UNIVERSITY OF ŽILINA

FACULTY OF ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY

ANNUAL REPORT 2024

UNIVERSITY OF ŽILINA

Foreword

The Faculty of Electrical Engineering and Information Technology is an essential part of the University of Žilina – a modern university providing a full range of technological, economic, management, and a limited range of humanistic and natural science education at under-graduate, graduate and post-graduate levels.

During its more than 60-year existence the University has become a reputable institution with the firm position in the system of the Slovak higher education institutions. It was originally established in 1953 as the College of Railways in Prague. In 1959 the College changed its name to the University of Transport and in 1962 it was moved to Žilina. Afterwards, as a result of the increasing role of communications, the title was amended to the University of Transport and Communications. A series of transformation steps that brought essential changes into the academic life of the University and its Faculties and Institutes started in 1989. They proved effectiveness on the way towards a modern institution, featuring a character of a full-value university, named the University of Žilina since November 1996.

Nowadays, the University of Žilina consists of 7 Faculties (important dates of their establishing and/or transformation are indicated in parentheses):

- Faculty of Electrical Engineering and Information Technology (1953; 1992; 2019),
- Faculty of Mechanical Engineering (1953; 1992),
- Faculty of Operation and Economics of Transport and Communications (1953),
- Faculty of Civil Engineering (1990),
- Faculty of Management Science and Informatics (1990, 1996),
- Faculty of Security Engineering (1952, 1998, 2014),
- Faculty of Humanities (1998, 2010).

In addition to the Faculties, the University also involves the following 10 Institutes:

- Institute of High Mountain Biology,
- University Science Park,
- Research Centre,
- Institute of Lifelong Education,
- Institute of Forensic Research and Education,
- Institute of Physical Education,
- Institute of Competitiveness and Innovations,
- Aviation Training and Educational Centre
- Institute of Information and Communication Technologies.

PROFILE AND STRUCTURE OF THE FACULTY OF ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY

As mentioned above, history of the Faculty of Electrical Engineering and Information Technology of the University of Žilina goes back to the year 1953 when the College of Railways in Prague was founded. Another milestone in its history is the year 1959, when the College of Railways was renamed to the University of Transport and a joint faculty was created by the Faculty of Mechanical Engineering and the Faculty of Electrical Engineering.

In 1962, the College of Railways moved to Žilina. Along with the College, important representatives came to Žilina, who had rich experience from practice, scientific research activities and especially university pedagogical practice. In 1992, after the split, the Faculty returned to its previous original name. The Faculty of Electrical Engineering was renamed in January 2019 to the Faculty of Electrical Engineering and Information Technology. It became the first technically oriented faculty and generally the second Faculty in the Slovak Republic awarded the Quality Certificate for quality control system according to ISO 9001 (in 2003). Since that time further three successful re-certifications were realized (2007, 2010, 2013 and 2016). Due to the introduction of an internal quality system, the implementation of which results from complex accreditation, the Faculty decided in 2019 not to continue with the quality management system according to ISO 9001, and the recertification of the quality management system according to this standard was not carried out.

Structure of the Faculty

From a structure point of view, the Faculty of Electrical Engineering and Information Technology (FEEIT) consisted of seven departments (six departments located directly in Žilina and one institute established at the satellite work place in Liptovský Mikuláš), the Service centre and the Dean's office.

Scientific and research activities, properly projected to educational activities, are dynamically developing as a response to floating markets seen within both national and pan-European context. From the solution of classical topics of electrotechnical engineering in transport focused on electric traction, railway safety technology, or technical operation of telecommunications, the main emphasis is currently placed on information and communication technologies applied in the field of safe process management in transport and industry, modern telecommunications technologies, development of power electronic systems and modern management of electrical networks. Interdisciplinary fields are also developing, namely mechatronics, biomedical engineering and multimedia technologies. Through targeted education, the students of the Faculty acquire competencies that will enable them to succeed in the labor market not only on a national but also on an international level. Many graduates of FEEIT work in lucrative positions in many spheres of society with traditional and new employers.

The FEEIT's Departments are listed below:

- Department of Physics (DPh)
- Department of Electromagnetic and Biomedical Engineering (DEBE)
- Department of Mechatronics and Electronics (DME)
- Department of Power Systems and Electric Drives (DPSED)
- Department of Control and Information Systems (DCIS)
- Department of Multimedia and Information-Communication Technology (DMICT)
- Institute of Aurel Stodola situated in Liptovský Mikuláš (IAS) - until August 31, 2024, then relocated to Žilina.

The following table 1 shows the distribution of the pedagogical and the research positions at particular FEEIT's departments as of 31. 12. 2024.

Tab. 1: Number of pedagogical and research employees at the departments of FEEIT as of 31. 12. 2024

Department	Pedagogical staff		Research staff	
	Full-time	Part-time	Full-time	Part-time
DPh	16	2	2	1
DEBE	11	-	2	1
DME	15	1	4	15
DPSED	9	2	4	3
DCIS	12	1	-	-
DMICT	23	4	3	-
* IAS	4	-	-	-
Total	**89**	**10**	**15**	**20**

* as of 31.8.2024

Number of employees at FEEIT according to the categories can be seen in the table 2.

Tab. 2: Number of employees at FEEIT according to the categories in 2018 - 2024

Year	2018		2019		2020		2021		2022		2023		2024	
Full-time / Part-time	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT
Prof.	15	-	16	-	15	-	16	-	16	-	17	-	17	-
Assoc. Prof. in the position of Prof.	-	-	-	-	1	-	1	-	-	-	-	-	-	-
Guest Prof.	-	1	-	1	-	3	-	4	-	4	-	3	-	3
Assoc. Prof.	32	1	29	1	29	1	32	2	30	3	29	2	30	1
Senior Lecturer in the position of Assoc. Prof.	-	-	-	-	-	-	-	-			3	-	3	-
Senior Lecturer	53	9	53	8	48	10	42	9	39	9	41	7	39	6
Lector	2	2	1	2	-	2	-	3	-	3	-	3	-	3
Tech. Admin. Staff	22	2	25	2	23	2	23	1	20	2	20	2	19	2
Research Staff	18	8	13	14	13	15	12	17	13	19	14	21	15	20
Total	**142**	**23**	**137**	**28**	**129**	**33**	**126**	**36**	**121**	**40**	**124**	**38**	**123**	**35**

The most important events in 2024

The most important events at the faculty in 2024 can be summarized as follows:

- From 1 September 2024, there was a change of the Dean of the Faculty. Prof. Michal Frivaldský, PhD. was elected as a new Dean, replacing Prof. Pavol Špánik, PhD., who served in this position for two terms (8 years).
- From 1 October 2024, based on the proposal of the Dean of FEEIT and the discussions of the Academic Senate of FEEIT, a new faculty management was appointed, consisting of: Assoc. Prof. Mariana Beňová, PhD. - Vice-Dean for Education, Ing. Daniel Benedikovič, PhD. - Vice-Dean for Science, Research and International Relations, Prof. Peter Brída, PhD. - Vice-Dean for Cooperation with Industry and Public Relations, Assoc. Prof. Marek Roch, PhD. - Vice-Dean for Information Systems, Ing. Katarína Jurošková - Head of Administration and Finance and Assoc. Prof. Peter Hockicko, PhD. - Authorised person for international mobility and foreign cooperation.
- From the point of the implementation of foreign projects, the implementation of the project within the call DIGITAL-2022-CLOUD-AI-02 called TEF-HEALTH - Testing and Experimentation Facility for Health, continued. TEF-Health provides standards for certification and quality control to facilitate the access of trusted AI to the market and ensure its simple and effective evaluation.
- The solution of the scientific project APRIORI (Advanced technologies for Physical ResIlience of Critical Infrastructures) continued, financed from the resources of the NATO organization. The project aims to provide innovative technologies for the entire management cycle of critical infrastructures. The consortium consists of 5 members, the coordinator of the project is the Università degli Studi del Sannio from Italy.
- The implementation of the project focused on the European space program continued, within the ESA (European Space Agency) scheme, in cooperation with industrial partners SPINEA Technologies (SK) and THALES Alenia Space (FR), which deals with the development of advanced electronic systems for powering building blocks of space robotic arms.
- The faculty has been successful in solving UNIZA grant projects: Call No. 2/2023 in the category of 2nd-degree university students: 1st place: Bc. Paulecová Kristína, 2nd place: Bc. Zemaníková Miriam, 3rd place: Bc. Jaššák Jozef, Bc. Gonda Matej; Call No. 1/2023 in the category of young scientific and pedagogical employees: 1st place: Ing. Štefan Hardoň, PhD., 2nd place: Ing. Michal Labuda, PhD.
- In 2024, the periodic approval of study programs of the 2nd degree study (after its standard length of study) was carried out, which was successful based on the decision of the UNIZA Accreditation Board. 6 study programs in the Master degree study (biomedical engineering, photonics, multimedia engineering, process control, telecommunications and radiocommunication engineering, power electronic systems (specializations in autotronics, electric power systems, electric drives and traction, and power electronics) in accordance with the standards for study programs issued by the SAAVŠ (Art. 11, paragraph 5), the UNIZA Accreditation Board approved the study programs of the faculty of the 2nd degree study in the period corresponding to its standard length of study, valid from 1. 9. 2024 to 31. 8. 2026.
- At FEEIT, the strategy of building two top teams in the fields of electrical engineering and IT was fulfilled. The areas of research in electrical engineering are: efficient conversion, supply and transfer of energy, use of unconventional sources, promising technologies, materials, thermal management, sustainability, space applications, energy storage and lighting technology. In the field of information technology, it will be about smart systems, localization in 5G and B5G networks, the field of optical and radio communication networks, the field of machine learning and computer vision. The implementation of projects for scientists (No. 1/2021/FEIT/VP) and young scientists (No. 1/2021/FEIT/MVP) created as part of calls for submitting projects from R&D support funds according to MU 9/2020 continued.

- The 15th international conference ELEKTRO 2024 was held under the auspices of FEEIT UNIZA, in cooperation with long-term partners of the faculty - University of Catania, IT and Cracow University of Technology, PL. The venue of the conference was Zakopane, PL and it lasted from 20th to 22nd May 2024. A total of 101 papers were presented during the conference, a total of 114 participants from 12 countries participated in the conference. The conference papers were indexed in the international database IEEE Xplore® and SCOPUS.
- On the occasion of Teachers' Day, the rector honored the pedagogical acivities of the university's best teachers. Among the awardees there were two FEEIT teachers, Prof. Dušan Pudiš, PhD. and Assoc. Prof. Martin Vaculík, PhD., to whom the UNIZA rector presented J. A. Comenius plaques.
- The UNIZA Rector's Award was received by Ing. Ján Šeleng (2nd study degree – biomedical engineering) and the Rector awarded also Ing. Patrik Prôčka, PhD. (3rd study degree – theory of electrical engineering) for his dissertation entitled "Non-invasive vascular diagnostics using contactless optoelectronic measurement methods".
- Within the 20th year of the project Student Personality of Slovakia in the academic year 2023/2024, faculty doctoral student Ing. Juraj Tvarožek (1st year, high-current electrical engineering) became the laureate in the Electrical Engineering, Industrial Technologies category as the best student in this category.
- Cooperation with industrial entities in the field of contract research and marketing activities continues to develop successfully. The marketing strategy is implemented through a number of supporting events, such as competition for secondary school students the Technical Idea of the Year, active participation in the event MyMachine, organizing Open Days at FEEIT, UNIZA Masters 2024, and more. The faculty participated in the Girl's Day event, which is intended for secondary school students with the aim of motivating them to study IT.
- On March 22, 2024, the ŠVOS for Bachelor and Master degree students was held at FEEIT.
- The 20th anniversary of the Žilina Children's University took place from July 8 to July 12, 2024.
- The Spring and Autumn DROP OF BLOOD was organized in cooperation with ZAIT, in which more than 60 donors from among FEIT employees and students participated.
- FEITgroup students, with the support of the faculty management, organized various social events: 13th FEIT Representative Ball, Spring Games of Electricians, Opening of the semester, Electrician's “Punč” drink.
- FEIT students and employees went on a joint St. Nicholas expedition to the cottage under Suchý in Malá Fatra. 52 daredevils participated in the expedition.

EDUCATIONAL ACTIVITIES

- The courses in social sciences, psychology, economics and law are offered to the students in all study programs at Bachelor and Master degree study.
- In all study programs at Bachelor and Master study students are also offered courses focused on project teaching form through which students better acquire theoretical and practical aspects of their education.
- Students have the opportunity to express their observations, satisfaction or point out shortcomings in the enrolled courses through a questionnaire survey at the end of each semester.
- In 2024, the periodic approval of study programs of the 2nd degree study (after its standard length of study) was carried out, which was successful based on the decision of the UNIZA Accreditation Board.
- From the academic year 2022/2023, it is mandatory to complete an individual internship in the chosen organization according to the focus of the study program, or specializations of the study program, in the scope of min. 60 hours.
- FEEIT supports forms of development of interdisciplinary, multidisciplinary, distance and lifelong learning and teaching of foreign languages, by introducing mandatory subjects "professional English" not only in the 1st and 2nd degrees study, but also for young employees and doctoral students, as well as other elective courses.
- New structures were created at FEEIT for the purpose of ensuring the quality of education at the faculty, consisting of teachers, students, graduates and representatives from practice (Council of study programs, authorities from practice).
- FEEIT increases the attention given to the adaptation of new 1st degree students to the university environment (information sessions, detailed monitoring of study results, support of mutual communication between students – teachers, support for solving common student activities, the introduction of courses to support their adaptation to study, e.g. subject Introduction to studies, participation in the UNIZA Buddy system, etc.).
- Considerable attention is paid to students of the 3rd degree study. FEEIT supports them mainly in preparing high quality publication outputs, fulfilment of curricula, preparation and defending the dissertation thesis in the standard length of study, not only through targeted meetings with students, but also through the introduction of the compulsory course "Fundamentals of scientific work" in the 1st year of study.
- FEEIT has a developed student mobility system. Student mobilities to foreign universities, as well as mobilities to the industrial environment, are long-term supported by FEEIT and fully integrated into the students' educational process. Thus, students can complete part of their studies at important foreign educational institutions or in important industrial enterprises or corporations. For 3rd degree students, completing a mobility or internship is a mandatory part of their studies.
- FEEIT is using complex software system for supporting e-learning, which enables access to electronic materials supporting the traditional form of teaching, testing and examination of students, and organizational provision of study.
- FEEIT has an established study credit system in all degrees of study provided at FEEIT. The system enables uniform assessment of study results in the frame of EU and markedly makes the realization of mobility and acceptation of achieved results simpler.
- At FEEIT there is a contact person (vice-dean for education) for students with specific needs, who is responsible for creating optimal conditions for studying.
- Under the auspices of the Dean, the student FEEIT group operates at the faculty, which in 2024 organized several events for students, such as the FEEIT Ball, the Spring Games of Electricians, a tourist outing, the Electricians' Christmas “Punč” drink, the Spring and Autumn Drop of Blood, etc., which help to establish and develop supportive relationships between students, but also between students and teachers.

Tab. 3: Overview of accredited study programs (1st degree - Bachelor study programs, 2nd degree - Master study programs, 3rd degree - Doctoral study programs)

Field of study	Study program	Form of study	Duration of study	Title awarded	Guaranteed by
1st study degree					
Cybernetics	Control Engineering	FT	3 years	Bc.	Aleš Janota
Electrical Engineering	Biomedical Engineering	FT	3 years	Bc.	Ladislav Janoušek
Electrical Engineering	Electrical Engineering Specializations: - autotronics, - electric power systems, - electric traction and drives, - power electronics	FT, PT	3 years	Bc.	Michal Frivaldský
Electrical Engineering	Electrooptics	FT	3 years	Bc.	Dušan Pudiš
Informatics	Multimedia Technologies	FT	3 years	Bc.	Roman Jarina
Informatics	Communication and Information Technologies	FT	3 years	Bc.	Peter Počta
2nd study degree					
Cybernetics	Process Control	FT	2 years	Ing.	Aleš Janota
Electrical Engineering	Biomedical Engineering	FT	2 years	Ing.	Ladislav Janoušek
Electrical Engineering	Photonics	FT	2 years	Ing.	Dušan Pudiš
Electrical Engineering	Power Electronic Systems Specializations: - autotronics, - electric power systems, - electric traction and drives, - power electronics	FT	2 years	Ing.	Michal Frivaldský
Informatics	Multimedia Engineering	FT	2 years	Ing.	Róbert Hudec
Informatics	Telecommunication and Radio-com. Engineering	FT	2 years	Ing.	Peter Brída
3rd study degree					
Cybernetics	Process Control	FT, PT	3, 4 years	PhD.	Aleš Janota
Electrical Engineering	Electrotechnologies and Materials	FT, PT	3, 4 years	PhD.	Dušan Pudiš
Electrical Engineering	Power Electrical Engineering	FT, PT	3, 4 years	PhD.	Pavol Špánik
Electrical Engineering	Power Electrical Engineering	FT, PT	3, 4 years	PhD.	Pavol Špánik
Informatics	Telecommunications	FT, PT	3, 4 years	PhD.	Peter Brída
Electrical Engineering	Theory of Electrical Engineering	FT, PT	3, 4 years	PhD.	Ladislav Janoušek

Tab. 4: Number of the faculty students (as of 31. 10. 2024)

Field of study/Study program	Number of students			
	Full-time study		Part-time study	
	Nationals	Foreigners	Nationals	Foreigners
1st study degree				
Control Engineering	89	5		
Biomedical Engineering	59	8		
Electrooptics	8	0		
Electrical Engineering - specialization autotronics	36	4		
Electrical Engineering - specialization electric power systems	79	2		
Electrical Engineering - specialization electric traction and drives	13			
Electrical Engineering - specialization power electronics	29		37	
Multimedia Technologies	144	37		
Communication and Information Techn.	94	9		
Total	**551**	**65**	**37**	**0**
2nd study degree				
Biomedical Engineering	40			
Photonics	8			
Multimedia Engineering	108	6		
Process Control	52	1		
Telecomm. and Radio-comm. Eng.	24			
Power Electronic Systems - specialization autotronics	18			
Power Electronic Systems - specialization electric power systems	36			
Electrical Engineering - specialization electric traction and drives	15			
Power Electronic Systems - specialization power electronics	13	3		
Total	**314**	**10**		
3rd study degree				
Electrotechnologies and Materials	3			2
Process Control	8		2	
Power Electrical Engineering	16	1	3	
Telecommunications	10	1		
Theory of Electrical Engineering	4		2	
Total	**41**	**2**	**7**	**2**

Tab. 5 and 6: Overview of the faculty students' number since 2018 (as of 31. 10. 2024)

Full-time study				
2020	**2021**	**2022**	**2023**	**2024**
1st study degree				
741	785	688	606	616
2nd study degree				
288	263	272	322	324
3rd study degree				
54	52	37	34	43
Part-time study				
2020	**2021**	**2022**	**2023**	**2024**
1st study degree				
8	0	30	24	37
2nd study degree				
		0	0	0
3rd study degree				
3	9	7	9	9

Admission for study

a) Form of the admission procedure in 2024 and a brief assessment:

The basic condition for admission to bachelor study (1st level study programme) was the acquisition of a full secondary education or completed secondary vocational education. The admission procedure takes place in two forms: without an entrance examination and with an entrance examination. Applicants (except for applicants for the study program of *Multimedia Technology*) were admitted to the study without an entrance examination, if they meet the basic conditions for the bachelor's study, and at the same time, during their secondary school studies, they were successful solvers of subject Olympiads in mathematics, physics and computer science, or placed in 3rd place, including at least at the district level, in international and national competitions related to the content of the study program, SOČ or FEEIT UNIZA's Technical Idea of the Year. All study applicants who did not meet the condition for admission to study without an entrance exam, passed the entrance exam. The entrance exam was conducted in the form of a test of knowledge from the secondary school curriculum. When creating the list of admitted applicants who passed the entrance exam, the order of applicants determined by the respective number of points that the applicants obtained from the test of knowledge of the secondary school curriculum was accepted, as well as the decision of the dean of the faculty on the final number of admitted applicants.

Applicants for study in the *multimedia technology* study program completed an entrance exam consisting of three parts: presentation of the applicant's motivation to study the study program, evaluation of the applicant's academic results and general overview of the applicant, presentation of the applicant's multimedia activities and secondary school knowledge, including clarification of the procedures and techniques that were used.

The selection process for the 2nd study degree is based on results from previous Bachelor study of an applicant. Those applicants who completed the Bachelor degree with honours, or reached the required weighted average are accepted without the selection procedure. The other applicants took the entrance exam, which consisted of a test from state exams for bachelor's studies at FEEIT UNIZA according to individual study programs.

The selection procedure for the 3rd study degree takes the form of a personal interview with each applicant individually in front of an admission committee. One part of the interview is focused on mapping the overview of the applicant in the professional field related to the chosen topic of the doctoral study. The next part aims to verify the knowledge of foreign languages and the assumptions for individual scientific work. The order of applicants is drawn up by the committee in the form of the secret voting.

b) Faculty activities that promote learning:

FEEIT devoted considerable effort to promote the study programs to students of secondary schools. Representatives of the Faculty participated in the Open Days at selected secondary schools. FEEIT organized for secondary schools its own Open Day, which took place in an entertaining way with streaming. FEEIT representatives participated in various promotional events organized at the university level, but also on their own initiative at selected secondary schools. At the same time, online promotion of study opportunities at FEEIT on social networks (Facebook, Instagram, Youtube, ...) was intensified.

Number of applicants for study and number of enrolled students can be seen in the following Tables.

Tab. 7: Statistical review of the admission procedure in 2024

Field of study/Study program	Number of applicants for study					
	Full-time study			Part-time study		
	S	P	E	S	P	E
1st study degree						
Control Engineering	117	84	53			
Biomedical Engineering	67	56	34			
Electrooptics	5	5	5			
Electrical Engineering - specialization autotronics	47	34	19			
Electrical Engineering - specialization electric power systems	108	84	34			
Electrical Engineering - specialization electric traction and drives	11	8	6			
Electrical Engineering - specialization power electronics	37	37	20			
Multimedia Technologies	187	118	77			
Communication and Information Techn.	147	91	53			
Total	**726**	**517**	**301**			
2nd study degree						
Biomedical Engineering	26	24	18			
Photonics	5	5	3			
Multimedia Engineering	74	61	56			
Process Control	29	27	25			
Telecomm. and Radio-comm. Engeneering	24	19	10			
Power Electronic Systems - specialization autotronics	8	8	8			
Power Electronic Systems - specialization electric power systems	34	32	20			
Power Electronic Systems - specialization electric traction and drives	8	8	9			

Power Electronic Systems - specialization power electronics	8	8	6			
Total	**216**	**192**	**155**			
3rd study degree						
Electrotechnologies and Materials	2	2	2			
Process Control	6	6	6			
Power Electrical Engineering	6	6	6			
Telecommunications	2	2	2			
Theory of Electrical Engineering	4	4	3			
Total	**20**	**20**	**19**			

S - Subscribers, P - Participation in the admission procedure, E - Enrolled

Tab. 8: Number of graduates of the Faculty in the academic year 2023/2024

Field of study/Study program	Number of graduates in 2023/2024			
	Full-time study		Part-time study	
	Nationals	Foreigners	Nationals	Foreigners
1st study degree				
Control Engineering	25	2		
Biomedical Engineering	23			
Electrical Engineering - specialization autotronics	11			
Electrical Engineering - specialization electric power systems	33			
Electrical Engineering - specialization electric traction and drives	4			
Electrical Engineering - specialization power electronics	4			
Electrooptics	2			
Multimedia Technologies	27	8		
Communication and Information techn.	19			
Total	**148**	**10**		
2nd study degree				
Biomedical Engineering	16			
Photonics	1			
Multimedia Engineering	34			
Process Control	30			
Telecomm. and Radio-comm. Eng.	9			
Power Electronic Systems - specialization autotronics	8			
Power Electronic Systems - specialization electric power systems	17			
Power Electronic Systems - specialization electric traction and drives	3			
Power Electronic Systems - specialization power electronics	10	3		
Total	**128**	**3**		

3rd study degree				
Electrotechnologies and Materials				
Process Control	3			
Power Electrical Engineering	1	1	1	
Telecommunications	2			
Theory of Electrical Engineering	3			
Total	**9**	**1**	**1**	

Tab. 9: Overview of graduates of the Faculty since 2018/2019 (as of 31. 12. 2024)

Full-time study					
2018/2019	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**	**2023/2024**
1st study degree					
140	134	102	156	183	148
2nd study degree					
153	124	112	131	93	128
3rd study degree					
13	14	10	17	17	9
Part-time study					
2018/2019	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**	**2023/2024**
1st study degree					
0	9	1	0	0	0
2nd study degree					
0	0	0	0	0	0
3rd study degree					
1	1	0	0	0	1

Graduates' employment

BACHELOR STUDY PROGRAMMES

Control Engineering
(Field of study Cybernetics)
The graduate will acquire education in the field of control engineering and process control with the support of information and communication technologies. He/she has also practical experience in application of safety critical control and communication systems performed mainly based on PLC and industrial networks. He/she will successfully apply in the operation of control and information systems at the process and operative level. Theoretical knowledge acquired during the bachelor study will create good prerequisites for further education, either within the further forms of university study or within lifelong education.
Software skills: C language, C++, MATLAB, PLC, ATMEL, MS ACCESS, HTML, CSS, Tia Portal.

Biomedical Engineering
(Field of study Electrical Engineering)
The graduate will acquire knowledge in the subjects of theoretical and technical basis, as well as in theoretical basis of medical disciplines with emphasis on the structure and functioning of biological objects, biochemical, physiological and pathophysiological processes. He/she will gain knowledge of medical technique and its applications, modern tools of biomedicine, principles of their activities, conditions for operation and their safe

for diagnostic and treatment purposes. He/she is able to evaluate functionality of technical and computer aided equipment under given conditions of a health care facility or other operations and laboratories and at the same time able to lead qualified communication with the health care staff. He/she will successfully apply as an expert in medical and biological laboratories, in the operation of biomedical technique, in business and service organisations.
Software skills: Jazyk C, MATLAB, EAGLE, TI-TINA.

Electro-Optics
(Field of study 2675 Electrical Engineering)
During the bachelor's degree studies, the graduate of the field of study Electro-optics acquired the basics of natural and technical sciences with regard to the field of optics, opto-electronics and electronics. The technical skills and knowledge are also complemented by knowledge of programming. The combination of technical knowledge and skills creates a basis for employment not only in the field of semiconductor and semiconductor technology production and control processing, but thanks to the knowledge in the field of optics and opto-electronics, the graduate of Electro-optics is able to navigate and apply in the processes of preparation and production of LEDs, LD, Lidar technologies or other processes of preparation of optoelectronic systems. Theoretical as well as practical knowledge of graduates in the field of applied optics also provides them with the opportunity to find employment in the field of preparation and production of optical fibres and photonic elements for the transmission, detection and processing of optical signals for industrial, automotive, biomedical or military systems.
Software skills: MATLAB, C-Arduino, LabVIEW

Electrical Engineering
(Field of study Electrical Engineering)
The graduate will acquire knowledge from the subjects of theoretical base applied in the fields of power electronics, utilisation of applied microprocessor technique and programming, electric drives, electrical traction, electric power systems and mechatronics. He/she will gain knowledge in the field of quality management and reliability in a production company, marketing and trade, electrical standards, rights and legal regulations related to the field of study. Graduates may further specialise in the field of automobile electrical engineering, electrical traction, electric drives, electric power systems, power electronic systems and mechatronics systems. Graduates obtain theoretical knowledge and practical experience in order to acquire the principles, installations, operations, functions, service and repairs of electrical products, devices and equipment in compliance with international standards. He/she will successfully apply in all fields of power electrical engineering, in the field of mechatronics, robotics, applied microprocessor technique, electronics, optoelectronics, power electronics, computer design and construction in organisations of administrative, production, operation or repair character.
Software skills: MS Office, MATLAB, SIMULINK, FEMM, MOTORSOLVE, SICHR, DIALUX, DSPACE, CODE WARIOR, LABWIEV, EMPT-ATP, MODES, GE-PSLF, RUPLAN, RS Logix, RS Link, RS View, Assembler, AVR Studio, EAGLE, OrCAD-PSPICE, PLECS.

Communication and Information Technologies
(Field of study Informatics)
Graduates of the bachelor's degree study programme - Communication and Information Technologies in the field of study - Informatics will acquire the ability to specialize and adapt to the latest and future needs and requirements of practice in manufacturing companies of network operators and in service companies in the field of electronic communications. They will be prepared for a continuous deepening of knowledge from the field. They can work as qualified workers for the operation and design of technology of communication networks and services and will be able to solve the tasks of practice in team. They can work at the positions of executives, operators of electronic communications, network specialists in enterprises and institutions and

developers of communication services and in companies developing technologies of Industry 4.0. Graduates can work as designers, system designers or specialists for various areas of ICT.

Multimedia Technologies
(Field of study Informatics)
The graduate will acquire knowledge in acquisition, processing and presentation of digital signal at an adequate technical, aesthetical, ethical and art levels. The synergy of technical and art education will make the graduate a specialist in creating multimedia presentations. The graduate will gain knowledge and practical experience in working with the screen and the sound element of multimedia that predetermines him/her for working in organisations focused on information technologies, advertising and counselling activities, in public administration institutions, in studios producing multimedia products.
Software skills: C language, C++, MATLAB, Java, JSP, Blender, Cinema 4D, Adobe Premiere, Adobe Audition, Adobe Photoshop, Adobe Illustrator, Adobe InDesign, Protools, HW, SQL, PSpice, Microsim, Corel Draw, QuarkxPress, LaTex.

MASTER STUDY PROGRAMMES

Biomedical Engineering
(Field of study Electrical Engineering)
The graduate has an overview of modern technical tools of biomedicine, diagnostic, medical and rehabilitation devices, their safe use and the most recent world trend in their development. The graduate acquired knowledge in theoretical and selected clinical medical disciplines in order to understand the purpose of application of technical tools, ability to assess functionality and ability to create conditions for qualified communication with medical doctors. He/she has a wide knowledge of existing information systems and technologies. The graduate can successfully apply in all fields of technical and information provision of health care facilities, in institutes and laboratories of biomedical research and development, in the field of information systems and in technical management, especially of medical facilities. He/she will also work as a senior executive in the management of medical facilities, in companies that work with biomedical technology.
Software skills: C language, HTML, PHP, MATLAB, Simulink, CST-studio suite.

Photonics
(Field of study Electrical Engineering)
The graduate of the study programme Photonics is very well prepared analytically and technologically to deal with the design, preparation and production of semiconductors, crystals, opto-electronics, applied photonics, sensors, or to deal with the proposal of optical design or optical modelling. Knowledge in the field of nanotechnology and nanophotonics enables the graduates of the study programme Photonics to find employment in the field of modern technologies focused on research and innovation throughout the EU. Technological progress thanks to photonic technologies and innovation provides the graduates of the study programme Photonics with the opportunity to further specialise and adapt to new advanced technologies. The interconnection of numerical tools and programming languages with photonics technologies already during their studies allows graduates to gain the necessary experience and to be able to analytically solve technical and information requirements and other practical tasks.
Software skills: MATLAB, LabVIEW, ANSYS-SPEOS, Lumerical.

Multimedia Engineering
(Field of study Informatics)
The graduate of the master´s (engineering) study programme Multimedia Engineering has deepened his/her knowledge of the theoretical basis of the field of study Informatics, including digital and analogue processing

of video and audio signals, processing and transmission of multimedia streams through various types of communication technologies, networks and services, development of interfaces and applications. He/she is an expert with multidisciplinary overlap with artistic, technical and informational knowledge that he/she can apply in the field of multimedia application development. By selecting compulsory elective courses, he/she can specialise more narrowly in either image, graphic or audio information processing. Knowledge of web technologies and services, 2D/3D graphics and animation techniques, digital processing of multimedia content including machine learning methods, 3D design, game design, mobile applications, 3D applications for augmented and virtual reality are important components of the knowledge. He/she will have the ability to specialise and adapt at different levels according to the needs of practice, development and research, as well as the ability to continuously deepen knowledge of the field. The graduate has acquired the knowledge and skills that will enable him/her to work as a specialist, both independently as well as in teams, to solve projects integrating the technical and creative levels into a single entity, or to lead these teams. His/her employability on the labour market is mostly in positions as a multimedia application developer, web application developer, system analyst, data specialist and game designer.
Software skills: ADOBE package, HTML, PHP, MySQL, Blender, Unity 3D, Android studio, JAVA, Microsoft Direct3D, OpenGL, After Effect, ZScan, Matlab.

Process Control
(Field of study Cybernetics)
The graduate of the engineering study programme has acquired knowledge in the field of telecommunication and information systems and networks. He/she can explain and apply the basic approaches used in the case of planning and operation of communication networks and project management, together with knowledge of the principles of operation of second to fifth generation (2 – 5G) radio networks and microwave systems, in order to apply the knowledge gained in solving problems related to design, implementation and operation of microwave, radio, metallic and optical transmission systems, with a view to solving problems related to the optimal configuration of network nodes with respect to the guarantee of quality of service (QoS) for IP services, while possessing knowledge in the filed of measurement, design and management of transmission and operating systems, system components, and configuration of services. In addition, he/she has gained knowledge of design and verification and selected optical communication chain components and RF circuits used in radio networks through analytical and numerical tools. The graduate is prepared to adapt to the rapidly evolving modern ICT technologies and to 6 apply him/herself as a creative worker in technical development, telecommunication design and management, research as well as in all areas of application and development of telecommunication, radiocommunication and information and communication technologies and services.
Software skills: Phyton, C Language, C++, MATLAB, Java, HTML, CSS, SQL

Telecommunication and Radiocommunication Engineering
(Field of study Informatics)
The graduate of the engineering study programme has acquired knowledge in the field of telecommunication and information systems and networks. He/she can explain and apply the basic approaches used in the case of planning and operation of communication networks and project management, together with knowledge of the principles of operation of second to fifth generation (2 – 5G) radio networks and microwave systems, in order to apply the knowledge gained in solving problems related to design, implementation and operation of microwave, radio, metallic and optical transmission systems, with a view to solving problems related to the optimal configuration of network nodes with respect to the guarantee of quality of service (QoS) for IP services, while possessing knowledge in the filed of measurement, design and management of transmission and operating systems, system components, and configuration of services. In addition, he/she has gained knowledge of design and verification and selected optical communication chain components and RF circuits used in radio networks through analytical and numerical tools. The graduate is prepared to adapt to the rapidly evolving modern ICT technologies and to 6 apply him/herself as a creative worker in technical development,

telecommunication design and management, research as well as in all areas of application and development of telecommunication, radiocommunication and information and communication technologies and services. *Software skills: Phyton, C Language, C++, MATLAB, Java, HTML, CSS, SQL.*

Power Electronic Systems
(Field of study Electrical Engineering)
The universality of this study programme guarantees a very wide employment of graduates on the labour market in the field of autotronics, power engineering, electric drives, electronics. The acquired knowledge can be applied in the most lucrative areas of electrical, mechanical and energy industry as well as in transport. In the future, their application in the field of services is expected. These are mainly the areas of development, design, projection and application of power and control electronic systems, mechatronic and automotive systems, their control nodes, superior control systems, industrial automation machines and robots and means of industrial automation. Due to the significant representation of subjects focused on programming and development of control software, the graduate can successfully find employment in very interesting job positions. Graduates of this field of study can apply for jobs in companies dealing with design, production and application of power electronic and/or mechatronic systems and industrial automation. They can also work in specialised machinery companies operating in the areas of the automotive industry, chemical and petrochemical industry, gas industry, paper production as well as transport.
Software skills: Freescale ARM, Texas Instruments DSP, ANSI C Language, EAGLE, OrCADPSpice, PLECS, LabVieW, Simulink, COMSOL, VHDL ISE Desing Suite. dSpace, Texas Instruments Education Modules.

DOCTORAL STUDY PROGRAMMES

Electro-technologies and Materials
(Field of study Electrical Engineering)
The graduate of the doctoral degree study programme Electro-technologies and Materials masters scientific methods for the design and preparation of innovative materials and structures. He/she masters scientific advances in processing technology, photonic structures, electro-acoustic structures, solid state and electronic systems, diagnostics and physical property modelling. The scientific knowledge acquired enables the graduate to apply knowledge in a wide range of manufacturing technologies in electronics, photonics, or materials. The graduate is able to independently operate scientifically and implement new knowledge in the field of technology. He/she has the skills to lead scientific and engineering teams designed to provide technical and informational assignments in solving complex tasks not only in industry, but also in science and research. After graduation, the graduate is able to establish and implement innovative technological procedures for the production and preparation of electrical engineering elements, structures, systems and equipment, while being able to think critically and creatively for the design and implementation of innovations.

Process Control
(Field of study Cybernetics)
The doctoral degree study in the study programme Process Control is intended for graduates of the second degree of university study (Engineer/Master of Science or Art) who tend to have an original solution to engineering and scientific problems in the field of management and control of transport and technological processes. The aim of the doctoral degree study is to educate such an expert who will not only have comprehensive knowledge but will be able to enrich science and knowledge in the field of process control. To solve these tasks, the doctoral student uses the latest knowledge of modern analytical and numerical methods, methods of mathematical and physical modelling, informatics, measurement of electric and non-electric variables, microelectronics, electrical power engineering, automatic and discrete control up to the level of artificial intelligence, including the implementation of control by appropriate processors, as well

as knowledge from other fields. A prerequisite for successful completion of the doctoral degree study is the ability of the doctoral student to think abstractly and his/her ability to apply and implement acquired knowledge in solving technical problems. The graduate of the doctoral degree study in the study programme Process Control acquired knowledge based on the current state of scientific knowledge and by his/her own creative activity he/she will contribute to the development of this knowledge as well as to new findings in this field. He/she has a broad expertise in several areas of the field, which serves as a basis for conducting research, development and creation of new knowledge in traditional areas of the field such as: methods of modelling and process control, design of robotic and mechatronic systems control, new software and communication systems for control of complex systems. The student is capable of critical analysis, abstraction, evaluation and generalization of given problems and synthesis of new and complex concepts.

Power Electrical Engineering
(Field of study Electrical Engineering)

The doctoral degree study in the study programme High-voltage electrical engineering is intended for graduates of the second degree of university study (Engineer/Master of Science or Art) who tend to have an original solution to engineering and scientific problems in the field of heavy current electrical engineering, i.e. electric drives, power electronics, electric traction, electric machines and instruments as well as traction electrical power engineering. To solve these tasks, the doctoral student uses the latest knowledge of modern analytical and numerical methods, methods of mathematical and physical modelling, informatics, measurement of electric and non-electric variables, microelectronics, electrical power engineering, automatic and discrete control up to the level of artificial intelligence, including the implementation of control by appropriate processors, as well as knowledge from other fields. A prerequisite for successful completion of the doctoral degree study is the ability of the doctoral student to think abstractly and his/her ability to apply and implement acquired knowledge in solving technical problems. The doctoral student will learn to correctly characterize and understand physical phenomena and experimental knowledge of these phenomena, to look for adequate models and to implement new applications in the above-mentioned specific disciplines, in science, research and practice. The doctoral degree study will enable the doctoral student to acquire comprehensive theoretical knowledge, experimental skills and practical experience, as well as to master the methodology of scientific work and prepare him/ her for independent scientific work. The graduate of the doctoral degree study in the study programme High-voltage electrical engineering acquired knowledge based on the current state of scientific knowledge and by his/her own creative activity he/she will contribute to the development of this knowledge as well as to new findings in this field.

Telecommunications
(Field of study Informatics)

The graduate of the third degree study programme Telecommunications acquired deep theoretical and methodological knowledge and practical experience in key areas of information and communication technologies and multimedia at the current state of research in the world. He/she acquired the principles of independent and team scientific work, scientific research, scientific formulation of problems, solution of complex scientific problems and presentation of scientific results. He/ she is able to analyse and solve complex and non-standard tasks in the field of information and communication technologies and multimedia and provide original, new solutions. The graduate is able to use the acquired knowledge to evaluate and justify the suitability of the use of individual methods for solving research tasks in the field of metallic, optical and radio communication systems, using the analysis of different types of signals and the implementation of various machine learning methods. He/she can creatively apply acquired knowledge in practice. He/she will find professional application in various fields of science, research, industry and services in the public as well as private sectors. In addition to the aforementioned theoretical knowledge, the graduate of the third degree of the study programme Telecommunications has acquired additional knowledge, abilities and skills and is able to lead smaller and larger teams of scientific, research and development workers, to lead large projects

and to bear responsibility for complex solutions to scientific and research problems. He/she is able to follow the latest scientific and research trends in the field of information and communication technologies and multimedia and supplement and update his/her knowledge through lifelong learning process. The graduate has mastered the principles of managerial work, designing an experiment with a timetable, leading and controlling team members, he/she is able to communicate and cooperate with managers of scientific projects and specialists from other professions, is able to apply legal, social, moral, ethical, economic and environmental aspects of his/her profession in his/her work.

Theory of Electrical Engineering
(Field of study Electrical Engineering)
The doctoral degree study in the study programme Theoretical Electrical Engineering is intended for graduates of the second degree of university study who tend to have an original solution to engineering and scientific problems in the field of Theoretical Electrical Engineering and its applications. To solve these tasks, the doctoral student uses the latest knowledge of modern analytical and numerical methods, methods of mathematical and physical modelling, informatics, measurements of electric and non-electric variables, electronics, interdisciplinary methodologies, biomedical applications, as well as knowledge from other fields. A prerequisite for successful completion of the doctoral degree study is the ability of the doctoral student to think abstractly and his/her ability to apply and implement acquired knowledge in solving technical problems. The doctoral student will learn to correctly characterize and understand physical phenomena and experimental knowledge of these phenomena, to look for adequate models and to implement new applications in the above-mentioned specific disciplines, in science, research and practice. The doctoral degree study will enable the doctoral student to acquire comprehensive theoretical knowledge, experimental skills and practical experience, as well as to master the methodology of scientific work and prepare him/her for independent scientific work.

Tab. 10: Information about final thesis

Number of submitted thesis	Number of defended theses	Physical number of tutors of final thesis	Physical number of tutors of final thesis (without PhD.)	Physical number of tutors of final thesis (experts from practice)
Bachelor thesis				
166	145	74	12	5
Master thesis				
135	112	69	12	16
Doctoral thesis				
9	9	6		

Students' awards in 2024

Awards of students within the university:

- Final evaluation of grant projects of the Rector's call No. 2/2023 - students of 2nd degree study (the solution period was from 21. 11. 2023 to 31. 10. 2024):
  - 1st place: Bc. Paulecová Kristína (biomedical engineering)
  - 2nd place: Bc. Zemaníková Miriam (biomedical engineering)
  - 3rd place (divided) Bc. Jaššák Jozef, Bc. Gonda Matej (telecommunications and radiocommunication engineering);

- Rector's price was awarded to Ing. Ján Šeleng, (2nd degree study – Biomedical Engineering);
- Rector's Award for the dissertation titled Non-invasive Vascular Diagnostics Using Contactless Optoelectronic Measurement Methods was awarded to Ing. Patrik Prôčka, PhD. (3rd degree study – Theory of Electrical Engineering);
- Dean's price was awarded to the following students of the 2nd degree study:
    - Ing. Miroslav Sobkuliak (Biomedical Engineering)
    - Ing. Michal Klímo, Ing. Martin Príč, Ing. Eliáš Baltazár Špilák (Power Electronic Systems)
    - Ing. Lenka Smatanová (Multimedia Engineering)
- Dean's price was awarded to the following students of the 1st degree study:
    - Bc. Alexandra Faktorová (Biomedical Engineering)
    - Bc. Kostiviar Martin, Bc. Matúš Škorvaga, Bc. Andrej Pavlus (Electrical Engineering)
    - Bc. Dušan Kokosík (Electrooptics)
    - Bc. Lucia Iríčková (Multimedia Engineering)
    - Bc. Viktória Pikulíková (Communication and Information Technologies)
- Student awards for works presented at ŠVOS:
    - 1st place: Petra Belešová (1st degree study)
    - 2nd place: Adam Petrovič (1st degree study)
    - 3rd place: Bc. Mário Michálik (2nd degree study)

Non-University Student Awards:
20th year of the project Student Personality of Slovakia academic year 2023/2024 - doctoral student Ing. Juraj Tvarožek (1st year, Power Electrical Engineering) became the laureate in the category Electrical Engineering, Industrial Technologies.

Support for students in 2024

a) Scholarships (motivation, faculty)

For excellent study results the Faculty provides the scholarships to students. These scholarships were allocated in 2024:

- merit scholarships - the number of students: 82, the amount paid: 46 227 EUR,
- special scholarships - the number of students: 9, the amount paid: 2 780 EUR,
- social scholarships - the average number of recipients/students: 14, the amount paid: 35 940 EUR,
- trade scholarships - number 371, the amount paid: 151 400 EUR,
- from own resources - the number of students: 15, the amount paid: 2 830 EUR.

b) Consultation and advice

Students have the opportunity to consult issues related to the study with student advisors and the vice dean for education, what they are actively using.

c) Level of students' satisfaction with the services (accommodation, food, availability of administrative staff, library, learning environment, ICT ...)

Students expressed their satisfaction/dissatisfaction with the services through the questionnaires that are continuously processed and evaluated. Positive suggestions are used for improving the quality of the services.

SCIENTIFIC RESEARCH ACTIVITIES

Scientific research activity, together with educational activity, is a fundamental mission of the Faculty of Electrical Engineering and Information Technology. Its development is an essential prerequisite for the further advancement of the faculty and is closely linked to the quality of education. Scientific research at the faculty is carried out mainly in the form of projects, with its focus defined by the research activities of individual departments. One of the key outputs of scientific research is scientific publications indexed in major international databases such as Web of Science and SCOPUS, as well as at international conferences supported by prominent professional organizations, in particular IEEE, SPIE, IFAC, IFIP, ACM, IET, SEFI, and others.

Research focus of the departments

Research activities of the **Department of Physics** are carried out by three main research groups. They are focused on the development and application of optic and photonic elements on a chip and in optic fibres, polymeric composite materials for electrical engineering, application of acoustic wave processes for the investigation of condensed matter and theoretical studies of elementary particles. Results are published in impacted journals in databases WOS and SCOPUS. Research is performed in six laboratories. There is also a significant collaboration with the University Science Park.

The section of Acoustics and Materials exploits a wide range of acoustic methods and techniques as well as acoustoelectric, acoustooptic and acoustomagnetic phenomena to investigate semiconductors, metals, ion glasses and magnetic liquids. Acoustic group has reached important results in the areas of semiconductor MOS layers, magnetic fluids on the basis of the transformer oil or water, studies of LiPON type ion glasses as well as in the research of liquid crystals doped with magnetic nanoparticles and carbon nanotubes. Recently, important results have been obtained in the study of nanocomposite polymeric materials.

The section of Optics and Photonics studies physical properties of the conventional telecommunications optic fibres and special fibres such as capillary fibres and photonic fibres and photonic elements and sensors. The latest results are in the area of sensors on a chip and fibres for the laboratory on a chip. The group has extended its activities to laser technologies of preparation and analysis of photonic structures for integrated optics and optoelectronics. The cutting edge photonic elements for applications on a chip and optic fibres are developed using 3D laser litography. The group also studies the influence of external physical fields on the optical properties of selected polymeric and crystalline solids. The most important results were achieved in the field of special optic fibers and fiber devices for sensor applications. In the field of active devices, the new types of light emitting diodes with patterned surface using photonic structures and polymeric membranes with photonic structure were developed. The development of these devices is based on the latest 3D laser lithographies with submicrometer resolution.

The section of General physics and elementary particles is active in the pedagogical research and in the area of particle physics.

The **Department of Mechatronics and Electronics** has realized and provided research and development, expertise and contracts, and develops publication activity in the field of electronics, control systems, mechatronics and power electronics mainly.

Professional activities of the department have been applied and disseminated on creation and operation of quality and reliable electronic devices and systems, application of programmable logic areas in the design of electronic systems, reconfigurable circuits study as well as diagnostics and analyzing of the failures using image analysis. Topology optimizing for power semiconductor converters and their electromagnetic compatibility belongs to main activities of the department.

The scientific-research and development activities of the **Department of Control and Information Systems** are focused on the area of control tasks algorithmisation, automation of control on process, operational and management levels, while utilising modern artificial intelligence approaches, and on the area of reliable, safe and secure communication and information processing in control of selected critical processes, above all the ones which imply the criterion of safety besides usual optimisation criteria. For reasons given there is a large number of research projects and cooperation projects with praxis and industry directed into the area of applied telematics and intelligent control and safety systems in transport and industry.

Research and Development activities are at the **Department of Electromagnetic and Biomedical Engineering** directed towards areas where the common factors are electromagnetic field and human body. The department has modern research infrastructure and means for realizing numerical simulation, measurements, and experimental analyses. A part of the scientific activities is focused on the electromagnetic non-destructive evaluation of biomaterials. Research methodology in this area combines numerical simulations and experimental investigations. The activities are oriented towards new excitation and detection of signals together with innovative approaches for signal processing and evaluation for the inspection of implants used in medical practice.
The human resources and the research infrastructure of the department create unique basis for the innovation activities in the field of technical and ICT support in medicine. The activities are focused on: electromagnetic biocompatibility, innovative biopotential sensing, photoplethysmography imaging, processing and evaluation of biomedical signals including graphical information and numerical modelling and simulations of dynamical physiological systems. In collaboration with partner institutions research in the field of design and implementation of intelligent textiles, with the system for data collection and processing and their implementation in specific industries, is realized.

Research activities of the **Department of Multimedia and Information-Communication Technologies** cover a wide area of topics related to information-communication and multimedia technologies. Research and development activities are realized by 8 specialized laboratories.
In the area of communication technologies, attention is focussed on problematics of communication networks, software-defined networking, the Internet of things, access technologies, a convergence of network technologies, with main activities focusing on the quality of multimedia services. From the fixed network technology point of view research and development activities are in the area of wideband fully optical networks and photonic systems. In the field of radio technologies research activities are aimed at mobile and satellite communications, localization systems as well as DVB-x distribution technologies.
In the area of information technologies, the department is focused on the development of applied informatics as a support for communication and multimedia technologies. Research and development activities are focussed on the area of digital signal processing, mainly from semantic analysis of audio and video point of view, machine learning including deep neural networks, computer graphics, semantic web and web applications, 3D modelling and virtual reality.
In the area of multimedia technologies, the main orientation is on technological aspects as well as creativity represented by the basics of image composition, direction and work with multimedia content. The main goal in this area is the complex support of future multimedia services, which are created by the inclusiveness of artistic creation and modern trends in the area of informatics. Research activities are focused on the area of an image and sound analysis as well as quality assessment of multimedia signals.

Research and development activities of the ***Electric Power System*** section at the **Department of Power Systems and Electric Drives** are focused on issues concerning electricity generation, transmission, and distribution. The research activities oriented on electricity generation are mainly focused on a modelling of the operation of renewable energy sources. Simulation results as well as acquired knowledge are used

to design simulation models, which are thereafter applied in power system analyses as well as in the optimization of renewable energy sources' deployment within virtual power plants.
Scientific and research activities in the field of electricity transmission and distribution are focused on the modelling of electric power system operation, especially on an application of the concept of intelligent networks (Smart Grids) to the control of both power transmission and distribution networks.
An integral part of the research activities of the department is solving the issue of power quality in the distribution or transmission system. The issue is solved comprehensively. Attention is given to the causes of poor quality of supply, EMC, statistics in different locations of the system, and of course, possibilities for improvement by the application of the appropriate devices or by the design of other feasible measures.
The section of Electric Drives and Electric Traction mainly focuses on control of all types of electrical drives such as DC motors, AC motors, and special drives with different types of rotors (SRM, RSM, BLDC, and Stepper Motor). Research focus can be divided into the following areas:
Sensorless control of electric machines allows increasing the overall drive reliability as well as reducing the drive size. This topic includes research of estimation algorithms and control techniques for DC and AC drives (IM, PMSM, BLDC, RSM, and SRM). Traditional estimation methods are usually applied for the higher speed range of the drive. For the low, even zero speed, there are methods and algorithms which require high-frequency voltage signal injection for the estimation. Currently, the sensorless techniques form the basis of some control systems characterized by system fault tolerance. This means that at least partial operation under any circumstances is ensured. The research results have been presented at significant international conferences.
Design of novel and progressive control methods – the research in this area has been focused on methods that use forced dynamic control or sliding mode control. These control structures do not require the use of PI controllers, which means avoiding the complications associated with their setting (often trial and error setting technique) and their dependence on changing of the controlled system parameters. This category also includes various support control algorithms providing a wider speed range, less torque ripple, and therefore less vibration and noise.
Design and implementation of control algorithms for linear motors drive applications – linear motors are very progressive especially for high dynamic applications. Research activities cover the designing of control methods that have the capability to avoid all adverse effects of linear motors such as non-linear friction, cogging torque, and other problems that need to be eliminated in the highly precise and dynamic applications.
Design of energy flow control in hybrid railway vehicles – hybrid vehicles are today considered as a very progressive type of railway vehicles. The most needed research issues in this area are primary source operation optimization (catenary or a diesel engine) or braking energy storage that is in conventional vehicles lost as heat. Hybrid vehicles assume utilization of modern energy storage systems, mainly supercapacitors or modern electrochemical cells (lithium-based systems). Research results have been published at several international scientific conferences and implemented in an international commercial project.

The scientific research activity of **Institute of Aurel Stodola** is focused on the formation and analysis of properties of semiconductor-dielectric systems, oxide and nitride layers, research of microstructure properties, investigation of electrical charge states and optical properties, the influence of formation and passivation of structures and nanotextured interfaces. Research is mainly focused on the field of semiconductor solar cells and thin-film solar energy conversion systems, on the formation and analysis of the properties of porous silicon structures for solar applications, and on optoelectronic applications. Problems of photoelectro-catalytic processes in water, problems of development of analytical methods based on statistical, Fourier and multifractal formalism, modeling of quantum charge states, transport processes and research of photon interactions are solved. Diagnostic techniques (scanning probe methods, optical spectroscopy in a wide spectral range, spectral ellipsometry, Raman scattering, electro-optical methods) are based on high-quality experimental equipment of the workplace. Microstructure formation processes on

silicon and photoelectrochemical processes for hydrogen generation are investigated both experimentally and theoretically in the photoelectrochemistry laboratory. Numerical problems are solved using remote access to servers providing computing resources (Comsol) and other HPC resources.
In the research of linear and nonlinear optical phenomena of a deterministic and stochastic nature in a high-speed optical communication system, several numerical methods focused on the simulation of optical elements in the time and spectral domain were implemented.
Scientific research activity in the field of alternative energy sources is focused on the study of processes associated with hydrogen generation, charge generation and recombination processes in photovoltaic systems and applications of digital technologies in solar energy devices.

Grant projects and cooperation with practice

The most important types of projects are international ones together with projects financed from the Structural Funds as well as projects supported from national resources through the Slovak Research and Development Agency (SRDA), the Scientific Grant Agency of the Slovak Ministry of Education, Science, Research and Sport and the Slovak Academy of Sciences (VEGA) and the Cultural and Educational Grant Agency of the Ministry (KEGA). Cooperation with industrial partners in the field of applied research is also of high importance.

In 2024, a total of 88 tasks were carried out at FEEIT:

Project type	Number
Projects of International Programmes	14
VEGA	12
KEGA	6
APVV	12
State Research and Development Program	1
Structural funds	3
FEEIT projects to support young researchers (MVP)	7
FEEIT projects to support researchers (VP)	4
Grant system – projects of Doctoral (PhD.) students	7
UNIZA grant system – projects of young scientific-pedagogical employees under 35 years of age	15
Other national research projects	3
Other national non-research projects	4
Total	**88**

Research for Practice; the Most Important Realized Outputs

Project title: Nano-Structured Silicon Photonics for Energy-Aware On-Chip Data Communication Links
Project number: APVV-21-0217
Coordinator: Ing. Daniel Benedikovič, PhD. (DMICT)
Summary / Achievement: New solutions have been proposed for compact grating couplers for low-loss nanophotonic fiber-to-chip interfaces, utilizing silicon-compatible materials and simplified fabrication processes for practical implementation in energy-intensive, high-capacity data communication links.

Project number: KEEP2024/1
Project title: Design of a reluctance linear motor for compressor applications
Coordinator: Pavol Rafajdus, Matúš Horník (DPSED)
Summary / Achievement: Designed prototype linear reluctance motor for compressor applications

Project title: IM Toolkit
Coordinator: Pavol Makyš (DPSED), Michal Frivaldský (DME)
Summary / Achievement: The creation of design software for induction machines

Conferences and seminars

The Faculty of Electrical Engineering organized, or participated in preparation of the following scientific events in 2024:

- 18th International Conference on Railway Signalling and Security Technology, April 22–24, 2024, Žilina, main organizer: Betamont s.r.o., Zvolen; co-organizer: Aleš Janota, DCIS
- RADIOELEKTRONIKA 2024, April 17–18, 2024, Žilina; responsible organizer: Róbert Hudec, DMICT
- UNIZA–ZČU Workshop 2024, February 9–11, 2024, Zuberec; responsible organizer: Ladislav Janoušek, DEBE
- International Masterclasses 2024, February 15, 2024, University of Žilina; responsible organizers: Gabriela Tarjányiová, Ivan Melo, DPh
- ADEPT, June 24–27, 2024, Nový Smokovec; responsible organizer: Dušan Pudiš, DPh
- Slovak–Czech–Polish Optical Conference (SCPOC 2024), September 2–6, 2024, Štrbské Pleso; responsible organizer: Dušan Pudiš, DPh
- Current Issues in Physics Education and Possible Solutions 2024, September 9–10, 2024, UNIZA University Centre, Zuberec; responsible organizer: Peter Hockicko, DPh
- 27th Conference of Slovak Physicists, September 2–5, 2024, University of Žilina; responsible organizer: Jozef Kúdelčík, DPh
- Žilina Children's University 2024, July 8–12, 2024, UNIZA; responsible organizer: Peter Hockicko, DPh
- 48th Colloquium of Departments and Institutes of Power Engineering at Universities in the Czech and Slovak Republics, January 30 – February 1, 2024, Rajecké Teplice; responsible organizer: Peter Braciník, DPSED
- Meeting of Telecommunications Departments and Institutes (RTT 2024), September 11–13, 2024, Zuberec; responsible organizer: Róbert Hudec, DMICT

Publication activities

The permanent task of the Faculty is to increase the publication activity in quality journals which are indexed in international professional databases.

The outputs of the faculty's publishing activities in the period 2017-2024 in the perspective of categorization according to Decree No. 456/2012 until 2021 and according to Decree No. 397/2020 from 2022 is summarized in the following table.

Tab. 12: The outputs of the faculty's publishing activities in the period 2017-2024

Code	Category name	Code	Category name	2017	2018	2019	2020	2021	2022	2023	2024
V3	Scientific output of publication activity from the journal	ADC	Scientific papers in foreign peer-reviewed journals	52	34	26	44	58	106	84	62
		ADE	Scientific papers in foreign non peer-reviewed journals	14	17	9	6	1			
		ADF	Scientific papers in other domestic non peer-reviewed journals	8	8	26	10	3			
		ADM	Scientific papers in foreign journals registered in the WoS or SCOPUS databases	17	9	22	30	15			
		ADN	Scientific papers in domestic journals registered in the WoS or SCOPUS databases	7	13	9	10	7			
V2	Scientific output of publication activity as part of an edited book or collection	AFC	Published papers at foreign scientific conferences	72	145	84	175	58	188	119	168
		AFD	Published papers at domestic scientific conferences	79	53	123	27	66			
V1	Scientific output of publication activity as a whole	AAA	Scientific monographs published by foreign publishers	1	0	0	0	0	1	4	3
		AAB	Scientific monographs published by domestic publishers	1	2	1	3	3			
P1	Pedagogical output of publication activity as a whole	ACA	University textbooks published by foreign publishers	0	0	0	1	1	5	6	6
		ACB	University textbooks published by domestic publishers	4	1	0	3	1			
		BCI	Scripts and textbooks	4	1	3	2	6			

O3	Odborný výstup publikačnej činnosti z časopisu	BDF	Professional papers in domestic non peer-reviewed journals	5	2	1	1	0	0	1	1
TOTAL (selected categories)				264	285	304	312	219	300	214	240
TOTAL (all categories)				**339**	**338**	**368**	**343**	**243**	**322**	**239**	**287**

Habilitations and Inaugurations

Tab. 13: Number of habitations and inaugurations within last twelve years

Year	Habilitation		Inauguration	
	Internal	External	Internal	External
2008	2	5		3
2009			1	1
2010			2	
2011	3		2	
2012	5			
2013	2			1
2014	6	1	3	
2015			2	
2016	2		1	
2017	1		1	
2018	2		2	
2019	1		1	
2020	8			
2021	5		2	
2022	1		1	
2023	1		1	
2024	2			

FOREIGN ACTIVITIES

Foreign activities of the Faculty of Electrical Engineering and Information Technology (FEEIT) in 2024 were developed in connection with the solution of international projects, active participation in foreign scientific and professional events and also mutual mobility of teachers, researchers and students at foreign institutions.

From the point of the implementation of foreign projects, the implementation of the project within the call DIGITAL-2022-CLOUD-AI-02 called TEF-HEALTH - Testing and Experimentation Facility for Health, continued. TEF-Health will provide standards for certification and quality control to facilitate the access of trusted AI to the market and ensure its simple and effective evaluation.

The solution on the international scientific project APRIORI (Advanced Technologies for Physical Resilience of Critical Infrastructures), funded by NATO, also continued. The project aims to provide innovative technologies for the entire lifecycle management of critical infrastructures. The consortium consists of five members, with the project coordinated by the Università degli Studi del Sannio, Italy.

The implementation of a project focused on the European space program continued within the framework of the ESA (European Space Agency) scheme, in cooperation with industrial partners SPINEA Technologies (SK) and THALES Alenia Space (FR). The project addresses the development of electronic systems with advanced technology for powering structural modules of space robotic arms.

The faculty is successfully continuing the implementation of the Double Degree program in the field of Electrical Engineering with its partner university, Università degli Studi di Catania, in Sicily, Italy. In the 2023/2024 academic year, FEIT also hosted two students from the partner university.

Information about available study stays, government scholarships, summer schools, excursions, job opportunities, foundations, and similar programs is communicated through various channels, such as the faculty website, the faculty's Facebook page, announcements on the FEIT Dean's Office notice board, and distribution to students and heads of departments at individual workplaces. Their role is to choose the most effective way to inform their colleagues about the available opportunities for international cooperation, thereby ensuring that the communicated information reaches its intended recipients.

Programmes supporting educational activities

Program ERASMUS+

Within the frame of Erasmus+ programme, bilateral agreements with 29 foreign universities were approved for students / teachers / other staff exchanges for the academic year 2023/2024, as follows:

1. University of Chemical Technology and Metallurgy (BG)
2. Technical University of Liberec (CZ)
3. VŠB-Technical University in Ostrava (CZ)
4. University of West Bohemia (CZ)
5. Czech Technical University in Prague (CZ)
6. Tomas Bata University in Zlin (CZ)
7. RWTH Aachen (DE)
8. RUHR-Universitaet Bochum (DE)
9. Hochschule für Technik und Wirtschaft Dresden (DE)
10. Technische Universitaet Dresden (DE)
11. Technische Universität Ilmenau (DE)
12. Technische Hochschule Koeln (DE)
13. Universitat Autonoma de Barcelona (ES)

14. Universidad de Oviedo (ES)
15. Université de Technologie de Compiègne (FR)
16. Universite Gustave Eiffel (FR)
17. University of Patras (GR)
18. Budapest University of Technology and Economics (HU)
19. University of Catania (IT)
20. Universita degli Studi di Palermo (IT)
21. Technological University Dublin (IRL)
22. Kaunas University of Technology (LT)
23. Riga Technical University (LV)
24. Instituto Politecnico de Braganca (PT)
25. Universidade da Beira Interior (PT)
26. Universidade do Porto (PT)
27. Politechnika Bialostocka (PL)
28. Gdansk University of Technology (PL)
29. Silesian University of Technology (PL)
30. Cracow University of Technology (PL)
31. Lublin University of Technology (PL)
32. Kazimierz Pulaski University of Technology and Humanities in Radom (PL)
33. West Pomeranian University of Technology (PL)
34. Universitatea "POLITEHNICA" din Bucuresti (RO)
35. Gheorghe Asachi Technical University of Iasi (RO)
36. Aalto University (FIN)
37. University of Jyväskylä (FIN)
38. University of Vaasa (FIN)
39. University of Maribor (SI)
40. Bursa Uludag Universitesi (TR)
41. Biruni Üniversitesi (TR)

Erasmus+ stays

In the academic year 2023/2024 33 students (thence 2 students for Erasmus+ practical placements) participated in the Erasmus+ programme and 42 teachers/ employees from FEEIT participated in the Erasmus+ programme.

The Faculty accepted altogether 25 foreign students and 15 teachers/ employees from partner universities.

Other scholarship programmes

In the academic year 2023/2024, the following mobilities were relized from FEEIT:

- 5 students participated in foreign mobilities within the *National Scholarship Programme of the Slovak Republic*,
- 3 students participated in the *2024 Semiconductor Summer Program-2*
- 1 student participated in the *Taiwan Chip-based Industrial Innovation Program*
- 1 student participated in the *Taiwan-Europe Semiconductor Short-Term Training Program*
- 1 teacher was accepted within the National Scholarship Programme of the Slovak Republic.

The Faculty accepted in the academic year 2023/2024:

- 5 students within the *National Scholarship Programme of the Slovak Republic*,
- 2 students within the "*Double degree program*",

- 1 student within the *Bilateral agreement*,
- 1 teacher within the *IIT Indore's International Travel Grant.*

Other activities

The Faculty of Electrical Engineering and Information Technology cooperates in the frame of bilateral agreements with the following institutions:

- Fergana Polytechnic Institute (UZ)
- Universita degli Studi di Catania (IT)
- University of Novi Sad (RS)
- Cracow University of Technology (PL)
- The Indian Institute of Technology Indore (IN)

Purpose of these agreements is to enhance academic exchange and co-operation in the field of education and research. The co-operation programme involves especially the following activities:

- exchange of students,
- exchange of faculty members and staff,
- exchange of scientific materials, publications and information,
- joint research and research meetings,
- cooperation within the Doctoral study (mainly with University of Catania (IT)).

In addition, FEEIT cooperates with many other international institutions, in particular:

- University of Strathclyde, Glasgow (UK)
- Tokyo University, Tokio (JP)
- DFCM ISIR Osaka University (JP)
- National Research Council, Ottawa (CA)
- CERN, Ženeva (CH)
- Centre de Nanosciences et de Nanatechnologies, CNRS, Universite Paris-Saclay (FR)

A detailed list of institutions is presented in the annual reports of the departments.

Foreign stays, visits and conferences

Employees of the Faculty performed in 2024 several short or long stays in foreign countries at partner universities or institutions, and on the contrary, FEEIT and its departments accepted teachers from abroad.

An overview of the number of people who arrived at FEEIT or left FEEIT as part of foreign stays (in addition to Erasmus+ and NŠP SR) and visits is shown in the following table.

Tab. 14: Foreign stays, conferences and visits in 2024

Foreign stays and visits in 2024						
Country	**Department (IN/OUT)**					
	DPh	**DEBE**	**DME**	**DPSED**	**DCIS**	**DMICT**
Czech Republic	2 / 0	5 / 2	2 / 0	0 / 2	2 / 4	
China				0 / 1		
France						0 / 1

India						1 / 0
Lithuania			1 / 0			
Hungary	0 / 1					
Malta						0 / 1
Moldova						2 / 0
Germany					1 / 0	
Poland	3 / 0				3 / 0	
Austria	0 / 4					1 / 0
Slovenia				1 / 0		1 / 1
Serbia						1 / 0
Spain						0 / 1
Italy	0 / 1		0 / 1			4 / 4
USA		0 / 1		0 / 1		
Total	**5 / 6**	**5 / 3**	**3 / 1**	**1 / 4**	**6 / 4**	**10 / 8**
Total all	**30 / 26**					

Employees of the FEEIT published and/or took part in some international conferences, workshops and symposiums. Detailed information about particular names of employees, titles of papers and conferences, activities performed during the study stays and purposes of foreign visits are presented in annual reports of the departments of FEEIT for 2024.

Membership in International Institutions/Committees

Employees of the Faculty of Electrical Engineering and Information Technology, respectively the departments as a whole, are members of many national and international institutions/organizations/committees of international journals, conferences, in scientific boards and trade committees, and so on.

Detailed information about memberships are presented in annual reports of the departments of FEEIT for 2024.

MAIN TASKS OF THE FACULTY FOR THE YEAR 2025

The development of the Faculty will continue in line with the Long-Term Plan of the Faculty of Electrical Engineering and Information Technology of the University of Žilina for the period 2021–2027, which was discussed at the meeting of the FEIT UNIZA Scientific Council on February 15, 2021. This process will also incorporate insights gained from the practical implementation of activities proposed in the Long-Term Plan.

The fundamental strategic goal is to build FEEIT as a prestigious educational and research institution, holding a leading position among Slovak faculties and achieving significant international recognition in most of its study programmes as well as in research, development, and innovation.

As part of the faculty's development, infrastructure improvements will include the construction of a modern meeting room within the Dean's Office premises and a faculty ICT laboratory designed to support the teaching of IT-related courses.

Field of education

- Ensure the quality of education in accordance with the new quality standards and the established internal quality assurance system at UNIZA;
- Continuously monitor and ensure the fulfillment of the set indicators of performance contracts in the field of education;
- Collect more extensive feedback from students regarding their satisfaction with the education provided at FEEIT in order to optimize educational activities;
- Organize a meeting of the faculty management with the academic community of the faculty once a year;
- Continue with the established of marketing activities aimed at primary and secondary schools to increase students' awareness of study opportunities at the faculty;
- Introduce an adaptation week for first-year students.

Field of science and research

- Active participation in organizing conferences, seminars, events, and special issues of scientific journals;
- Implement qualification growth of FEIT staff in accordance with established plans;
- Organize and support the ŠVOS competition for all three levels of study, with an emphasis on enabling FEEIT students to participate in national and international rounds of the competition;
- Monitor and evaluate at least twice a year the interim assessment of accreditation standards in the field of doctoral studies, as well as the quality of outputs of programme guarantors, co-guarantors, and habilitation and inauguration procedures;
- Continuously monitor and ensure the fulfillment of the set indicators of performance contracts in the field of research activities and VER;
- Evaluate submitted project proposals to national and international grant agencies twice a year;
- Intensify cooperation with industrial partners and other institutions;
- Define the areas of relevant research activities at the faculty, including staff allocation;
- Monitor and control the records of research activities and their corresponding outputs;
- Prepare grant calls for young researchers and FEEIT research staff;
- Launch a pilot programme of internal research internships "FEIT Internship", offering students the opportunity to actively participate in ongoing research and collaborate with faculty research groups on current projects.

Field of international cooperation

- Development of tools for more efficient engagement of research groups in the EU Framework Programme for Research and Innovation HORIZON 2020 and other European programs as COST, cross-border cooperation and cooperation with foreign industrial partners;
- Improve the propagation and support of students' and teachers' mobility within the framework of the internationalization of education in order to increase the quality and number of mobilities;
- Create conditions for more effective international cooperation in terms of accreditation standards;
- Attractiveness of the faculty's educational system for international students;
- More prominent presentation of study opportunities in Eastern European countries.

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