ŽILINSKÁ UNIVERZITA
V ŽILINE

DESCRIPTION OF THE STUDY PROGRAMME

Name of faculty: Faculty of Electrical Engineering and Information Technology
Name of study programme: Power Electrical Engineering Degree of study: 3.
Date of approval *of the creation* or *last modification of* the study programme by the UNIZA Accreditation Board: 31.8.2022
Date of the last *corrections to the DESCRIPTION* of the study programme: 26.4.2023

1.	Basic information about the study programme			
a	**Name of the study programme**	**Power Electrical Engineering**	Number according to the SP register	**21204**
b	**Undergraduate degree**	**3.**	ISCED_F grade code education	**864**
c	**Location(s) of study**	**Univerzitná 8215/1, 010 26 Žilina**		
d	**Name of the field of study**	Electrical Engineering	Number of the field of study according to the SP register	2675V00
			ISCED_F code of the field(s)[1]	0788
e	**Type of study program**	Academically oriented		
f	**Academic degree awarded**	PhD.		
g	**Form of study**	Daily		
h	**Cooperating universities and definitions**	-		
i	**Language of the study programme**	English		
j	**Standard length of study**	4 years		
k	**Capacity of the study programme (planned number of students)**	Listed in the documents "Principles and Rules of the FEIT Admission Procedure" available: https://feit.uniza.sk/studenti/doktorandske-studium/ a "FEIT Annual Reports" for each year, available: https://feit.uniza.sk/fakulta/uradna-tabula/		
	Actual number of applicants	Listed in the documents "Report on the evaluation of the quality of education at the FEIT faculty level" for individual academic years *https://www.uniza.sk/index.php/component/content/article/4273-sprava-o-hodnoteni-kvality-vzdelavania-na-urovni-fakulty-feit?catid=2:uncategorised&Itemid=101* a "FEIT Annual Reports" for each year, available: https://feit.uniza.sk/fakulta/uradna-tabula/		
	Number of students	Listed in the documents "Report on the evaluation of the quality of education at the FEIT faculty level" for individual academic years		

[1] *According to https://ciselniky.portalvs.sk/classifier/show/basic/4*

		https://www.uniza.sk/index.php/component/content/article/4273-sprava-o-hodnoteni-kvality-vzdelavania-na-urovni-fakulty-feit?catid=2:uncategorised&Itemid=101 a "FEIT Annual Reports" for each year, available: https://feit.uniza.sk/fakulta/uradna-tabula/

2.	Graduate profile and learning objectives	
a	**Objectives of Study Programme Education as Student's Abilities at the Time of Completion of the Study Programme and Main Learning Outcomes**	**Graduate profile:** A graduate of the 3rd degree of the study program Power Electrical Engineering in the field of Electrical Engineering represents a qualified professional with unique knowledge and skills reflecting existing and modern trends in the field of high-current electrical engineering. These are mainly in the areas of electric power, power electronics and electric drives, including systems for automotive and electromobility applications. The added value of the study of electrical engineering in the given program is the extension of knowledge to the field of control of these systems, including the creation, tuning and implementation of control algorithms. The graduate has broad professional knowledge in several areas of the field, which serve as a basis for conducting research and development and creating new knowledge in traditional areas of the field, such as: methods of analysis and synthesis of power systems, electrical systems, power semiconductor systems and electric drives, their design and control. The graduate has professional and methodological knowledge of an interdisciplinary nature, on the basis of which he/she can profile himself in intersecting areas such as electromagnetic compatibility, thermal management, progressive storage systems, including electrochemical and design, tuning and implementation of their control algorithms. The graduate is able, by applying scientific methods, to solve research problems in specialized areas of energy, industry, transport and other application areas in accordance with the priorities formulated for the areas of basic and applied research. The graduate is able to demonstrate a systematic understanding of the field of study and the acquisition of skills and methods of scientific research associated with the given field corresponding to the current state of knowledge in the field of electrical engineering, masters and is able to choose specific scientific methods of basic and applied research in one of the areas of electric power engineering, power electronics, electric drives and their industrial and transport applications. The graduate is capable of critical analysis, abstraction, evaluation and generalization of the given issue and the synthesis of new and complex concepts. Demonstrates the ability to conceive, construct, implement and modify a substantial part of research with scientific integrity. He/she applies and implements his/her own findings of his/her theoretical analysis and his/her comprehensive scientific research in problem-solving. Through his original research, he contributes to expanding the frontiers of scientific knowledge through the realization of an extensive body of works, some of which are worthy of peer-reviewed publication at the national or international level. The graduate is characterized by independent, critical and analytical thinking, which he applies in changing conditions. The graduate is prepared to present the results achieved within the studied program to the general professional public. He/she is able to

		present the achieved results at professional scientific symposia, conferences and workshops. The graduate is able to interpret the dissemination of the results of scientific research activities not only in their mother tongue, but also in a selected world language. In addition to presenting the achieved results, he is also able to adequately confront them with a professional audience. By applying the acquired knowledge, he is able to analyze and evaluate the problems studied, while the common denominator of his work is creativity and creation, at the highest cognitive level. He sees solving tasks and related problems as a challenge. He can evaluate the results of his work and other professional work with a valid, reliable and transparent approach. In the process of confronting the results and at the same time in the pedagogical process, in relation to students of lower levels of study, he uses constructive feedback. From the point of view of accepting its performance, it places maximum emphasis on the accuracy and quality of its outputs. At the same time, it makes effective, creative and erudite use of the potential of powerful computer technology and available study literature. The graduate is able to take into account social, scientific and ethical aspects when formulating research intentions and interpreting research results. Can determine the focus of research and coordinate a team in the relevant scientific field. In academic and professional contexts, its ability to promote technological, social or cultural progress in a knowledge-based society is expected. In the field of electrical engineering and the above specializations, he is an experienced in-demand specialist and his employability in the labor market is relatively high. **Learning objectives:** [CV1] Acquisition of analytical skills and conceptual knowledge: Analysing and differentiating knowledge acquired mainly through self-study and an active approach to finding relevant information from reliable sources. - Methods of scientific work, Compulsory elective courses according to the focus of the dissertation. [CV2] Acquisition of Assessment Skills and Procedural Skills: Critical evaluation of the results obtained. Assessment based on established criteria and through applicable standards. Acquisition of the ability to evaluate and argue, distinguish between relevant and unconfirmed conclusions. - methods of scientific work, compulsory elective courses according to the focus of the dissertation, written part of the dissertation exam and its defence. [CV3] Acquisition of creative competencies and metacognitive knowledge: The ability to combine individual elements into a coherent functional whole. Based on the acquired knowledge using an analytical approach, the use of synthesis in the process of creating a new, or different, new form, as proof of the use of the highest mental function. - methods of scientific work, compulsory elective courses according to the focus of the dissertation, dissertation projects I to IV, scientific publication outputs, dissertation thesis and dissertation defence. **Learning outcomes:** [VV1] The student is able to analyze complex problems in the field of electrical power, power electronics and electric drives, including systems for automotive and electromobility applications, using information acquired in the process of self-study. He/she can critically approach finding

		solutions to problems arising from the issue of energetic and electromagnetic and thermal interactions of electrical systems with the environment. It can analyze, classify, and categorize said interactions with different systems. – methods of scientific work, compulsory elective courses according to the focus of the dissertation [VV2] The student is able to independently react and solve unpredictable situations, as well as apply a higher level of decision-making, in the process of conducting experiments and creating numerical models. He/she is able to build, analyze and critically evaluate a complex computational model of the problem under study. He/she is able to creatively apply the practical use of the acquired knowledge and scientific procedures in the analysis, synthesis and design of systems that are the subject of the field of high-current electrical engineering. He/she is able to analyze and propose methods for eliminating negative interactions and electromagnetic interferences of systems sharing a common electromagnetic environment – compulsory elective courses according to the focus of the dissertation, Independent scientific work, dissertation projects I to IV, scientific publication outputs, dissertation and dissertation defense. [VV3] The student is able to confront the results of his/her work, while being able to justify the methods and approaches used, and the suitability of their selection, when solving tasks in the field of theoretical electrical engineering. The results can be presented in the prescribed form of final reports, projects, or in the form of professional publications. In front of the professional public, he can argue, draw conclusions and discuss his scientific research. – independent scientific work, dissertation projects I to IV, scientific publication outputs, dissertation and dissertation defence. [VV4] The student is able to prepare, compile and submit professional documents with high information value related to the issues of electric power, power electronics and electric drives, including systems for automotive and electromobility applications. He/she is able to interpret the acquired results of his/her research work at various levels. With his creative approach, innovative thinking and critical assessment of the situation, he is able to eruditely solve problems in the field of high-current electrical engineering, or in its wider contexts. – independent scientific work, dissertation projects I to IV, scientific publication outputs, dissertation and dissertation defence.
b	**Indicated professions for which the graduate is prepared at the time of graduation and the potential of the study programme from the point of view of the employment of graduates**	List of some indicated professions: Electrical Engineering Specialist in R&D Quality Management Specialist in Electrical Engineering Research, Development and Technical Development Manager in the Energy Sector Researcher and pedagogical worker in the energy sector Microsystems Researcher **Potential of the programme in terms of employment in the labour market:** Graduates of the doctoral study program in Power Electrical Engineering are employed as specialized research and development workers in companies, institutes and research centers, where the highest degree of critical and constructive thinking, proactive approach and invention in solving highly professional problems is required, as well as a high degree

		of responsibility and self-reflection in relation to work and its results. Due to their organizational, managerial and team skills, they are able to lead scientific and research teams. From the above, it is clear that they have a high potential for their application in the labour market.
c	**Relevant external stakeholders who have provided an opinion or a favourable opinion on the compliance of the obtained qualification with sector-specific professional requirements**	The study programme does not prepare for a profession requiring an opinion on the conformity of the acquired qualification

3.	**Applicability**	
a	**Assessment of the employability of graduates of the study programme**	Although "Power Electrical Engineering" is one of the oldest disciplines in electrical engineering, thanks to its continuous own development and application of the latest knowledge in the fields of automation and control, microelectronics, informatics, electrical power engineering and other relevant technological areas, it is currently one of the most dynamically developing fields. It significantly affects not only other areas of electrical engineering, but also technology as such, and to a large extent it also affects the overall economic prosperity of the state. The entire study programme is designed and compiled in such a way that the doctoral student acquires the knowledge, abilities and skills that are required of a graduate of the 3rd degree of university study in the field of study of electrical engineering. Experts specializing in high-current electrical engineering have been, are and will continue to be in high demand on the labor market. The thematic focus and content of the study are specified so that the graduate of the study program Power Electrical Engineering is able to solve demanding and specific operational, development, research and development and economic problems associated with the operation of high-current equipment in various areas of industry. Typical skills and scientific knowledge that are required for the study relate to the design, operation and management, optimization and innovation of electrical sources in mobile and stationary energy sources; transmission, distribution and distribution of electrical energy and electric drives that use this energy, and this activity is governed by systems of advanced technology of power electronics, microcomputer control, intelligent digital devices and information and communication systems used in electrical engineering. These skills are further developed by using classic and newly created analytical methods used in modeling and simulation of the investigated processes, which the graduate can apply in specialized software tools used not only by technical practice, but also by scientific research institutions. Thanks to this, graduates of the submitted study programme will find employment in research, design, management, construction, optimization, operation and innovation of industrial enterprises in all areas of high-current electrical engineering and electric power engineering, in design and research institutes and other organizations of a correct, production, operational or repair nature.

b	**Successful graduates of the study programme**	In general, it can be stated that the employability of FEIT UNIZA graduates is more than 96% (https://www.feitcity.sk/o-com-je-feit), which is also valid for the study program Power Electrical Engineering. Reference employers include companies such as: BROSE Prievidza, Stredoslovenská distribučná, Slovenská elektrizačná prenosová sústava, Panasonic Trstená, Semikron, NXP semiconductors, Onsemi, EVPÚ, Bel Power Solutions and Protections, Siemens, Delta Electronics, Schaeffler Slovakia, HYDAC. **Successful graduates of the study program:** **Name and surname:** Ing. Marek Franko, PhD. **Professional profile (at the discretion):** He works as the director of research and development at EVPÚ Nová Dubnica. **Company Name (Job Title):** EVPÚ **Name and surname:** Ing. Peter Čerňan, PhD. **Professional profile (at discretion):** He works as the head of the research and development center at DELTA electronics Slovakia, s.r.o. **Company Name (Job Title):** Delta electronics **Name and surname:** Ing. Marek Štulrajter, PhD. **Professional profile (at your discretion):** He holds the position of Automotive Solutions Engineering Manager at NXP Semiconductors Czech Republic, s. r. o. **Company Name (Job Title):** NXP Semiconductors, Czech Republic **Name and surname:** Ing. Rastislav Šmidovič, PhD. **Professional profile (at discretion):** Dispatcher for the management of ancillary services enabling safe and reliable operation of the Slovak electricity system. **Company name (job position):** Slovenská elektrizačná prenosová sústava, a. s.
c	**Evaluation of the quality of the study programme by employers**	The survey among employers is part of the monitoring of the quality of the study programme and its implementation is planned at an interval of 3 years. Power Electrical Engineering is a long-term and stably established study program at the doctoral level at the Faculty of Electrical Engineering and Information Technology of the University of Žilina. Workplaces providing the study programme regularly monitor feedback from employers of graduates, but so far this has been carried out mainly through personal interviews during meetings at state final examinations, thesis defences, scientific and professionally focused conferences and during joint projects. The conclusions of these feedbacks were implemented in the adjustments and direction of the study program as part of its harmonization. In connection with the harmonization according to the UNIZA internal quality system, feedback from companies is obtained by evaluating the following graduate indicators - with a rating on a scale from 1 (worst) to 5 (best): • Ability to demonstrate general technical skills of the field studied. • Ability to think analytically when solving specific assignments of project tasks.

		• The degree of use of critical thinking in solving a given problem. • The level of self-motivational effect and degree of creativity. • Ability to work in a team and interpersonal cooperation. • Communication skills in terms of interpreting facts and achieved results. • Ability to use a foreign language in professional issues. The secondary evaluation criterion is the number of graduates in the company (up to 10, over 10 graduates)

4.	Structure and content of the study programme
	Rules for the creation of study plans in the study programme
a	They are listed in Directive No. 204 - Rules for the creation, modification, approval and cancellation of study programmes at UNIZA: https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2
b	**Recommended study plans for each study trip** **Education trajectory of the study program Heavy Current Electrical Engineering** 1. year 3D0 D0 11 World Language 10 credits 3D0 E0 01 Basics of Scientific Work 10 credits 2. year 3D0 D0 01 Written Thesis for the Dissertation Examination and Defence of the Written Thesis for the Dissertation Examination 10 credits 3. year 4. year Dissertation Thesis and Dissertation Defence 30 credits 3D0 D0 03 Electric Drives and Electric Traction 10 credits 3D0 D0 04 Electrical machinery and apparatus 10 credits 3D0 D0 05 Electromagnetic Compatibility 10 credits 3D0 D0 06 Physics 10 credits 3D0 D0 07 Programming 10 credits 3D0 00 03 Selected Statements in Mathematics 10 credits 3D0 D0 09 Power Electronics 10 credits 3D0 D0 10 Power Semiconductor Systems 10 credits 3D0 D0 13 Smart Grids 10 credits 3D0 D0 14 Power Quality 10 credits 3D0 D0 15 Modelling of Electricity System Operation 10 credits 3D0 D0 19 Control of Operation of Electricity Systems 10 credits Compulsory subject Compulsory elective subject **Komentár od [MB1]:** Replace Fig.
c	**Study plan of the program**
	The study plan of the given SP is listed in e-education based on the choice of faculty, form of study and the name of the SP: https://vzdelavanie.uniza.sk/vzdelavanie/plany.php

d	**Number of credits, the achievement of which is a condition for the proper completion of studies**
	180
e	**Other conditions that the student must meet during the study of the study programme and for its proper completion, including the conditions of state examinations, the rules for repeating studies and the rules for extension, interruption of studies.**
	Conditions during the study: Continuous and final evaluation in individual subjects is part of the course information sheets, which can be found after the selection of the faculty, the form of study and the study programme itself under the name of the course at: https://vzdelavanie.uniza.sk/vzdelavanie/plany.php Doctoral studies take place according to individual study plans, while the set of knowledge, abilities and skills is subordinated to the specific topic of the dissertation. The individual study plan is compiled by the supervisor in cooperation with the doctoral student according to the needs of the dissertation and submitted for approval to the chairman of the working group Power Electrical Engineering of the Electrical Engineering Department, which is established according to the internal regulation of the university. The individual study plan consists of a study part and a scientific part, each of which is assigned an appropriate number of credits, and a pedagogical part. The study part represents 50 credits from the scope of the study plan. It focuses on the acquisition of deep theoretical knowledge in the field of high-current electrical engineering with an emphasis on the multidisciplinary field of power electronic systems and the acquisition of methodological apparatus supported by knowledge of selected mathematical, physical and professional disciplines. It consists of the study of two compulsory and two compulsory elective subjects and the compulsory subject Written Work for the Dissertation Exam and Defense of the Written Thesis for the Dissertation Exam. Compulsory subjects are Basics of Scientific Work and World Language. The choice of two compulsory elective courses depends on the topic of the dissertation. Each subject of the study part is assigned 10 credits. All subjects of the study part are subjects of the state examination. The scientific part represents at least 130 credits from the scope of the study plan. It is carried out in Dissertation Projects I to IV and through individual and team scientific and research work, including the elaboration and defense of the dissertation. Dissertation projects I-IV represent comprehensive parts (stages) of the dissertation and 10 credits are assigned to each. The evaluated activities within individual and team scientific work are: publications in journals and conference proceedings, chapters in monographs/university textbooks, protection of intellectual property (patent, utility model), citations registered in the SCI citation index and active presentation of results at conferences. The allocation of credits for individual activities within individual and team scientific work is determined by the relevant regulations listed above. The study ends with the defense of the dissertation, which is one of the state exams. After preparing and accepting the dissertation and defending it, the doctoral student will receive 30 credits (for the dissertation and its defence). Among the obligations of full-time doctoral students, which arise from the Act on Higher Education Institutions and on the Amendment of Certain Acts No. 131/2002 Coll., there is also pedagogical activity. Specific conditions in the course of study: interim and final evaluation of individual subjects with the weight indicated in the course information sheets; meeting the condition of the minimum number of credits for advancing to a higher year of study in accordance with the above regulations. The basic part of the study is the year in which the student is expected to obtain an average of 60 credits. Full-time study is divided into years as follows: 1. year - the student will receive at least 40 credits, 2. year - the student will receive at least 60 credits (or a total of at least 100 credits for the 1st and 2nd year), 3. Year - the student will receive so many credits to achieve a minimum of 180 credits for the entire study. The condition for advancing to the next part of the study is obtaining the prescribed number of credits in the given year of study. In case of failure to comply with this obligation, the student will be expelled from studying. The recommended study plan is compiled so that by completing it, the student meets the conditions for completing the study within the standard length of study. Specific conditions for proper completion of studies: successful completion of exams in two compulsory subjects – World Language and Basics of Scientific Work and two compulsory elective professional subjects; preparation and successful defence of the written part of the dissertation examination; development and successful defence of dissertation projects I to IV; individual and team scientific work; pedagogical activities; Elaboration and successful defense of the dissertation. Number of credits required for proper graduation: 180. Rules for the extension of studies: in accordance with the Higher Education Act **Other conditions:** They are listed in: Directive No. 110 Study Regulations for the 3rd Level of Higher Education at the University of Žilina https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2

f	**Conditions for the completion of individual parts of the study programme and the progress of the student in the study programme in the structure**					
	Completion of studies = standard length of study *Completion of part of the study = 1 academic year*	**For the entire study**	**For part of the study**			
			1.r	**2.r**	**3.r**	**4.r**
	number of credits for compulsory courses required for proper completion of studies	60	20	10	30	0
	number of credits for compulsory elective courses required for proper completion of studies	20	20	0	0	0
	number of credits for elective courses required for proper completion of studies	0	0	0	0	0
	the number of credits for the final thesis and the defense of the final thesis required for the proper completion of the study	30	0	0	30	0
	the number of credits for professional experience required for the proper completion of studies	0	0	0	0	0
	Number of credits required for proper completion of studies for project work with an indication of relevant subjects in engineering study programmes	100	20	50	30	0
	the number of credits required for the proper completion of studies for artistic performances other than the final thesis in art study programmes	0	0	0	0	0
g	**Rules for the verification of learning outcomes and student assessment and the possibility of correcting this assessment**					
	At the university level, the processes, procedures and structures are defined by Directive No. 110 Study Regulations for the 3rd Degree of Higher Education at the University of Žilina and Directive No. 216 Quality Assurance of Doctoral Studies at UNIZA https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 At the faculty level, these are the following documents: Dean's Decision on the Organization and Administrative Support of the 3rd Degree of Study https://feit.uniza.sk/oznamy-pre-doktorandov/ a Guide to Doctoral Studies at FEIT https://feit.uniza.sk/doktorandske-studium-sprievodca/					
h	**Conditions for the recognition of studies or parts of studies**					
	At the university level, the processes, procedures and structures are defined by Directive No. 110 Study Regulations for the 3rd level of higher education at the University of Žilina and Directive No. 216 Quality Assurance of Doctoral Studies at UNIZA. In the case of foreign mobilities and internships, the processes, procedures and structures of the conditions for the recognition of studies are defined by Directive No. 219 – Mobility of students and employees of the University of Žilina abroad. https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 At the faculty level, these are the following documents: Dean's Decision on the Organization and Administrative Support of the 3rd Degree of Study https://feit.uniza.sk/oznamy-pre-doktorandov/					

a
Guide to Doctoral Studies at FEIT
https://feit.uniza.sk/doktorandske-studium-sprievodca/

i **Topics of final theses of the study programme**

	Surname	Name	Supervisor	Theme	
2020					
	Hanko	Branislav	doc. Ing. Peter Drgoňa, PhD.	Internal Combustion Engine Turbocharging Hybrid System Management Design	SE
	Morgoš	John	doc. Ing. Michal Frivaldský, PhD.	Research on the Energy Node Inverter System for Smart Grids	SE
	Sumega	Martin	prof. Ing. Pavol Rafajdus, PhD.	Minimizing torque ripple in electric drives with PM motors	SE
	Štefún	Rastislav	doc. Ing. Peter Drgoňa, PhD.	Application of Recursive Identification Methods in Inverter Systems	SE
	Varecha	Patrick	Makyš Pavol, doc. Ing. PhD.	Optimization of current measurement topology in electric drives in the automotive industry	SE
	Zoššák	Simon	Makyš Pavol, doc. Ing. PhD.	Sensorless control of high-speed drive	SE
2021	**Surname**	**Name**	**Supervisor**	**Theme**	
	Кочан	Stephen	prof. Ing. Pavol Rafajdus, PhD.	Reluctance Type Electric Machine Structural Design for High Speed Applications	SE
	Pipíška	Michal	doc. Ing. Michal Frivaldský, PhD.	Research of 3-f PFC circuit topologies	SE
2022	**Surname**	**Name**	**Supervisor**	**Theme**	
	Bajzík Jakub		Koniar Dušan	Audio Content Analysis Using Machine Learning Methods	SE
	Bulava Jaroslav		Hargash Libor	Non-contact measurement methods based on specialized vision systems	SE
	Ďurana Peter		Drgoňa Peter	The Influence of Inverters in Modern Luminaires on the Quality of Electricity Consumed	SE
	Kellner Jakub		Špánik Pavol	Investigation of fault conditions of the 5-phase motor drive	SE
	Resutík Patrik		Špánik Pavol	Research and Design of Matrix Inverter for Electric Motor Drive	SE
	Šimčák Marek		Frivaldský Michal	Optimization of battery storage parameters	SE
	Kováčik Michal		Pavol Rafajdus	Structural Design of Permanent Magnet Electric Machine for High Speed Applications	SE
2023	**Surname**	**Name**	**Supervisor**	**Theme**	
	Strumming Peter		Gutten Miroslav	MOISTURE AND SPECIFIC CONDUCTIVITY ANALYSIS OF INSULATING ELEMENTS OF POWER TRANSFORMERS BY FDS METHOD	SE
	Karman Martin		Korenčiak Daniel	Insulation Condition Analysis of Dry High Voltage Transformers	SE
	Plšičík Robert		Drgoňa Peter	Low-flying target tracking and interception system	SE
	Škorvaga Jakub		Frivaldský Michal	Research on the design arrangement of high-power coils (> 20kW) of non-contact power transmission	SE
	Takács Kristián		Frivaldský Michal	Research on Semiconductor Transformer Circuit Solutions for Smart Grids	SE
	Zelník Richard		Frivaldský Michal	Investigation of commutation processes of modern power semiconductor components	SE
	Furmanik Marek		Pavol Rafajdus	Control topology for multiphase permanent magnet synchronous machine	SE
	Vidlák Michal		Pavol Makyš	Advanced control methods of permanent magnet electric motors used in automotive applications	SE
2024	**Surname**	**Name**	**Supervisor**	**Theme**	
	Šimčák Jakub		Frivaldský Michal	Research of the topological solution of the traction automotive inverter	SE
	Konvicný Daniel		Pavol Makyš	Design of permanent magnet motor control without position sensor on motor shaft	SE
	Staňo Michal		Pavol Rafajdus	Design of hybrid-excited permanent magnet synchronous motor for automotive traction applications	SE
2025	**Surname**	**Name**	**Supervisor**	**Theme**	
	Šimko Juraj		Sirloin Michal	Design of a DC/DC converter control method using artificial neural networks	SE
	Stanko Pavel		Alena Otčenášová	Effect of electricity consumption on the power factor at the common power supply point	SE
	Weaver Matej		Peter Braciník	Research of selected support mechanisms for electric vehicle charging stations to reduce the volatility of power consumption from the electrical grid	SE

add topics for 2022-2026

Komentár od [MB2]: add

j **Rules for the assignment, processing, opposition, defence and evaluation of final theses in the study programme**

At the university level, the processes, procedures and structures are defined by Directive No. 215 – Directive on Final, Rigorous and Habilitation Theses in the Conditions of the University of Žilina, Directive No. 110 Study Regulations for the 3rd Level of Higher Education at the University of Žilina and Directive No. 216 Quality Assurance of Doctoral Studies at UNIZA.
https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2

At the faculty level, the current Dean's Decision on the organization and administrative provision of the 3rd level of study at FEIT UNIZA in the given academic year applies and specific information for students:
https://feit.uniza.sk/oznamy-pre-doktorandov/ and https://feit.uniza.sk/studenti/doktorandske-studium/

Proposals for dissertation topics on the proposal of supervisors are approved by the Dean, who will announce them no later than two months before the last day for submitting applications for doctoral studies that can be applied for in the admission procedure. For each topic announced, the name of the study programme, the name of the supervisor, the form of study (full-time, part-time), the deadline for submitting applications and the date of the admission procedure are stated. Proposals for dissertation topics are announced and published on the official board of the faculty website, which also publishes the method and dates of student application for study. The date of publication of dissertation topics is determined by the academic calendar of the training workplace.
The entrance examination takes place in front of an admissions committee that has at least four members. The admissions committee consists of its chairman and at least two members appointed by the dean. Another member of the committee is the supervisor for the announced topic. The admissions committee evaluates the result of the entrance examination at a closed session with the conclusion "passed" or "failed". If several applicants have applied for one topic, their order will be determined by the success of the entrance examination. When determining the ranking, the committee also takes into account the scope and quality of the applicant's previous professional publishing activity and the results of his other professional activities. Based on the results of the entrance examination, the Dean will decide on the admission of the applicant within 30 days from the date of the entrance examination.
During the implementation of the study programme, the facts related to the fulfilment of the content of the individual study plan of the doctoral student are evaluated. The evaluation is carried out once a year at the end of the academic year by the supervisor and approved by the guarantor of the study programme and subsequently by the dean. The decisive facts are the dissertation exam and the defense of the dissertation. A doctoral student who has not fulfilled all the obligations arising from the individual study plan and does not have enough credits cannot apply for the dissertation exam or apply for permission to defend the dissertation.
Within the deadline set for the submission of the thesis, the author of the thesis personally uploads its electronic version identical to the bound version in the form of .pdf in one file with the possibility of converting it to plain text into the system of the Register of Final Theses (hereinafter referred to as EZP). Access to the EZP is via the website: http://kniznica.uniza.sk/ezp . UNIZA sends the thesis in electronic form to the Central Register of Final, Rigorous and Habilitation Theses (CRZP), where the degree of originality of the submitted thesis is verified. A doctoral student submits an application to the Dean for permission to defend his or her dissertation in accordance with the study schedule if he or she has obtained the prescribed number of credits. Together with the dissertation thesis, the relevant opinions of opponents, supervisors, supervisors of final theses or rigorous theses, reviewers or other persons are also sent in electronic form, and these opinions are stored in the Central Register of Final, Rigorous and Habilitation Theses together with the relevant thesis for the period of its storage. Further details are regulated by Directive No. 215 – Directive on Final, Rigorous and Habilitation Theses in the Conditions of the University of Žilina.

After receiving all the reviews from the opponents, the Dean forwards the doctoral student's application for permission to defend the dissertation together with all the requisites, including the opponents' opinions, to the chairman of the defence committee and the chair proposes to the dean the time and place of the defence of the dissertation. The dissertation together with its defense form one subject. The defence of the dissertation is a state examination and in the standard length of study, the doctoral student must complete it no later than in the last month of the last academic year of his/her standard length of study. The defence of the dissertation takes place in the form of a scientific debate. The defence may take place only in the presence of at least two-thirds of the number of members of the defence committee entitled to vote, including at least two opponents, while at least one member of the committee must be from a workplace outside UNIZA.
After the end of the defence, a closed meeting of the commission is held, which is attended by its members, including opponents and the supervisor. At a closed session, the course and result of the defence and the possibility of using the results of the dissertation in practice will be evaluated. At the same time, the commission and the opponents will decide in a secret ballot whether the commission will propose to award the doctoral student with an academic degree. Subsequently, the committee evaluates the defence of the dissertation with a grade, while the classification is carried out according to the classification scale specified in Directive No. 110 Study Regulations for the 3rd level of higher education at the University of Žilina. The proposal for awarding or not awarding an academic degree to a doctoral student together with the minutes and file material of the doctoral student is submitted by the chairman of the defence committee to the dean. After a positive assessment of the proposal of the dissertation defence committee for awarding or not awarding the academic title "Doctor" to a doctoral graduate, the Dean submits to the Rector documents on the completion of the study.

	The academic title "doctor" ("philosophiae doctor", abbreviated as "PhD.") is awarded by UNIZA with effect from the date of the successful defence of the dissertation. https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 Documents on the completion of the SE doctoral study programme in the field of study of electrical engineering are a university diploma, a state examination certificate and a diploma supplement. Documents on completion of studies are usually handed over to the doctoral student by the dean at the graduation ceremony, organized according to the traditions and customs of UNIZA.
k	**Opportunities and procedures for participation in student mobility**
	At the university level, the processes, procedures and structures are defined by Directive No. 219 – Mobility of students and employees of the University of Žilina abroad. https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 At the faculty level, student mobility within doctoral studies is highly supported, and it is recommended to implement it after passing the dissertation exam (after about 18 months from the start of study). For the implementation of mobility, the student can obtain additional credits according to the rules set out in the Guide to Doctoral Studies at FEIT and also in the Dean's Decision on the Organization and Administrative Support of the 3rd Level of Study at FEIT UNIZA. https://feit.uniza.sk/doktorandske-studium-sprievodca/ https://feit.uniza.sk/studenti/studium-v-zahranici/ https://feit.uniza.sk/oznamy-pre-doktorandov/ At the faculty level, the coordinators and contact persons are: doc. Ing. Peter Hockicko, PhD. (Person in charge of international mobility and international cooperation), peter.hockickoniza.sk Mgr. Silvia Pirníková, (faculty Erasmus administrator), silvia.pirnikova@uniza.sk
l	**Rules for adherence to academic ethics and drawing consequences**
	At the university level, the processes, procedures and structures are defined by Directive No. 207 – Code of Ethics of the University of Žilina and Directive No. 201 – Disciplinary Code for Students of the University of Žilina. https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 A Disciplinary Committee has been established at the faculty level, which discusses specific suggestions and misdemeanours of students in accordance with Directive No. 201. https://feit.uniza.sk/disciplinarna-komisia/
m	**Procedures applicable to students with special needs**
	At the university level, the processes, procedures and structures are defined by Directive No. 198 – Support for Applicants and Students with Special Needs at the University of Žilina and Directive No. 110 Study Regulations for the 3rd Level of Higher Education at the University of Žilina. https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 Detailed information for students can be found on the website: https://www.uniza.sk/index.php/studenti/vseobecne-informacie/studenti-so-specifickymi-potrebami At the faculty level, the coordinators and contact persons are: doc. Ing. Mariana Beňová, PhD. (Vice-Dean for Education), mariana.benova@uniza.sk Bc. Emília Pekárová, (Education Officer), emilia.pekarova@uniza.sk
n	**Procedures for filing complaints and appeals by the student**

	At the university level, the processes, procedures and structures are defined by Directive No. 110 Study Regulations for the 3rd level of higher education at the University of Žilina. https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 At the faculty level, through the published e-mail contacts of the responsible persons, through students represented in the student part of the FEIT Academic Senate and via the link We will advise you: https://feit.uniza.sk/studenti/poradime-vam/ or Link for the Dean: https://odkaz.feit.uniza.sk/

5.	**Study Programme Subject Information Sheets** *(in the structure according to Decree No. 614/2002 Coll.)*
	ILPs can be found in the e-learning system after selecting the faculty, form of study and the study program itself under the name of the subject at: https://vzdelavanie.uniza.sk/vzdelavanie/plany.php

6.	**Current academic year schedule and current schedule**	
	Academic calendar	https://feit.uniza.sk/akademicky-kalendar-pre-doktorandov-feit/
	Current schedule	https://vzdelavanie.uniza.sk/vzdelavanie/rozvrh2.php

7.	**Staffing of the study programme**			
a	**Name, surname and titles of the person responsible for the implementation, development and quality of the study programme (guarantor).**			
	Name, surname, titles: **prof. Ing. Michal Frivaldský, PhD.** Function: Dean of the Faculty contact (e-mail, tel.): michal.frivaldsky@ uniza.sk; 041/513 2050			
b	**List of other persons responsible for the implementation, development and quality of the study programme (co-guarantors).**			
	prof. Ing. Pavol Špánik, PhD., KME FEIT UNIZAprof. Ing. Pavol Rafajdus, PhD., KEEP FEIT UNIZAprof. Ing. Peter Braciník, PhD., KEEP FEIT UNIZAdoc. Ing. Pavol Makyš, PhD., KEEP FEIT UNIZA			
c	**List of all persons providing profile subjects of the study programme**			
	Name, surname and titles of the teacher in the position of associate professor or professor	Additional information	Profile Subject	
	prof. Ing. Peter Braciník, PhD.	3D0D013	Smart grids	
	prof. Ing. Michal Frivaldský, PhD.	3D0D010	Power Semiconductor Systems	
	doc. Ing. Pavol Makyš, PhD.	3D0D003	Electric drives and electric traction	
	doc. Ing. Pavol Makyš, PhD.	3D0D007	Programming	
	prof. Ing. Pavol Rafajdus, PhD.	3D0D004	Electrical machinery and equipment	
	prof. Ing. Pavol Špánik, PhD.	3D0D009	Power electronics	
d	**List of all teachers (including doctoral students) of the study programme**			
	Teacher's name, surname and titles	The organizational form that the university teacher provides (P,C,L,T)	Additional information	Subject of the study programme
	prof. Ing. Peter Braciník, PhD.	exercises, exercises	3D0D011	World language

	prof. Ing. Peter Braciník, PhD.	exercises, exercises	3D0D013	Smart grids
	prof. Ing. Peter Braciník, PhD.	exercises, exercises	3D0D019	management of the operation of electricity systems
	doc. Ing. Peter Drgoňa, PhD.	exercises, exercises	3D0D007	Programming
	doc. Ing. Peter Drgoňa, PhD.	exercises, exercises	3D0D011	World language
	prof. Ing. Michal Frivaldský, PhD.	exercises, exercises	3D0D009	Power electronics
	prof. Ing. Michal Frivaldský, PhD.	exercises, exercises	3D0D010	Power Semiconductor Systems
	prof. Ing. Michal Frivaldský, PhD.	exercises, exercises	3D0D011	World language
	prof. Ing. Michal Frivaldský, PhD.	Lectures, lectures	3D0E0E1	Basics of scientific work
	doc. Mgr. Branislav Ftorek, PhD.	Lectures, lectures	3D00003	Selected Mathematics Essays
	doc. Ing. Marek Höger, PhD.	exercises, exercises	3D0D013	Smart grids
	doc. Ing. Marek Höger, PhD.	exercises, exercises	3D0D015	Modelling of electricity system operation
	doc. Ing. Marek Höger, PhD.	exercises, exercises	3D0D019	management of the operation of electricity systems
	prof. Ing. Ladislav Janoušek, PhD.	Lectures, lectures	3D0E0E1	Basics of scientific work
	Ing. Martina Kajanová, PhD.	exercises, exercises	3D0D015	Modelling of electricity system operation
	Ing. Martina Kajanová, PhD.	exercises, exercises	3D0D019	management of the operation of electricity systems
	doc. Ing. Pavol Makyš, PhD.	exercises, exercises	3D0D003	Electric drives and electric traction
	doc. Ing. Pavol Makyš, PhD.	exercises, exercises	3D0D007	Programming
	doc. Ing. Pavol Makyš, PhD.	exercises, exercises	3D0D011	World language
	prof. Ing. Alena Otčenášová, PhD.	exercises, exercises	3D0D014	Electricity quality
	prof. Ing. Alena Otčenášová, PhD.	exercises, exercises	3D0D015	Modelling of electricity system operation
	doc. Ing. Michal Praženica, PhD.	exercises, exercises	3D0D010	Power Semiconductor Systems
	prof. Ing. Dušan Pudiš, PhD.	exercises, exercises	3D0D006	Physics
	prof. Ing. Dušan Pudiš, PhD.	Lectures, lectures	3D0E0E1	Basics of scientific work
	prof. Ing. Pavol Rafajdus, PhD.	exercises, exercises	3D0D004	Electrical machinery and equipment
	prof. Ing. Pavol Rafajdus, PhD.	exercises, exercises	3D0D011	World language
	Ing. Michal Reguľa, PhD.	exercises, exercises	3D0D014	Electricity quality
	doc. Ing. Marek Roch, PhD.	exercises, exercises	3D0D013	Smart grids
	doc. Ing. Anna Simonová, PhD.	exercises, exercises	3D0D008	Theory of automatic control
	prof. Ing. Pavol Špánik, PhD.	exercises, exercises	3D0D005	Electromagnetic compatibility
	prof. Ing. Pavol Špánik, PhD.	exercises, exercises	3D0D009	Power electronics
	prof. Ing. Pavol Špánik, PhD.	exercises, exercises	3D0D010	Power Semiconductor Systems
	prof. Ing. Pavol Špánik, PhD.	exercises, exercises	3D0D011	World language
	prof. Ing. Pavol Špánik, PhD.	Lectures, lectures	3D0E0E1	Basics of scientific work

e	**Student representatives who represent the interests of students in the study program**	
	Student's name, surname and titles	Contact
	Ing. Matej Sládek, 1st year student	SP Council: https://feit.uniza.sk/fakulta/organy-fakulty/
f	**Study Programme Advisor**	

	Name and surname: prof. Ing. Michal Frivaldský, PhD. **Mail:** michal.frivaldsky@ uniza.sk **Tel.:** 041/513 2050 **Access to advice:** consultation hours, information on the website, individual consultations and advice
g	**Other support staff of the study programme (e.g. assigned study officer, career counsellor, administration, accommodation department, etc.)**
	Area of responsibility / Competencies: **Department for Education,** study agenda. Name and surname: **Bc.Viera Beláková and Bc. Emília Pekarová** tel.: +421 41 513 2064, 2063 E-mail: studref@feit.uniza.sk UNIZA Accommodations: https://www.uniza.sk/index.php/studenti/prakticke-informacie/ubytovanie Accommodation section, responsible person**: Renáta Šoková** tel.: +421 41 513 1471 E-mail: renata.sokova@uniza.sk

8.	**Spatial, material and technical provision of the study programme and support**
a	**List and characteristics of the study programme classrooms and their technical equipment with assignment to the outcomes of education and subject** (laboratories, project and art studies, workshops, science and technology parks, technology incubators, school enterprises, practice centres, training schools, teaching and training facilities, sports halls, swimming pools, sports grounds)

Classroom signage	**Classroom equipment**	**Secured items**
Power Electronics Laboratory (AB015)	**HW:** Power supplies - Rigol, Statron, Diametral, Tektronix oscilloscopes, oscilloscope accessories - current and differential probes, Rigol signal generators, benchtop and precision multimeters, autotransformers, electronic loads, power analyzers, Ersa, Diametral, Weller soldering stations, hand tools, boxes with components, teaching modules for measuring parameters of components and converters, inverter teaching modules - Semiteach IGBT and thyristor **SW:** Matlab, ORCAD, Plecs, ANSYS,	Power electronics, power semiconductor systems
Laboratory of Industrial Automation (AB016)	**HW:** The laboratory is equipped with PC technology necessary to teach programming PLC controllers from Allen Brdley (PLC5, SLC 500, PLC5000 families). PLC controllers are equipped with extension digital, analogue and special ones (fast counters, direct connection of temperature sensors, etc.) I/O cards, also in lab. They find frequency converters and 3F motors of small power, motors with speed sensors. The laboratory is equipped with models of technologies that are used to support the teaching of PLC programming. There are also stands for working with sensors of physical quantities, such as temperature, pressure, deflection, level level, etc. power supplies, oscilloscopes. Development kits with TI microprocessors, Development kits with NXP microprocessors,	Programming, theory of automatic control

	SW: Full version **of the development environment from Rockwell Software which includes programs such as RS Linx, RSlogix, RS View, RS Logix Emulate, FactoryTalk View Studio, Studio5000, Development Environment Code Composer Studio, Development Environment Code Warrior,**	
Laboratory of Special Electronics and Virtual Instrumentation (AB019)	**HW:** Measuring I/O cards for virtual instrumentation (MyDAQ, NI PCI-6221, NI PCI-6229), modular systems with measuring modules for virtual instrumentation (NI-cRIO, NI PXI), simulators for development and verification of the functionality of digital circuits, inspection cameras + accessories, light microscopes, digital oscilloscopes, signal generators, multimeters **SW:** NI LabVIEW development environment with modules (Vision Assistant, Vision Builder, MultiSim, TestStand)	Programming
EMC Laboratory (ABS03)	**HW:** FSL6 – spectrum analyzer, 9kHz .. 6GHz, SMA100A – signal generator, GTEM 1000 – chamber for EMC measurements, FLH120B – power amplifier, C5081 – directional coupler, PMS1084 – power meter EFS-10 - Field Strength Meter, 11867 - Pulse Limiter, NSG 435 - Electrostatic Discharge Simulator, SHC-PROBE - Voltage Probe F-33-1 - Current Probe, ENV216 TWO-LINE – Artificial Network, AOR AR2000 – Frequency Monitor, Tectronix MDO 4104-6 Oscilloscope, Tektronix TDS-3054 Oscilloscope, P 5200 Oscilloscope Voltage Probe, TCP303-TCPA300 Oscilloscope Current Probe with Amplifier, Fluke8845A Benchtop Multimeter, MT4090 RLC Meter, GFG3015 Generator, RSE-1000 Rack Generator **SW:** RFLAB - control SW with license for EMC immunity measurement	Electromagnetic compatibility
Laboratory of Progressive Inverter Structures (AB116)	**HW:** Workbenches, coil winder, digital oscilloscopes, Magna DC power supply, California AC power supply, dSpace DS1103 programming environment, soldering stations, SEMIKRON semiconductor power converters, Tektronix current probes, voltage differential probes, multimeters, controllable isolating transformer **SW:** dSpace Control Desk	*Power semiconductor systems,* basics of scientific work
Laboratory of Autotronics and Electromobility (AB017)	**HW:** Digital oscilloscopes, signal generators, multimeters, DC power supplies, USB->CAN converters, USB interface for CAN, LIN and FLEXRAY, Programmable electronic DC load, programmable DC power supply. **SW:** SW for control of PicoScope digital oscilloscopes, SW for control of USB->CAN converters PP2CAN, MATLAB	Programming, electric drives and electric traction

	Laboratory of Electrical Power Engineering (BD212)	**HW:** laboratory instruments for measuring electrotechnical quantities (voltage, current, resistance, frequency, ...), data projector, computers	Electricity quality
	Laboratory of Electrical Networks (BI009)	**HW:** air-insulated Unigear ZS1 Digital HV switchboard with VD4 switch adapted for educational purposes, gas-insulated BEU2 HV switchboard equipped with REF543 digital protection and VD4 switch, stand-alone ABB Relion digital protections (1xREF615, 2xREF620, 2xRED615, 1xRET615), stand-alone ABB function power switches (1xHD4, 1xVD4, 1xVmax), current and instrument transformers and sensors, modular model network 22 kV with voltage and current scale 1:100, Applied precision programmable power supplies with 0.2% accuracy and output voltage up to 600 V and current up to 120 A, CompactRIO platform, quality analyzers (4xENA330, 3xFLUKE 1760), computer technology **SW:** Matlab, Labview, Ruplan, BIM, ELMA, ENA, FLUKE, SCHRACK, PCM600	Smart grids
	Laboratory of Electric Drives (BD214)	**HW:** soldering stations, laboratory power supplies, multimeters, oscilloscopes, DSP production cutter, autotransmitters, hand tools, electronic **components SW:** Autodesk Eagle, Autodesk Inventor, Autodesk AutoCAD, Orcad, Eplan, Matlab	Electrical Machines and Apparatus, Electric Drives and Electric Traction, Basics of Scientific Work
	NXP Microcomputer Technology Laboratory (BD215)	Teaching laboratory preparations consisting of NXP DSC 56F8346 Controller Board or NXP MPC 5567, NXP 16 V / 120 W power converter and electric motor in the variant of an asynchronous machine (Siemens, voltage 21/12 V, power 90W) or a synchronous machine with permanent magnets (TG-Drives, voltage 21/12 V, 90W), linear synchronous motor with permanent magnets with an output of 4 kW, powered by a Vonsch three-phase inverter and controlled by an NXP MC56F8346 digital signal controller.	Programming
	Laboratory of Electrical Machinery (BI011)	**HW:** laboratory measuring instruments for measuring electrical quantities of electrical machines (voltage, current, resistance, torque, frequency, speed), oscilloscopes, dynamometers up to 7.5 kW, universal measuring stations for measuring the properties of electrical machines (1x ASM + recuperation converter, 1x JSCBM + ASM + frequency converter	Electrical machinery and equipment
b	**Characteristics of the information provision of the study programme (access to study literature according to course information sheets), access to information databases and other information sources, information technologies, etc.**		
	At the university level, the processes, procedures and structures are defined by Directive No. 218 - Directive on the collection, processing, analysis and evaluation of information to support the management of study programmes: https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 The basic information system supporting the process of education and teaching at the University of Žilina (ŽU) is the Academic Information and Education System (AIVS). AIVS is available to students from the university domain and from the Internet, while the university WiFi network supports EDUROAM.		

Currently, AIVS covers the entire life cycle of a student of a study program, from the submission of the application to the state exam and activities related to the completion of studies at the university. AIVS supports the management of the study agenda at faculties and other parts of the university at all levels, forms and types of higher education. Within each study programme, it is used to register applicants, students and graduates, to monitor study results, to support the credit system of study in accordance with Section 62 of Act 131/2002 Coll., to support the creation of a schedule, etc. It supports the generation of ECTS information packages (Section 20 (1) (e), activities related to the completion of studies (certificates, diplomas), as well as the processing of diploma supplements (Section 68 (1) (c).

AIVS consists of several subsystems:
a) Subsystem "Admission Procedure" – enables the processing of the application (electronic and classic), results and their evaluation, communication with the applicant (invitations, announcements and statements), processing of statistics for the Ministry of Education.

(b) Education subsystem – consisting of the following modules:
- Register of students;
- study administration (study programmes, study plans, course information sheets),
- enrolment in studies,
- preparation of the teaching schedule and management of resources (classrooms, technical equipment),
- administration of exams (announcing exam dates, registering for exams),
- course of study - recording of study results, continuous evaluation of study results (Internal Directive No. 100 Rules for Continuous Evaluation of the Quality of Education Provided at the University of Žilina),
- Study stays (mobility) - data are part of the Student Register and are exported to the Central Student Register

c) Subsystem "Conclusion of Study" – consists of the modules "Final Theses" and "State Examinations".
The "Theses" module is aimed at supporting the following activities:
- assignment of topics of final theses by the department or teacher,
- selection of the topic of the final thesis by the student,
- approval and confirmation of the topic and the student by the department,
- export of basic data from AIVS to the local repository of the information system of final theses - EZAP (internal directive No. 103 on final theses),
- handing over the finished thesis to the EZAP at the ŽU,
- import of work status and compliance log data from EZAP.

The "State Examinations" module allows:
- the formation of state exam commissions by the department,
- definition of state exam subjects,
- enrolment in state exam subjects - graduating students,
- distribution of students by days and commissions,
- Record of exam results for individual state exam subjects, record of final thesis evaluation, on-line printing of the State Exam Record (to be signed by the State Exam Committee),
- Diploma printing - carried out in study departments.

For the preparation of the work, its submission to the EZAP and subsequent steps, the internal ŽU Directive No. 87 applies.

The "UniApps" application allows you to access AIVS data and services from mobile devices with Android OS, in accordance with the university's concept of mobile technology deployment. The university encourages students to use their own mobile devices. UniApps provides access to information for full-time students at the 1st and 2nd level. The following functionalities are currently available:
- schedule,
- User profile,
- exam dates,
- registration for exams,
- test results.

E-learning:
At the university, e-Education is built on the basis of LMS Moodle. The organization of the courses is based on controlled study with the support of information and communication technologies in close connection with AIVS. E-learning has been used at the university since the academic year 2004/2005.

c	**Characteristics and scope of distance learning applied in the study programme with assignment to subjects. Accesses, manuals of e-learning portals. Procedures for the transition from full-time to distance learning.**
	Doctoral studies are carried out on an individual basis.
d	**Partners of the submitter in the provision of educational activities of the study programme and the characteristics of their participation.**
	Characteristics of participation: cooperation in scientific and research activities, participation in education – professional lectures, opportunities for professional practice and internships, etc. **Onsemi** - participation in scientific research activities - solving dissertation topics, the possibility of professional practice and internships. **BROSE Prievidza** – participation in education – professional lectures, opportunities for professional practice and internships, solving diploma theses. **National Instruments** – a joint agreement at the faculty level – LabVIEW Academy (organization of seminars, lectures, recruitment of students for internships and summer internships, consulting, CLAD certification). **BROSE Prievidza** - participation in scientific research activities - solving dissertation topics, the possibility of professional practice and internships. **Bel Power Solutions and Protections** - participation in scientific research activities - solving dissertation topics, the possibility of professional practice and internships. **Semikron** – participation in scientific research activities – solving dissertation topics. **ABB Brno, CZ** - participation in education - professional lectures, professional excursions, dissertation. **NXP Semiconductors, Rožnov pod Radhoštem, CZ** - participation in education - provision of HW, SW and demonstration kits for students, solving diploma theses. Faculty-level partners: https://feit.uniza.sk/spolupraca-s-priemyslom/ University-level partners: https://uniza.sk/index.php# in the "researchers and partners" tab.
e	**Characteristics of the possibilities of social, sports, cultural, spiritual and social activities**.
	At the university level, the possibilities of social, sporting, cultural, spiritual and social activities are described by Directive No. 217: https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 Information about the possibilities of social, sports, cultural and spiritual activities of UNIZA students: https://uniza.sk/index.php# Especially in the "Students" tab Initial and summary information about all the basic facts necessary for a full-fledged academic life is provided to students in the form of an information manual (distributed on paper and electronically). Students have the opportunity to participate in various interest or self-governing organizations at UNIZA – Gama Club, Council of Accommodated Students Veľký Diel, Council of Accommodated Students of Hlina, Internet Club, Student Television í-Téčko, Club of Friends of Railways UNIZA, Dormitory Radios RAPEŠ and Radio X, Erasmus Student Network (ESN), University Club of Firefighting Sport UNIZA, OMNIA Choir, Folklore Ensemble STAVBÁR, University Pastoral Center at the University of Žilina**.** Sports activities are offered to students by the Institute of Physical Education - teaching the subject of physical education (23 sports), extracurricular sports activities, outdoor activities (rafting, cycling, skiing, windsurfing,...), organization of university competitions, regeneration (sauna). There are several sports facilities - FIT-CLUB HLINYV (Fitness center, aerobic hall, squash court, multipurpose field, regeneration complex, martial arts gym, climbing wall), FIT-CLUB VEĽKÝ DIEL (Fitness center, multipurpose hall, ricochet field, T18 gym Veľký Diel, gym Májová street, tennis courts, football grass field, athletic track). For those interested in performance sports, there are sections of the ACADEMIC UNIZA sports club. The Institute of Physical Education regularly organizes one-day and multi-day sports rafting courses (Soča, Salza, Váh, Hron, Belá), cycling stays associated with hiking, as well as winter ski courses (Low Tatras, Alps).

	The University Library provides a number of library services (lending services, interlibrary loan services, international lending services, bibliographic and information services, information consultancy, COPY centre, HandLab, 3D printing and others). The university operates EDIS – the UNIZA publishing house, offering the sale of study literature, promotional items, copying services, printing and binding of final theses, etc. Students obtain a student card, which entitles them to use several services such as an access system, catering system, external services outside the university (TRANSCARD – especially bus transport), university library, accommodation facility, LDAP account allowing access to information systems. On the university campus, within which the SP is provided, there are two accommodation facilities – Veľký Diel and Hliny, on the grounds of which there are sports, cultural, information and other interest facilities, associations and clubs and student organizations organized by or for students. Catering - students have the opportunity to use the services offered by the canteen, which provides meals in its 7 centers. Meals can be taken using a student card (student card. News about life at the university and especially at the faculty are provided to SP students through a special web portal FEIT City. At the faculty level, there are other options, such as (in case of a favorable epidemic situation) FEIT Ball, FEIT Sports Day, Christmas Punch with the Dean, etc.
f	**Possibilities and conditions for the participation of students in the study programme in mobilities and traineeships (with contact details), instructions for application, rules for the recognition of this education.**
	At the university level, the processes, procedures and structures are defined by Directive No. 219 Mobility of Students and Staff of the University of Žilina Abroad. https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 An Erasmus+ study stay or internship is already a natural part of studying at UNIZA. The priority of the UNIZA management is to send every student on Erasmus+ mobility, at least once during their university studies. Current and future FEIT students have the opportunity to study at approximately 70 higher education institutions with which the faculty has concluded a cooperation agreement, as well as to complete practical internships in companies and companies within the program countries. At the faculty level, detailed information for students is provided on the website: https://feit.uniza.sk/studenti/mobilita-erasmus-2/ contact person: Mgr.Silvia Pirníková, e-mail: silvia.pirnikova@uniza.sk At the level of the SE study programme, the coordinator is: prof. Ing. Michal Frivaldský, PhD., michal.frivaldsky@uniza.sk

9.	Required Abilities and Prerequisites of the Applicant for the Study Programme
a	**Required abilities and prerequisites required for admission to study**
	At the university level, the processes, procedures and structures are defined by Directive 206 – Principles and Rules of Admission to Study at UNIZA: https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 At the faculty level, the Academic Senate of the faculty has approved the Principles and Rules of Admission, which describes in detail all the required abilities and prerequisites necessary for admission to study of individual study programs at FEIT, including the study program Electrical Technology and Materials, and are available at: https://feit.uniza.sk/studenti/doktorandske-studium/ The application is submitted for a specific study programme and the applicant applies for a specific topic of the dissertation, which are published on the faculty website. If you are interested in more than one study programme, it is necessary to submit an application for each study programme separately with the payment of the relevant admission fee. Applicants fill in the electronic application form via the FEIT website (http://feit.uniza.sk/ in the Applicants section) or the UNIZA https://vzdelavanie.uniza.sk/prijimacky/index.php website. ***Submission of a duly completed application within the set deadline and payment of the admission fee within the specified deadline are a condition for the inclusion of the applicant in the admission procedure.***

	The basic condition for admission to study in the third level of higher education at the Faculty of Electrical Engineering and Information Technology of the University of Žilina in Žilina is the acquisition of a second-level university education (Higher Education Act No. 131/2002 Coll., as amended) in the same or related study programme. In the case of a foreign applicant or student who has completed his/her studies abroad, he/she shall submit to the application for higher education at the latest for enrolment in study, a decision on the recognition of the document on completion of second-level higher education by the relevant institution in the Slovak Republic, or apply to UNIZA for the recognition of the document on education.
b	**Admission Procedures**
	At the university level, the processes, procedures and structures are defined by Directive 206 – Principles and Rules of Admission to Study at UNIZA: https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2 At the faculty level, the Academic Senate of the faculty has approved the Principles and Rules of Admission, which describes in detail all the required abilities and prerequisites necessary for admission to study of individual study programs at FEIT, including the study program Electrical Technology and Materials, and are available at: https://feit.uniza.sk/studenti/doktorandske-studium/ The application is submitted for a specific study programme and the applicant applies for a specific topic of the dissertation, which is published on the faculty website: https://feit.uniza.sk/studenti/doktorandske-studium/ The selection of applicants will take place in the form of an entrance examination, in which the applicants will attend in person. Applicants are invited to the entrance examination in writing with information about its course. The applicant is obliged to present an identity card during the entrance examination. The entrance examination takes place orally in the form of a debate. At the request of an applicant with special needs and based on the evaluation of his/her specific needs, the Dean will determine the form of the entrance examination and the manner of its conduct taking into account his/her specific needs and in accordance with Directive No. 198 Support for Applicants for Studies and Students with Special Needs at the University of Žilina. During the entrance examination, the following are assessed: a) the results of previous studies, b) language maturity, c) the applicant's previous publication activity, d) other activities of the applicant in the given field (ŠVOS, practice, professional internships,...), e) prerequisites for independent scientific work of the applicant in the field of the study programme in the form of a debate on the selected topic. The language maturity of the applicant and the applicant's overview in the given area of focus of the dissertation are evaluated by the qualification level A – excellent to FX – insufficiently. If an applicant obtains an FX rating in at least one of these evaluated areas – insufficiently, he or she has failed the entrance exam. Based on the results from all the assessed areas, the admissions committee compiles a ranking of successful applicants, which is recorded in the Minutes of the Admissions Procedure, which is archived at the Study Department of the Faculty. The final decision on admission/non-admission to doctoral studies in a given study programme is issued by the Dean of the Faculty on the basis of the results of the admission procedure, taking into account the order determined by the admissions committee and the capacity possibilities of the relevant study programme.
c	**Results of the admission procedure for the last period**
	Listed in the documents "Report on the evaluation of the quality of education at the FEIT faculty level" for individual academic years *https://www.uniza.sk/index.php/component/content/article/4273-sprava-o-hodnoteni-kvality-vzdelavania-na-urovni-fakulty-feit?catid=2:uncategorised&Itemid=101* a "FEIT Annual Reports" for each year, available: https://feit.uniza.sk/fakulta/uradna-tabula/

10.	Feedback on the quality of education provided
a	**Procedures for monitoring and evaluating students' opinions on the quality of the study programme.**

Regulated by Directive No. 223 Monitoring and periodic evaluation of study programmes:
https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2

Each academic year, the student has the right to comment on the quality of teaching, through *a questionnaire on the quality of the provided subject and on the quality* of the teacher (for subjects in the winter and summer semesters), through *a questionnaire on the quality of the study programme (at each level of study),* through a *questionnaire for students with special needs,* through *a questionnaire on the quality of the admission procedure.*
All the above surveys, as well as data collection, are carried out in the form of IS e-learning.
The process of monitoring and periodic evaluation of study programmes is carried out at UNIZA at three levels:
a) at the level of the Study Programme Council;
b) at the level of faculties and institutes of UNIZA;
c) at the level of the UNIZA Accreditation Board.
Monitoring of the study programme in the conditions of UNIZA includes continuous monitoring and review of the learning process in the relevant study programme, implementation of planned activities aimed at improving the quality of education, achieving learning outcomes and goals, compliance with relevant legislation and other legal regulations and guidelines.
The following are involved in the monitoring and periodic evaluation of the study programme:
(a) internal stakeholders:
i. UNIZA students through feedback at subject level and at the level of study programmes implemented on an annual basis;
ii. teachers through regular annual evaluation of subjects and feedback mapping their perception of the teaching process on a three-year basis;
(b) external stakeholders:
i. UNIZA graduates through feedback mapping their entry into the labour market and adaptation in employment carried out on a three-year basis;
ii. employers through feedback mapping the readiness of SP graduates for practice carried out on a three-year basis.

Feedback from students:
1. Feedback on the admission procedure and the process of adaptation to higher education is obtained through an anonymous questionnaire intended for all first-year students at all levels of study.
2. Feedback on individual subjects is obtained through a regular semester anonymous questionnaire intended for all students of all levels of education. It maps the educational process to the teacher/subject level, the teacher's approach, the possibility of achieving learning outcomes and their connection with teaching and assessment methods, the specifics of the subject. In the case of several teachers providing a subject (e.g. lecture, exercise, etc.), one questionnaire is constructed per subject with a separate evaluation of individual teachers.
3. Feedback at the level of the study programme is obtained through a regular anonymous questionnaire intended for students of the final years of all levels of education. It is used to map the entire study program, including the content of education, the organization of education, and access to counseling and other services during study.

Students are invited to fill in questionnaires in the Feedback on the Admission Procedure and Feedback on Individual Subjects or professional guarantors of the study programme in the Feedback at the level of the study programme. The application for completion shall include information on the place of publication of the previous results of the monitoring and periodic evaluation.
The results of the feedback on the education provided and the identified opportunities for improvement are subsequently analysed, evaluated and are the basis for the creation of the Study Programme Evaluation Report within the periodic evaluation of the study programme by the Study Programme Council.

Alumni feedback:
Feedback from graduates of study programmes maps the effect and impact of completed higher education at the relevant level. The anonymous questionnaire is intended for all graduates who have completed their studies in a given study programme in the last three years.

The general set of questions consists of items organized at least into topics:
a) Sphere of application;
(b) Transition to employment;

	c) Relevance of the study in relation to employment, subject composition, comparison of knowledge, skills and competences acquired during the study and required by practice; d) The need for further education. Graduates are asked to fill out a questionnaire through the Study Programme Council in cooperation with the Dean of the Faculty. The application shall include information on the place of publication of previous monitoring and periodic evaluation results. The guarantor of the study programme analyses the data from the feedback obtained, identifies possibilities and suggestions for strengthening strengths, eliminating identified weaknesses and possible threats. The results of the feedback on the implemented education and the identified opportunities for improvement are subsequently analysed, evaluated by the Study Programme Council and are the basis for the creation of the Study Programme Evaluation Report within the periodic evaluation of the study programme by the Study Programme Board.
b	**Results of student feedback and related measures to improve the quality of the study programme**
	The results of student feedback are evaluated through the indicators of the UNIZA Internal Quality Assurance System: Uscl10 - Student Satisfaction Rate with Subject Teaching – Comprehensive Uscl11 – Student Satisfaction Rate with Teaching Quality (Teaching Methods and Assessment Methods) Uscl12 - Student Satisfaction Rate with Teacher Quality (Access, Preparation) USCL13 – Student Satisfaction Rate with Specific Needs USCL16 - Availability of Resources Planned in Course Fact Sheets Uvzdal 2 - Degree of satisfaction with adaptation to university studies UVZDEL9 - Academic Fraud Prevention Rate Uscl17 - Degree of satisfaction with the preparation and course of the internship/internship Uscl20 - Degree of satisfaction of students in their final years with the quality of the study program Uscl21 - Degree of Consistency and Impact of Education Output 2 - Degree of readiness of graduates for practice in terms of competences (Indicator evaluated from the Alumni Survey, which takes place every 3 years) Output 1- Employability rate of graduates of the study programme (Indicator evaluated by the Ministry of Education, Science, Research and Sport for the calendar year in which AR started) Output 3 - Employers' satisfaction with the educational outcomes of the study programme (Indicator evaluated from a survey among employers every 3 years) These indicators are evaluated in annual evaluation reports at degree programme, faculty and university level. Individual evaluation reports are discussed and in the case of significant deficiencies, consequences are drawn at the level of the Study Programme Board, at the level of the Dean's College and at the level of the UNIZA Accreditation Council. https://www.uniza.sk/index.php/hodnotiace-spravy

11.	**Links to other relevant internal regulations and information related to the study or the student of the study programme** (e.g. study guide, accommodation rules, fees directive, student loan guidelines, etc.).
Prescription Name	**Link**
Relevant internal regulations of UNIZA	https://www.uniza.sk/index.php/univerzita/vseobecne-informacie/uradna-tabula
Internal regulations of VSK UNIZA	https://uniza.sk/index.php?option=com_content&view=article&id=4131:smernice-pre-vnutorny-system-kvality-uniza-2&catid=2