Course Unit Descriptor

Study Programme: Power, Electronic and Telecommunication Engineering	
Course Unit Title: Application of Microprocessors in Power Engineering	
Course Unit Code: EE408A	
Name of Lecturer(s): Darko Marčetić	
Type and Level of Studies: Bachelor level	
Course Status (compulsory/elective): compulsory	
Semester (winter/summer): winter	
Language of instruction: english	
Mode of course unit delivery (face-to-face/distance learning): face-to-face	
Number of ECTS Allocated:6	
Prerequisites:none	

Course Aims:

Introducing undergraduate students to the basic principles of microprocessor system design in power engineering. The student gains knowledge in two fields: microcontrollers and digital control of electrical devices with numerous application examples.

Learning Outcomes:

After theoretical lectures and laboratory practice students gain practical knowledge in the field of microprocessors and digital control of electrical drives. Acquired knowledge can be used for solving specific engineering problems.

Syllabus:

Introduction. Numerical systems, codes, switching algebra, digital electronics. The basic principles of microprocessors. Elementary computer-the composition and functioning. Bus, RAM, ROM, I/O unit, other components. Typical microprocessor and microcontroller systems. 8-bit microcontroller 8031 and the family (8051, 80535,…) Internal architecture. Memory, registers, interruptions and priorities. 16-bit microcontroller 4011 (dsPIC family). Internal architecture. Memory, registers, interruptions and priorities. Basic instructions and programming. Analysis and programme testing (debugging). Digital signal processors (DSP). Programmable logic controllers (PLC). Possibilities of application of microprocessors in power engineering and industry. Realization of the regulatory circuit of the power converter using microprocessors. Realization of digital control law. Sensors, speed measurement, position (encoder and resolver), voltage, current. Application of microprocessors in the regulated DC electric motor. Application of microprocessors in the voltage controllers (DC and AC voltage controllers). Application of microprocessors in the AC controlled drive. Application of PLC in industrial plants. Other applications. The application of DSP in servo controlled alternating drives and in the motion control.

Required Reading: Relevant literature in English		
Weekly Contact Hours:4	**Lectures:3**	**Practical work:1**

Teaching Methods:

The course consists of lectures with contemporary illustrations, and the laboratory practice (of interactive and demonstration type)

Knowledge Assessment (maximum of 100 points):100

Pre-exam obligations	points	Final exam	points
Test	20	Oral part of the exam	30
Homework	5		
Laboratory exercise attendance	5		
Colloquim exam	40		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			