The C Programming Language	3.0
5	DE0048	Digital Devices and Systems	4.0
6	DE0201	Computer Studies (basic course)	5.0
7	DE0333	Internet of Things Technologies	3.0
		Signal Processing and Wireless Communication Systems	
1	DE0234	Fundamentals of Smart Radio	5.0
2	DE0505	Fundamentals of Smart Radio (study project)	3.0
3	DE0353	Transmission Systems	9.0
		Analog and RF Equipment and Systems	
1	DE0099	Analogue and Digital Integrated Circuits	4.0
2	DE0212	Antenna Design	5.0
3	DE0504	Antenna Design (study project)	3.0
		Electronic Hardware Design	
1	DE1021	Electronic Communications Services and Measurements	9.0
2	DE0503	Electroacoustics	3.0
3	DE0497	Design of Printed Circuit Boards	6.0

4	DE0110	Design and Documentation of Electronic Equipment	4.0
5	DE0088	Electromagnetic Compatibility: Components and Applications	4.0
B2		**Humanities and Social Sciences Study Courses**	**6.0**
1	DE0279	United Europe and Latvia	3.0
2	DE0384	Basic Ethics	3.0
3	DE0295	Political System of Latvia	3.0
4	IV0383	Organization of Production	3.0
5	DE0258	Sociology of Management	3.0
B6		**Languages**	**6.0**
1	DE0337	The English Language	3.0
2	DE0502	The German Language	6.0
3	DE0405	The English Language	3.0
C		**Free Elective Study Courses**	**9.0**
D		**Practical Placement**	**30.0**
1	DE0491	Practical Placement	30.0
E		**Final Examination**	**18.0**
1	DE0499	Bachelor Thesis Including Project	18.0