

Study program Overview: Electronics, Automation and Robotics - BSc

Name of Institution:	University of Prishtina “Hasan Prishtina”
Faculty/Department:	Faculty of Electrical and Computer Engineering
Main Campus and/or Branch:	Main Campus
Title of the study program:	Electronics, Automation and Robotics
KKK qualification level:	BSc. Level 6 of NQF
Academic degree or denomination of academic degree in diploma:	Bachelor of Science in Electrical Engineering (BSc)
ECTS:	180
Profile of study program (specializations):	1. Electronics 2. Automation and Robotics
Minimum duration of studies:	3 years(select one of the following non-technical electives)
Number of study places:	120

Departments:

- 1. Electronics**
- 2. Computerized Automation and Robotics**

These two departments offer a joint bachelor's degree program in **Electronics, Automation and Robotics**, with two modules (specializations): **Electronics** and **Automation and Robotics**.

Syllabus: Level 1 study cycle in **Electronics, Automation and Robotics** study program

1st year				
1st semester				
No	M/E	Course		ECTS
1.	M	Linear Algebra and Calculus 1		7
2.	M	Physics 1		6
3.	M	Fundamentals of Electrical Engineering 1		7
4.	M	Fundamentals of Programming		5
5.		Non-technical electives (select one of the following non-technical electives)		
	E	1. Technical English		5
	E	2. Communication Skills		5
	E	3. German Language		5
	E	4. Practical Mathematics		5
2nd semester				
1.	M	Calculus 2		7
2.	M	Physics 2		6
3.	M	Fundamentals of Electrical Engineering 2		7
4.	M	Algorithms and Data Structures		5
5.	M	Digital Circuits		5

2nd year				
3rd semester				
No	M/E	Course		ECTS
1.	M	Microprocessors and Microcontrollers		5
2.	M	Calculus 3E		5
3.	M	Signals and systems		6
4.	M	Automation		5
5.	M	Electronics		5
6.	M	Electronic measurements		4
4th semester				
1.	M	Internet of Things		6
2.	M	Power Systems		5
3.	M	Electromagnetic Fields and Waves		5
4.	M	Discrete Signals and Digital Processing		5
5.	M	Computer Architecture		5
6.		Non-technical electives ((select one of the following non-technical electives))		
	E	1. Innovation and Business		4
	E	2. Project management		4
3rd year: Electronics				
5th semester				
No	M/E	Course		ECTS
1.	M	Electronic Devices		6
2.	M	Digital Electronics		6
3.	M	Power Electronics		5
4, 5		Technical electives (select two of the following technical electives)		
	E	1. Optoelectronics		5
	E	2. Sensors and Actuators		5
	E	3. Electronic Communication		5
	E	4. Measurement Instrumentation and DAQ		5
	E	5. Fundamentals of Mechatronics		5
	E	6. Biomedical Signals		5
6.		Non-technical electives ((select one of the following non-technical electives))		
	E	1. Entrepreneurship		3
	E	2. Microeconomics		3
6th semester				
1.	M	Microelectronics		5
2.	M	Analog Electronics		5
3, 4		Technical electives (select two of the following technical electives)		
	E	1. Fundamentals of Multimedia		5
	E	2. Fundamentals of Robotics		5
	E	3. Optical Communication Technology		5
	E	4. Embedded Systems		5
	E	5. Computer Aided Design of Electronic Systems		5
	E	6. Biomedical Instrumentation		5
5.	M	Internship		5
6.	M	Bachelor Thesis		5

3rd year: Automation and Robotics				
5th semester				
No	M/E	Course		ECTS
1.	M	Fundamentals of Control Systems		6
2.	M	Fundamentals of Robotics		5
3.	M	Programmable Logic Controllers		6
4, 5		Technical electives (select two of the following technical electives)		
	E	1. Sensors and Actuators		5
	E	2. Smart Actuators and Drives		5
	E	3. Smart Sensors		5
	E	4. Communications in Automation		5
	E	5. Finite Element Methods		5
	E	6. Operating Systems		5
6.		Non-technical electives (select one of the following non-technical electives)		
	E	1. Entrepreneurship		3
	E	2. Microeconomics		3
6th semester				
1.	M	Modeling and Simulation		5
2.	M	Digital Control Systems		5
3, 4		Technical electives (select two of the following technical electives)		
	E	1. Nonlinear Control Systems		5
	E	2. Chemical Processes Control		5
	E	3. Continuous and Batch Processes		5
	E	4. Real-time Control Systems		5
	E	5. Computer Data Acquisition and Analysis		5
	E	6. Building Automation		5
5.	M	Internship		5
6	M	Bachelor Thesis		5

Explanation

- M- mandatory course, E -elective course
- Total number of credits (ECTS) accumulated for one year is 60 ECTS credits.
- The first year (first and second semesters) is the same for all study programs at FECE.
- After choosing the elective course it becomes a compulsory subject, the student or the professor will not be able to change the subject.
- Sixth semester professional internships will be pursued in industry (outside the faculty) and will be organized in the last semester of block studies totaling 120 teaching hours.

Comparison of the Electronics, Automation and Robotics study program with the other universities

The proposed study program is comparable to similar field programs in regional universities:

- Faculty of Electrical Engineering - University of Lubjana, 60%, https://www.uni-lj.si/academies_and_faculties/faculties/2013052914482436/
- Faculty of Electrical Engineering - University of Zagreb, 40%, <https://www.fer.unizg.hr/en>

The mission, objectives and administration

Based on the strategic mission of the Faculty of Electrical and Computer Engineering (FECE) for overall performance enhancement and reform implementation in the structure of studies, the content of study programs, and the attainment of skills, the mission of the study program in Electronics, Automation and Robotics is to deliver up-to-date, flexible content that will easily follow up-to-date technological developments as well as local, regional and global industry and labor market requirements.

The bachelor's degree program in Electronics, Automation and Robotics is characterized by a comprehensive interdisciplinary combination of the content required to deal with most current contemporary systems and those to be developed in the future. Throughout studies, students will gain knowledge about electronics, computers and programming, communication networks in general, as well as specific knowledge about automation communications and complex automated systems. This program enables graduates to gain theoretical and practical knowledge of international levels, using contemporary teaching methods and active involvement of students in implementation of critical and creative thinking, independent work and teamwork at all levels.

Students of the study profile in Electronics gain theoretical and practical knowledge needed for modeling, simulating, analyzing and manufacturing electronic circuits and systems. Students gain knowledge in the fields of microelectronics; radio frequency and microwave electronics; optoelectronics; power electronics; acoustics and audio techniques; electronic measurement and electronic devices and circuits testing; biomedical electronics; electric vehicles; and other fields of applied electronics. This study program reflects the orientation of engineering studies and research in these basic areas of application of electronics: telecommunications, automated control systems, power systems, and biomedicine.

Students of Automation and Robotics study profile gain theoretical and practical knowledge needed for design and implementation of automatic control systems, embedded systems, dedicated computer systems, PLC programming for automation of processes, distributed measurement, supervisory and automation systems (SCADA), and robotics. Students gain knowledge in the fields of: mathematical modeling methods, simulation and identification, design and optimization of products and systems, advanced control methods, design and optimization of embedded computer systems, signal processing for physical interfaces, distributed computer systems, sensors and actuators, smart sensors, medical equipment, home automation, communication protocols (general and for specific applications), industrial automation and PLC programming, distributed computer and control systems, power systems, SCADA, industrial robots, mobile robots, electric vehicles and autonomous driving, computer games, artificial intelligence.

Program objectives for graduates:

- To have a general understanding of the functionality of complex systems of different natures and the possibilities for automation of such systems;
- To have a general understanding of the principles of functionality of basic electronic components, electronic systems, and microelectronics;
- To be trained in the maintenance, diagnostics, and repair of electronic systems and computerized systems for automation and robotics;
- To be trained in the independent design and implementation of automation systems based on microcontrollers, computers and PLCs;
- To develop critical and creative thinking on contemporary technological achievements in the fields of electronics, automation, and robotics;
- To be trained for the local and international labor market;

- To be trained in providing expertise to relevant industries, institutions and organizations.

Expected learning outcomes

After successful completion of this program, **study profile Electronics**, students will be able to:

- understand the electronic systems and subsystems within the field of electrical engineering;
- understand the design and operation of basic electronic components and systems (such as: amplifiers, transmitters, receivers, microprocessors, computer systems, power sources, power inverters, electric vehicles, smart homes, internet of things, robots,);
- analyze the implemented systems in commercial electronics (such as: TV, cell phones, radios, hi-fi systems);
- understand bioengineering and photonics for applications in biomedical diagnostics;
- analyze, implement and optimize information systems;
- design and implement systems based on microprocessors, microcontrollers and computers;
- understand systems for entertainment, speech and visual recognition;
- prepare technical documentation for electronic systems, optical fibre systems;

After successful completion of this program, study profile **Automation and Robotics**, students will be able to:

- understand the electronic systems and subsystems within the field of electrical engineering;
- understand the design and operation of basic electronic components and systems (such as: amplifiers, transmitters, receivers, microprocessors, computer systems, power sources, inverters, electric vehicles, robots);
- design, document and implement dedicated computer systems based on microcontrollers, computers, and PLCs;
- analyse, design, and implement industrial, home, and building automation systems;
- understand, program, document and use industrial and mobile robotic systems, and integrating them with automation systems, electric vehicles and autonomous driving;
- understand, program, and implement advanced interfaces, HMI, speech and visual;
- be involved in different implementation phases of distributed automation systems (SCADA).