

JOSIP JURAJ STROSSMAYER UNIVERSITY OF OSIJEK

FERIT FACULTY OF ELECTRICAL ENGINEERING, COMPUTER SCIENCE AND INFORMATION TECHNOLOGY OSIJEK

Dean's foreword



The Faculty of Electrical Engineering, Computer Science and Information Technology Osijek is a modern faculty that has constantly been developing in all areas of its expertise. The educational process consists of three levels with study programmes being continually upgraded and harmonised with recent scientific discoveries and economy needs.

Scientific research is essential for the development of the Faculty. The Faculty actively participates in numerous domestic and international consortia used by the Faculty's established research groups for conducting successful scientific research. The Faculty's research groups have participated in numerous domestic and European projects as either heads or associates.

Cooperation with the economy, encouragement of entrepreneurship and transfer of knowledge and technologies are fundamental indicators of the Faculty's development. The Faculty successfully cooperates with the most important companies in the fields of electrical engineering, computer engineering and information and communication technologies. Cooperation with the economy has been supported by professional and development projects and research studies. Furthermore, doing their practical work, bachelor and master theses, students have gradually been prepared for the job market and solving real engineering problems.

Undoubtedly, powerful faculties and universities are imperatives for the society's development. Information and communication technology, electrical and computer engineering providing additional values for new products and services represent strategic priorities for the development of modern economies. Hence, the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek continues to successfully fulfil its mission – provision of support for knowledge and technology-based economy.

Dean

Dr Drago Žagar, Full Professor



JOSIP JURAJ STROSSMAYER UNIVERSITY OF OSIJEK

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Dr **Goran Martinović**, Full Professor Vice-Dean for International Cooperation



Department of Core Courses (ZZP)

Department of Power Engineering (ZEE)



Department of Electromechanical Engineering (ZES)

Department of Communications (ZAKOM)



Department of Software Engineering (ZPI)



Department of Computer Engineering and Automation (ZRIA)



Welcome to Osijek

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The Republic of Croatia is geographically located between Central and Eastern Europe. It covers the geographical area that extends from the spacious Pannonian Plain across a narrow area of the Dinaric Alps to the Adriatic coast - one of the most indented coastlines in the world. The interior of the country has a moderate continental climate, whereas a pleasant Mediterranean climate prevails along the Adriatic coast.

Slavonia and Baranja

Slavonia and Baranja is a historical region in eastern Croatia. It is surrounded by three rivers; the Sava River (the border with Bosnia and Herzegovina), the Drava River (the border with Hungary) and the Danube (the border with Serbia), forming an area of exceptional beauty with forests, meadows and hills. In Slavonia, there are numerous castles and villas that once belonged to rich families, but now they add a special charm to this part of Croatia. Baranja stretches between the Drava River in the north and the Danube in the east. At the point where the Danube and the Drava River meet, nature has created a remarkable phenomenon - Kopački Rit Nature Park, which is rich in flora and fauna. In 1967, Kopački Rit and its immediate area were declared a nature park and a zoological reserve, respectively.

The largest city in Slavonia, Osijek, which is located on the Drava River, is an interesting tourist destination with numerous parks, cultural monuments and entertainment possibilities.

Osijek

Osijek is the fourth largest city with about 110,000 inhabitants. It is located in a valley on the right bank of the Drava River. It consists of the Fortress – a baroque city-fortress built in the 18th century, the Upper, the Lower and the New Town, Retfala and the Industrial District. Osijek is the most verdant city in the Republic of Croatia.

The 18th century baroque city-fortress of Osijek was built by transforming the then historic city located at the strategic crossing over the Drava River. The first new city-fortress was built within a large strategic system of fortified baroque towns on the border with the Ottoman Empire, which was founded by Prince Eugene of Savoy who began to build it in 1712. The fortress had four gates: The New Gate (south), the Water Gate (north), the Imperial Gate (east) and Valpovo Gate (west). Out of these four gates to the fortress, only one is still present today - the Water Gate, where there is a memorial plaque dedicated to the builder of Osijek fortress, general Stephan von Beckers. It is believed that his body was walled up in the outer wall or rampart.

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www.osijek.hr

Josip Juraj Strossmayer University of Osijek

Josip Juraj Strossmayer University was established in 1975. It consists of 17 constituent units, i.e., 11 faculties, 5 University departments, 1 Academy of Arts and 3 university infrastructure institutions, i.e., the City and University Library in Osijek, the Student Centre in Osijek and the Student Centre in Slavonski Brod, as well as the Technology Development Centre Osijek Ltd. Today, Josip Juraj Strossmayer University of Osijek has 1,458 employees and about 20,000 students with almost 2,000 students studying at the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek. Each year, the number of incoming students doing their practical training and scientists conducting research has been increasing in both the University and the FERIT.

Josip Juraj Strossmayer

Josip Juraj Strossmayer (Osijek, 4 February 1815 - Đakovo, 8 April 1905) was a Croatian bishop, theologian, politician, cultural worker (founder of the central Croatian scientific and cultural institutions), writer and one of the most important and influential figures in the 19th century Croatia.

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DUCNOST

DEPARTMENTS AT THE FERIT OSIJEK







DEPARTMENT OF CORE COURSES

Chair of Mathematics and Physics

Chair of Mechanical Engineering and Foreign Languages

DEPARTMENT OF COMMUNICATIONS

Chair of Radiocommunications and Telecommunications

Chair of Electronics and Microelectronics

Laboratory for High Frequency Measurements

DEPARTMENT OF SOFTWARE ENGINEERING

Chair of Visual Computing

Chair of Programming Languages and Systems







DEPARTMENT OF COMPUTER ENGINEERING AND AUTOMATION

Chair of Automation and Robotics

Chair of <u>Computer Engineering</u>

DEPARTMENT OF POWER ENGINEERING

Chair of Power Systems and Substations

Chair of Power Plants and Energy Processes

Electromagnetic Compatibility Laboratory

DEPARTMENT OF ELECTROMECHANICAL ENGINEERING

Chair of Fundamentals of Electrical Engineering and Measurements

> Chair of Electric Machines and Power Electronics

FERIT OSIJEK

The Faculty of Electrical Engineering, Computer Science and Information Technology Osijek is a higher education, scientific and research institution that conducts scientific, research, development and educational projects and performs undergraduate, graduate, postgraduate and professional study programmes in technical sciences.

Higher education curriculum in electrical engineering was first established in Osijek in 1978 as the third study of the kind in the Republic of Croatia. The establishment of the Study of Electromechanical Engineering resulted from an initiative of the University of Osijek and took place in 1977 and 1978. It was supported by the economy of the city of Osijek and surrounding municipalities in the Slavonia and Baranja region. In 1993, the Faculty of Electrical Engineering Osijek (ETFOS) was founded as a public institution of higher education. Today, it is organised in six departments with a total of fifteen chairs and two accredited laboratories.

Through its university and professional study programmes, the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek has been educating and training its staff to be able to keep up with technology advances in the areas of electrical and computer engineering as well as to apply their knowledge to engineering problem solving and, through direct cooperation with industry, to transfer knowledge of new technologies based on new scientific findings. Study programmes are in line with European and global trends, but also adapted to the needs of the economy in the environment. The Faculty of Electrical Engineering, Computer Science and Information Technology Osijek is also a regional scientific and research centre of excellence in the areas of electrical and computer engineering.

A Quality Management System (QMS) supported by ISO 9001:2008 has been established at the FERIT Osijek. The purpose and the goal of establishing the QMS at the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek is to ensure the required level of quality of higher education (i.e., the teaching process), scientific, research and professional work, and systematic documentation of important elements of the defined procedures and activities.

UNDERGRADUATE UNIVERSITY AND PROFESSIONAL STUDY PROGRAMMES

The FERIT Osijek implements study programmes in the scientific fields of electrical and computer engineering. Currently, nine study programmes are being delivered, i.e., two undergraduate university study programmes (in electrical engineering and in computer engineering), two graduate university study programme (in electrical engineering and in computer engineering), one postgraduate doctoral study programme, three postgraduate specialist study programmes and one professional study programme.



STUDY PROGRAMMES AT THE FERIT OSIJEK





Undergraduate university study programme in Computer Engineering (3 years, 180 ECTS)

Within the framework of the Undergraduate university study programme in *Computer Engineering*, the students are educated and trained to work in a very dynamic area of technological development. These students are taught how to identify, formulate, and solve engineering problems by using various computer tools and systems.

Undergraduate university study programme in Electrical Engineering Elective modules: (elected in the second year of study) Power Engineering Communications and Informatics

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The students in the Undergraduate university study programme in *Electrical Engineering* acquire skills and competencies to apply their knowledge of mathematics, physics, science and engineering to electrical engineering as well as to design and conduct experiments, analyse and interpret measurement results. The students learn how to identify, formulate and solve engineering problems.



The students in the professional study programme branch **Power Engineering** acquire knowledge and skills to design, test and maintain electrical installations at all levels of complexity, transmission and distribution networks and lines, switching substations, city substations, distribution overhead and underground networks, facilities and plants of flexible production systems, automated electromotive plants, etc.

The students in the professional study programme branch **Automation** acquire knowledge and skills to design, implement, test and maintain automated technological, power and transport plants and processes, etc.

The students in the professional study programme branch **Informatics** acquire knowledge and skills to purchase, develop and maintain computers and computer systems as well as software products; they will be able to apply computers in production process management, design and exploit computer networks, design, implement and maintain business and private networks and corresponding computer systems, apply and maintain hardware and software for design systems in other sectors, etc.



The graduate study programme in *Process Computing* at the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek allows the students the opportunity to become qualified in various aspects of process computing and other scientific areas. Upon graduation, the students will be able to:

- plan, design, and discover hardware and software solutions for computing systems in economy, industry, business and other applications in companies;
- develop hardware and software solutions;
- participate in interdisciplinary efforts, either independent or as a member of a team in creative or systematic solving of complex engineering problems in the area of computing or programming;
- operate laboratory research;
- plan and optimise contemporary hardware and software solutions.

Furthermore, the students will acquire additional competencies depending on the courses of the elective module (Computer Engineering, Process Computing, Software Engineering and Information and Data Science).



The graduates in this branch acquire knowledge and competencies and upon completion they will be able to:

- design power plants and systems (electric power plants and cogeneration power plants);
- design and maintain electrical machines;
- design and maintain transmission and distribution networks and lines, switching substations, city substations, distribution overhead and underground networks;
- design and maintain power systems.

Furthermore, the graduates will acquire additional competencies depending on the courses in the elective module (Power Systems, Sustainable Power Systems, Industrial Power Engineering).

Graduate university study programme in Electrical Engineering Branch: Power Engineering Elective modules: Electric Power Systems Sustainable Power Systems Industrial Power Engineering (2 years, 120 ECTS)



Upon completion of this study programme, the graduates will be able to solve complex engineering problems regarding communication and information systems, design communication systems, lead a team and research and develop information and communication technologies. They will be able to:

- work in the telecommunications industry, as public mobile radio networks operators, TV and radio concessionaires;
- install and maintain radio systems;
- engage in the research and development of software products for networks and services in the telecommunications industry;
- plan, maintain and operate public mobile and stationary telecommunication network and the Internet.

Furthermore, the students acquire additional competencies depending on the courses of their elective module (Communication Technologies and Network Technologies).

Graduate university study programme in Electrical Engineering Branch: Communications and Informatics Elective modules: Communication Technologies Network Technologies (2 years, 120 ECTS)

Postgraduate specialist study programme in Process Computing (1.5 years, 90 ECTS)

Upon completion of the postgraduate specialist study programme in *Process Computing*, the graduates are able to handle complex projects by applying new methods, computer and IT technologies. The study programme provides necessary theoretical and practical knowledge of applied probability and statistics, the design of modern computer architecture and network technologies, data-based process modelling, intelligent robotic systems, distributed embedded computer systems, software engineering, multimedia communications and quality of service, taking into account different information processes and applications.

Postgraduate specialist study programme in

Electric Power Networks in the Market Environment (1.5 years, 90 ECTS)

> Upon completion of the postgraduate specialist study programme in *Electric Power Networks in the Market Environment*, the graduates are able to handle complex projects in electric power and industrial networks, power stations and plants by applying new methods and power technologies, with special emphasis on professional application, and are ready to develop and apply new methods, models and tools for electric power network analysis in the market environment.



Upon completion of the postgraduate specialist study programme in *Advanced Communication Technologies*, the graduates are able to handle complex projects by applying new methods and information and communication technologies, with special emphasis on professional application. The study programme broadens and deepens their knowledge of stochastic processes and applications in communications, modern communication networks, advanced encryption systems and information protection, multimedia communications and service quality in different information and communication networks. 05.2011. - 29.01.2012.

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Postgraduate doctoral study programme in Electrical Engineering Power Engineering,

Communications and Informatics (3 years, 180 ECTS) The Faculty of Electrical Engineering, Computer Science and Information Technology Osijek has had a postgraduate study programme since the year 2000. The postgraduate doctoral study programme in Electrical Engineering, which has been completely harmonised with the Bologna Declaration, has been carried out at the FERIT Osijek since the 2006/2007 academic year. Upon completion of the postgraduate doctoral study programme in Electrical Engineering, the students are able to conduct research projects, develop and apply new technologies as well as to educate professional and scientific staff. The programme has two branches, namely *Power Engineering* and *Communications and Informatics*.

Branch Power Engineering

The postgraduate doctoral study programme in *Power Engineering* extends knowledge relative to energy generation, transmission, distribution, consumption and management previously acquired at the graduate study programme. Furthermore, the study programme aims at providing a comprehensive study of physical processes and a theoretical background with respect to the aforementioned issues as well as to introduce scientific methods used for development, construction, management and maintenance planning of the electric power system.

Branch Communications and Informatics

The postgraduate doctoral study programme in *Communications and Informatics* broadens the prior knowledge of information theory, information networks, programming and processing algorithms in networks, analyses and applications of modulation processes, state-of-the-art radio communications systems, theory, analysis and synthesis methods as well as a design of embedded, distributed and expert computer systems and software solution for system and application software. Moreover, the students gain theoretical and scientific knowledge covering the fields of analysis, optimisation, planning and a design of communications and information systems, radio communications systems, multimedia systems, process control systems, intelligent and broadband integrated services digital networks, modern computer architecture and its software.

SCIENTIFIC AND RESEARCH ACTIVITY

The scientists employed at the Faculty of **Electrical Engineering, Computer Science** and Information Technology Osijek conduct research in the fields of electrical engineering, information and communication technologies, automation, electromechanical and computer engineering. In the past five years, the scientists participated in more than 30 scientific and technological projects and published more than 120 research papers in international journals. The Faculty of Electrical Engineering, Computer Science and Information Technology Osijek cooperates with the Scientific Centre of Excellence for Science on Data and Cooperative Systems - the first Croatian centre of excellence in technical sciences whose purpose is to improve and promote science in Croatia thus increasing participation in the European Research Area.

Research on current-voltage characteristics, efficiency, production and a quality of energy with different technologies of photovoltaic systems with respect to regional climate conditions, estimations of reliability and availability of windmills, stochastic estimation of voltage sags caused by short-circuit faults in power systems and development of a solar powered car are very important.

Furthermore, numerous research have been done in the fields of nonlinear systems, ferroresonant circuits, application of soft computing methods on machines and devices, chaos theory application, modelling of processes based on measurement results, building of soft-sensors for estimation of difficult-to-measure variables and industrial processes supervision. Also, algorithms for obstacles overcoming for humanoid robots are created. Research on flexible manufacturing systems, robots and manipulators in manufacturing automation are conducted. In addition, the researchers are studying possibilities of applying evidential reasoning algorithms for multiple attribute analysis in complex technical systems estimation, grey systems application theory and visual detection of malfunction in the ceramic tiles industry.

Further, upon the development of a new energy efficient system for wireless measurement of biological signals, research are carried on in the fields of radio frequency and capacitive passive identification systems, conformal antennas, radio waves propagation, optimisation of industrial wireless sensor networks, application and implementation of various QoS in computer networks. Additionally, numerous research are conducted in the fields of software engineering, artificial intelligence of embedded, distributed and service-oriented computer systems emphasising their temporal conditions, self-sustainability, reduction of energy consumption and its application in real computer-driven surroundings. Advanced analytical methods of 2D and 3D images, compression, image and video quality assessment and data visualisation are continually being developed.

The Faculty of Electrical Engineering, Computer Science and Information Technology Osijek has been publishing the international scientific journal entitled International Journal of Electrical and Computer Engineering Systems since 2010. Theoretical and applied research results from electrical and computer engineering and related interdisciplinary fields are published in the journal. For more information, check the official webpage http://www.etfos.unios. hr/ijeces/.

The IEEE Systems, Man and Cybernetics, IEEE student branch Osijek and the Department of Power Engineering were established at the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek. The Institute of Electrical and Electronics Engineers (IEEE) is a non-profit professional association advancing innovation and technological excellence for the benefit of humanity thus being one of the world's leading organisations in the fields of electrical and computer engineering.

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PROFESSIONAL ACTIVITY AND COOPERATION WITH THE ECONOMY

The main research and professional activities of cooperation with the economy are done within the Faculty departments. The Faculty has so far signed cooperation agreements with 20 partners. Two faculty laboratories are extremely important for undertaking professional activities.





ELECTROMAGNETIC COMPATIBILITY LABORATORY

The Electromagnetic Compatibility Laboratory functions within the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek. The main activities undertaken in the laboratory are measurements of low frequency magnetic and electric fields and electrical energy quality insurance.

LABORATORY FOR HIGH FREQUENCY MEASUREMENTS

The Laboratory for High Frequency Measurements functions within the Department of Communications. The main activities done in the laboratory are measurements, calculations and estimations of high frequency electromagnetic fields and estimations of electromagnetic field radiation harmful effects in high frequency fields.





ENERGY PERFORMANCE CERTIFICATE OF BUILDINGS

Together with partners, the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek is authorised to carry out inspections and issue energy performance certificates of buildings compliant with current law regulations. It also suggests the implementation of the most recent technological solutions for improvements in energy efficiency.



INTERNATIONAL COOPERATION

The Faculty of Electrical Engineering, Computer Science and Information Technology Osijek has been cooperating with other faculties, colleges, scientific and research institutions in both Croatia and abroad. The Office for International Cooperation establishes, promotes and strengthens international and institutional relationship. Cooperation has been realised with incoming and outgoing student, academic and non-academic staff mobility as well as scientific, research and professional activities. Academic staff can apply for teaching and research exchange programmes. Furthermore, students can conduct their Bachelor, Master and Doctoral theses research abroad. Additionally, students can do their practical training, take language courses, participate in projects, etc.

Erasmus+ mobility programmes enable university-level students and staff as well as staff of organisations and institutions participating in higher education to study and work abroad. In addition to universities, companies can take part in Erasmus programmes. Students can do their practical training and staff can apply for continuing professional development courses within the programme.

Most courses at the Faculty of Electrical Engineering, Computer Science and Information Technology Osijek, some of which are Erasmus+ courses, can be taken in the English language. The number and duration of both incoming and outgoing student, staff and partners' mobility have been continually increasing.

The International Association for the Exchange of Students for Technical Experience (IAESTE) is an independent, non-profit and non-political student exchange organisation with 85 member states from all over the world. It provides students in technical degrees (primarily Science and Engineering) with paid, course-related, training abroad. Since it was established, IAESTE Osijek activities have been organised by student volunteers. In addition to outgoing and incoming student practical trainings, IAESTE Osijek supports students' continuous education and practical training by organising seminars, trips to exhibitions and other specialised events abroad.

The EUROWEB+ Scholarship Programme is open to selected nationals in the EU countries and the Western Balkans who want to study or work at one of the partner institutions. It is a scholarship programme for students on undergraduate, master, doctoral and post-doctoral level, as well as for university staff in academic or administrative positions financed by the European Commission. In addition to 17 institutional partners, the FERIT Osijek participates in the mobility programme.

The overall objective of the EUROWEB+ project is to create a partnership in research and education with the aim of strengthening the ties between the EU member states and the Western Balkans. The official project webpage is available at http://www.mrtc.mdh.se/eurowebplus.









FERIT in figures





PARTNER INSTITUTIONS

ALBANIA

- Aleksandër Xhuvani University of Elbasan
- Polytechnic University of Tirana

AUSTRIA

- Campus 02 University of Applied Sciences, Graz
- Vienna University of Technology

BOSNIA AND HERZEGOVINA

- Faculty of Electrical Engineering, University of Sarajevo
- University of Mostar
- University of Tuzla

MONTENEGRO

Mediterranean University Montenegro

HUNGARY

- Faculty of Mechanical Engineering and Automation, Kecskemét
- Óbuda University, Budapest
- University of Pécs

GERMANY

Albstadt-Sigmaringen University

- City University of Applied Sciences, Bremen
- Paderborn University
- University of Applied Sciences Würzburg-Schweinfurt
- University of Applied Sciences Mittelhessen

POLAND

- Lodz University of Technology
- Poznan University of Technology
- University of Applied Sciences in Nysa
- University of Science and Technology, Bydgoszcz

PORTUGAL

- Polytechnic Institute of Castelo Branco
- Polytechnic Institute of Port

ROMANIA

- "1 Decembrie 1918" University of Alba Iulia
- Technical University of Cluj-Napoca
- University Politehnica of Bucharest
- University "Stefan cel Mare" of Suceava

USA

 College of Computing and Informatics, The University of North Carolina at Charlotte, NC North Carolina University, Raleigh, NC

SLOVENIA

- Faculty of Electrical Engineering and Computer Science, University of Maribor
- Jožef Stefan International Postgraduate School, Ljubljana
- University of Primorska, Koper

SERBIA

- Faculty of Electronic Engineering, University of Niš
- Faculty of Technical Sciences, University of Novi
 Sad
- University of Belgrade
- Technical College of Professional Studies, Subotica

SPAIN

Barcelona College of Industrial Engineering

SWEDEN

• Mälardalen University, Västerås

TURKEY

• Süleyman Demirel University, Isparta