FACULTY OF
ELECTRICAL ENGINEERING

LEAVE YOUR MARK IN
TECHNOLOGICAL PROGRESS
The University of Ljubljana is an institution with a very rich tradition. It was established in 1919 on the foundations of a long-established pedagogical tradition. It is a very large university, with 40,000 undergraduate and postgraduate students taking over 300 different undergraduate and postgraduate study programmes. It employs approximately 5,600 higher education teachers, researchers, assistants and administrative staff in 23 faculties and 3 arts academies. The central building, all three academies and the faculties are located in the centre. Some of the most recent and modern buildings have been constructed on the outskirts of Ljubljana, giving the university and its students a ubiquitous presence in the city.

The University of Ljubljana is the central and largest educational institution in Slovenia. It is renowned for its quality social and natural sciences and technical study programmes, structured in accordance with the Bologna Declaration. Our projects keep pace with the latest developments in the areas of arts, sciences and technology both at home and abroad.

The University of Ljubljana is listed amongst the top 500 universities in the world according to the ARWU Shanghai, Times THES-QS and WEBOMETRICS rankings.
The Faculty of Electrical Engineering (FEE) was founded in 1919 as a unit of the Technical Faculty of the University of Ljubljana. The main mission of the Faculty is the education of Electrical Engineering experts and research work, which are closely intertwined. The field of Electrical Engineering has come a long way from being simply the science of electrical current and voltage. Today, alongside Electronics and Power Engineering, we are developing and building courses in Information and Communication Technologies, Control Systems and Computer Engineering, Robotics, Biomedical Engineering, Mechatronics, Renewable Energy Sources, Multimedia Communications and Automation. All fields are integrated with computer and IT sciences, including the most up-to-date communications tools, Internet developments and Multimedia solutions.

Regular undergraduate studies consist of the university and higher professional education study programme (1st cycle Bologna programme). Upon completion, graduates can continue their studies in the Masters programme (2nd cycle Bologna programme), as well as a doctoral study programme (3rd cycle Bologna programme). Besides these study programmes the Faculty of Electrical Engineering also provides further professional training and supplementary education for experts from various technical fields. For these purposes it organises and implements shorter seminars of a few days’ duration. Special attention is devoted to the education of junior researchers who – under the guidance of university professors – are introduced to research and teaching work.

To date, over 13,000 engineers, diploma engineers and university diploma engineers have completed undergraduate studies within the Faculty. Postgraduate studies have been completed by over 1168 Masters students and 744 Doctoral students. Each year approximately 750 students enrol into Year 1 of all study programmes.
The mission of the Faculty of Electrical Engineering of the University of Ljubljana is to carry out accredited study programmes in the field of electrical engineering as well as scientific research work, and to successfully transfer knowledge into practice. We produce the best experts in electrical engineering and implement innovative scientific research programmes and projects in Slovenia and abroad.

The Faculty of Electrical Engineering of the University of Ljubljana builds its academic excellence through outstanding theoretical and empirical research work, extensive publishing of scientific and professional articles, and the successful transfer of research results to the educational process and practice.

The Faculty of Electrical Engineering of the University of Ljubljana bases its research activities, education and public service, as well as the relationships between its members, on the principles of the University of Ljubljana mission statement, namely:

- to offer diverse forms of education with an emphasis on internationalisation and practical skills as well as on international comparability of achieved educational levels;
- to conduct internationally comparable scientific research work;
- to foster professional work and the transfer of technologies into practice;
- to promote and further the development of the profession in society.
The vision of the Faculty of Electrical Engineering of the University of Ljubljana is to achieve excellent results in electrical engineering education, to exchange achievements in the field of sciences with other universities and scientific research institutions, to achieve resounding recognition of scientific research work nationally and internationally, and to cooperate even better with businesses, the government and local communities as well as with other civil society institutions, in a desire to contribute to the greatest possible extent of social and scientific research development and progress in Slovenia. Our vision of the future includes the introduction of numerous new IT-assisted forms of lifelong learning and training, enabling an even more intensive transfer of knowledge into practice, as well as the implementation of remote learning.

**Vision of the Faculty of Electrical Engineering of the University of Ljubljana:**

| to be committed to top-notch pedagogical work aimed at educating highly skilled engineers; |
| to be committed to top-notch scientific research and professional work by all pedagogues and researchers; |
| to promote the dedicated and honest work of students in meeting their study obligations; |
| to promote the dedicated and professional work of joint Faculty services in providing support for pedagogical, scientific research and professional work; |
| to nourish correct and professional relationships between all stakeholders in a creative Faculty environment, including pedagogues, students, researchers and joint service staff; |
| to ensure the wellbeing and reputation of the Faculty and to provide the required material resources for its operation. |
The Faculty implements the National Higher Education Programme in accordance with the Higher Education Act and the University of Ljubljana Statutes, following the principle of professional autonomy and the principle of professional competence stemming from the registered activity of the Faculty of Electrical Engineering. Furthermore, the Faculty of Electrical Engineering provides professional development and top-up training for experts from various technical professions. For this purpose, seminars, workshops and summer schools are organised and implemented. Special attention is devoted to educating young researchers, who are introduced to research and teaching work under the mentorship of university teachers.

The Faculty of Electrical Engineering offers the following Bologna study programmes:

**Bachelor’s Degrees**

**1st Cycle Academic Study Programme in Electrical Engineering**

The programme is of 3 years’ duration and worth 180 credits. Besides applied knowledge, the course also equips students with the skills required for autonomous research and development work, as well as resources for the continuation of studies at the master’s or doctoral level. The first two years are common to all students and then they can choose among four programme options of study:

- Control Systems,
- Electronics,
- Power Engineering and Mechatronics,
- Information and Communication Technologies.
1st Cycle Professional Study Programme in Applied Electrical Engineering

The programme is of 3 years’ duration and worth 180 credits. It is focused on the applied knowledge required for work in production, modelling and other fields in the business sector. The first year of studies covers a common curriculum for all students, followed by five study options in the second year:

- Control Systems,
- Electronics,
- Power Engineering Technology and System Automation,
- Quality Engineering,
- Information and Communication Technologies.

During the last (6th) semester, students complete compulsory work practice, which is worth 20 ECTS credits and has a duration of 13 weeks (3 months). They also write their thesis, which is worth 10 ECTS credits.

1st Cycle Interdisciplinary Academic Study Programme in Multimedia

This is the most recent programme at the University of Ljubljana, bringing together some of the best features of electrical engineering, computer science, creativity, business knowledge and communication. The programme is of 3 years’ duration and worth 180 credits. Media technologies, information technologies, telecommunications, software engineering and electrical engineering are areas which are significantly shaping today’s economy, education, culture, administration, and have spread to virtually all economic and non-economic branches of national economies.

The striking development of these technologies dictates the need for highly qualified staff capable of developing new computer and information technology and implementing it in innovative environments, which usually include also non-technical aspects. The field of multimedia is highly interdisciplinary and it requires knowledge from a wider range of areas than other studies.
Master's Degrees

2nd Cycle Postgraduate Study Programme in Electrical Engineering

The programme is of 2 years' duration and worth 120 credits. It comprises seven study options:
- Control Systems and Computer Engineering,
- Biomedical Engineering,
- Electrical Power Engineering,
- Electronics,
- Mechatronics,
- Robotics,
- Information and Communication Technologies.

The first three semesters take the form of lectures and laboratory practice, while the fourth semester is intended for the production of a master's thesis under the guidance of the selected mentor.

2nd Cycle Interdisciplinary postgraduate study programme in Multimedia

The programme is of 2 years' duration and worth 120 credits. The 2nd cycle Interdisciplinary postgraduate study programme in Multimedia is a continuation of the 1st cycle programme with the same name. The name reflects the areas on which the programme is based on and the learning outcomes:
- Media technologies: audio, video, design, language
- Telecommunications
- Software development
- Computer graphics
- Management and business development, etics.

The objective of the programme is to enable graduates of the 1st cycle programmes of Multimedia, Computer Science, Software Engineering, Informatics, Telecommunications, Electrotechnics and similar to broaden and extend their knowledge acquired at the first cycle study level and focus it on the area of media technologies. The study programme provides graduates with the knowledge necessary to follow technological changes and development in this rapidly developing field, join developmental and scientific work, or continue study at the doctoral level.
STUDY PROGRAMMES

2nd Cycle Interdisciplinary Master’s Study Programme in Applied Statistics

All students who complete first-cycle Bologna study programmes may apply for admission to the Master's Programme in Applied Statistics, regardless of their field of study in the first cycle. The programme is of 2 years' duration and worth 120 credits. It comprises five study modules: Biostatistics, Social Science Statistics, Economic Statistics, Business Statistics, Technical Statistics and Official Statistics. The first three semesters take the form of lectures and laboratory practice, while the fourth semester is intended for the production of a master's thesis under the guidance of the selected mentor.

Doctoral Degrees

3rd Cycle Doctoral Study Programme in Electrical Engineering

The doctoral study programme in Electrical Engineering is a third-cycle programme according to the Bologna scheme. The study programme of Electrical Engineering inseparably connects the studies with scientific research and development work. The programme focuses mainly on the independent creative research work of students, who are guided by their mentors. The programme gives priority to optional choice over obligatory forms of studies. In order to adequately cover the increasingly ramified field of modern electrical engineering, the choice of study contents is wide and versatile. The possibility of choosing gives students the opportunity to plan their research careers and follow the needs of future employers as soon as possible.
3rd Cycle Interdisciplinary Doctoral Study Programme in Biosciences – Nanosciences

The Interdisciplinary Doctoral Programme of Biosciences is a third-cycle programme under the Bologna scheme. The programme consists of organised classes and individual research work for the doctoral thesis. As well as taking into account the Bologna guidelines on quality, the Interdisciplinary Doctoral Programme in Biosciences combines science and experience from the fields of agronomy, biology, bioinformatics, biotechnology, economics of natural resources, management of forest ecosystems, horticulture, landscape architecture, wood and biocomposites, nanosciences, nutrition, technical systems in biotechniques, protection of natural heritage, cell sciences, animal sciences and animal breeding.


The main goal of the Interdisciplinary Doctoral Programme in Statistics is to further educate experts who have a fundamental knowledge of statistical theory, some experience in the field of statistics or some general statistical knowledge specific to an individual scientific discipline, and who wish to acquire the ability to solve complex methodological problems using advanced IT tools. After completion of their studies, the doctoral graduates will be qualified for creative and independent research work and for solving the statistical problems of future employers.
Biomedical Engineering

Biomedical engineering is a very diverse interdisciplinary field of study linking engineering with medicine and biology. Biomedical engineering strives to expand and deepen our knowledge of the composition and functioning of complex biological systems in different environments by employing engineering approaches and methods. Biomedical engineering continually develops new technologies, devices and procedures for the monitoring, maintenance and improvement of health and the quality of life; it is among the most rapidly evolving areas and will have an important impact on our future lives.

Control Systems and Computer Engineering

Control Systems is a discipline focused on systems and their control. It deals with the study and design of devices and systems replacing human work, substituting human perception abilities and in part even mental capabilities. Computer engineering is the science of the automatic collation, transformation, transfer, storage and use of data and information required for the automation of various processes. Assisted by information technology, control systems make it possible to achieve effective automatic operation of various technological, production, economic and other processes. On the basis of acquired knowledge graduates are able to design computer systems for the monitoring, supervision and automatic control of technical system tasks.
Electrical Power Engineering
The electrical power system is the largest system ever created and controlled by man. The management of “machinery” of such size requires solid knowledge and well-trained engineers, as its functioning depends on complex control, careful design and appropriate maintenance. Ever greater electricity consumption, the introduction of modern technologies, new energy sources, the establishment of the electricity market and the consideration given to sustainable development are all factors that continuously alter the electrical power sector. All of this engineering work has resulted in an efficient and reliable power system, enabling consumers a continuous supply of one of the most flexible forms of energy: electricity.

Information and Communication Technologies
Information and communication technologies are present in all spheres of our lives; they encompass computer science and telecommunications, which, due to extremely rapid progress, continue to merge into one. As a result, ICT includes data storage and processing as well as the transfer of information over wireless and wired connections based on copper and optic infrastructure. Virtual and augmented reality, cognitive radio, the internet of things, machine-to-machine communication and 5th generation mobile networks are just a few examples. The Information and Communication Technologies (ICT) field of study will prepare you for a successful career in the modern world of connected devices, wireless communications, internet and multimedia.

Electronics
Electronics engineers design electronic circuits using modern electronic components, sensors and integrated circuits. In our practical work, we use tools for the planning of printed and integrated circuits, the simulation and optimisation of analogue circuits and the development of microprocessor systems. The main asset of an electronics engineer is a comprehensive and in-depth understanding of modern device functioning, ranging from phenomena in the field of analogue signals to digital processing and programming of electronic systems.
STUDY FIELDS

Mechatronics

Mechatronics (mechanics and electronics) is a well-established comprehensive approach to electromechanical systems. It is usually defined as the synergy (mutual complementarity) between mechanics, electronics, control engineering and computer science in the design and implementation of technical systems. Due to the complexity of the target systems, mechatronics is a multi-disciplinary field that can only be mastered by well-educated professionals. Mechatronics at the Faculty of Electrical Engineering, University of Ljubljana, is a multi-disciplinary field, combining the knowledge of electromechanical components, power electronics systems as well as control and microprocessor engineering.

Multimedia

Computers and smartphones as well as the Internet became so widespread they are everywhere and are the everyday companions of our lives. Therefore, it is important that in addition to technical skills (ex. how to make an app for a smartphone that displays sensor data and the state of health of the user) we master the creative techniques and knowledge to create different types of content (ex. video production, animated characters, virtual 3D environments) and experiences (ex. interactive catalogues and videogames). More and more daily tasks are performed via the Internet and on mobile devices. There is an increasing number of digital devices which allow intertwining of the real environment with the virtual. Because of all those reasons we created the programme of Multimedia, through the course of which we educate students to become experts, qualified to work on some brand new challenges.
Robotics
Robotics employs knowledge from many different fields; as such, it is very much a multidisciplinary and interdisciplinary branch of science. Multidisciplinary because of the many skills in areas such as sensors, measurements, drives, signal processing, robot kinematics, dynamics and control, virtual environment, robot vision, information and computer technologies; and interdisciplinary because it involves the transfer of generic knowledge from one field to another. The study of robotics is designed in the same way. Robotics is not just limited to applications within various segments in production systems, but is today a key development focus in sectors ranging from medicine, servicing and maintenance, security to agriculture and environmental protection.

Quality Engineering
Quality Engineering refers to planned and systematic activities carried out as part of a quality system in order to meet product or service quality requirements. Quality engineering is based on systematic measurements and testing, and the results must comply with the requirements of technical directives and standards. Quality engineering comprises the quality assurance of components (the quality of materials, management processes, production processes, control procedures) as well as end products. Quality Engineering students acquire knowledge in the measurement of physical and non-physical quantities, sensorics and measurement instrumentation, the basics of control systems, robotics and software, as well as the processing and interpretation of the measured quantities.
Research work at the Faculty is conducted by the Faculty laboratories, as well as by programme and research groups. In 9 departments, there are 32 research laboratories bringing together the research efforts of teaching and scientific staff, researchers, young researchers and other associates.

All of this is made possible by the first-rate experts, modern laboratory equipment and ramified activities of the Faculty of Electrical Engineering, covering the fields of Electrical Power Engineering, Photovoltaics, Electronics, Microelectronics, Optoelectronics, Micro-sensors, Nanostructures, Mechatronics, Embedded Systems, Intelligent Systems, Control Systems, Robotics, Metrology and Quality Engineering, Biomedical Engineering and Informatics, ICT and Multimedia Systems. Faculty members develop bilateral cooperation with partners from all over the world. The number of scientific publications is constantly increasing, as is their significance (number of citations), while the interest in publishing books and individual chapters in books is growing, and there is an increasing number of patent applications.

The Faculty of Electrical Engineering actively participates in research within domestic and international core, applied and development projects. In the field of academic research, the Faculty of Electrical Engineering collaborates with over 50 universities and research institutes worldwide. The majority of the collaborations are with universities in Germany, Austria, England, France, the Netherlands, Italy, Portugal, Sweden and Norway. The Faculty also collaborates with universities from North America (USA, Canada), South America (Argentina) and Japan.

The Faculty laboratories are developing various forms of R&D cooperation with Slovenian industry: education of young researchers from the business sector, participation in centres of excellence, centres of competence, technology platforms and networks, and implementation of R&D projects. Project-based cooperation is facilitated by public calls published by ministries and public agencies, which encourage joint applications, partnerships on applied projects, and the involvement of complementary partners, whether institutions of knowledge or businesses, in particular: co-funding and partnership in applied projects of the Slovenian Research Agency, certain public calls of the Ministry of Education, Science and Sport (e.g., early career researchers), and public calls published by the Slovenian Technology Agency.
In addition to full-time study, the Faculty of Electrical Engineering also offers various weekly extracurricular activities aimed at encouraging creativity and innovation, developing competencies in fields that do not directly concern the study programme, and boosting opportunities for career development and easier integration in the labour market:

- professional workshops on electronics, programming, open code, robotics, etc.,
- workshops on the design of electronic circuits, websites, etc.,
- interdisciplinary professional student projects,
- workshops of the Career Centre of the University of Ljubljana,
- tutoring,
- language courses,
- Faculty of Electrical Engineering Sports Club,
- Faculty of Electrical Engineering Vocal Ensemble,
- various competitions, hackathons and entrepreneurial workshops.

Extracurricular activities connect Faculty students and teachers in an informal way. They are organised by the Faculty or the University, but also by various student associations and organisations, such as the FEE Student Council, the FEE Student Organisation, EESTEC student associations, the IEEE student branch, BEST, IAESTE and others. They usually take place in the FEE Creative Classroom (called KuFE) and in MakerLab, but some are also organised at locations outside the Faculty and are part of organised get-togethers.

An approved and accepted extracurricular activity can bring 3 or 4 ECTS credits. Recognised study obligations and ECTS credits are included in the total number of ECTS credits of the study programme in which a student is enrolled, and the extracurricular activity is stated on the list of courses completed by a graduate.
The internationally embedded programmes of the Faculty of Electrical Engineering offer students various international opportunities in the field of education and training, as well as the possibility to develop specific skills acquired in Erasmus+ programmes and in other types of mobility at universities abroad.

In student exchange programmes, students can fulfil part of their study obligations abroad, choosing from among more than 100 different partner universities – both in the EU and elsewhere in the world. Students take part in study exchange in the second and third year of the 1st cycle or in any year of the 2nd cycle; they can also choose to write their graduation thesis or complete their practical training abroad. Study exchange can last one or two semesters, while practical training or preparation of the graduation thesis can last from 2 to 12 months. Various scholarships are available to students for the exchange period.

As part of Erasmus Day, the Faculty of Electrical Engineering organises an International Partner University Fair every year, where students who decide to undertake a student exchange gain useful information from senior colleagues who have already participated in an exchange.
The Alumni Club of the Faculty of Electrical Engineering of the University of Ljubljana (UL FEE) is a professional, scientific and social meeting point for FEE graduates of all study programmes and all generations. The Alumni Club encourages the maintaining of ties and networking among FEE graduates, as well as between graduates and Faculty teachers, collaborators and partners. It enables the further personal and professional development of FEE graduates, promotes the knowledge and achievements of its members, and contributes to upholding the reputation of the electrical engineering profession and the quality of education at the Faculty. In the Alumni Club, graduates can enrich their knowledge and exchange experience with examples of good practice.
WITHOUT ELECTRICAL ENGINEERING THE WORLD AS WE KNOW IT WOULD NOT EXIST.