

		<b>Course title: <i>Real time control</i></b>		
<b>Course code</b>	<b>Course status</b>	<b>Semester</b>	<b>Number of ECTS credits</b>	<b>Lecture hours</b>
<b>PA4205</b>	<b>Mandatory</b>	<b>II</b>	<b>5</b>	<b>3L+1E</b>

**Study program:**

Master studies, ELECTRICAL ENGINEERING, study program: Power systems and Control, department: Industrial electronics and Automatics (studies last for 10 semesters, 300 ECTS credits).  
 Postgraduate studies, ELECTRICAL ENGINEERING, study program: Power systems and Control, department: Industrial electronics and Automatics (studies last for 8 semesters, 240 ECTS credits)

**Prerequisites:**

No prerequisites required.

**Course aims:**

Students will be introduced with basics of real time control, hardware and software elements needed for this process, as well as with some examples.

**Teacher(s) first and last names:**

*PhD Momir Đurović*

**Studying method:**

Lectures, laboratory exercises, individual work, consultations, seminar work.

**Course synopsis**

Preliminary week	Preparation and semester enrolment.
I week	Basics of control process (off/on, P, PI, PID, fuzzy logic, cascade, feed-forward)
II week	Computer role in control. DSP. Criteria for definition of control.
III week	Real time systems (parameters, calculations, predictability, time schedule, architecture )
IV week	Operating real time systems, communications error tolerances, clock synchronization
V week	Artificial intelligence. Signals (noise and filters, transmission lines acquisition of signal)
VI week	<b>I colloquium</b>
VII week	<b>Free week</b>
VIII week	Interruptions (PC interruptions, controller 8259, examples of hardware interruptions in control and measurement)
IX week	Parallel data transmission (parallel port, examples of application of parallel port in control)
X week	Timers (programming of timers 8254, 8253, 555, examples of timers application)
XI week	Information acquisition devices (sensors: classification, sensors for temperature, pressure, force, level, optical sensors.)
XII week	<b>II colloquium</b>
XIII week	Preparation of final exam with consultations.
XIV week	Preparation of final exam with consultations.
XV week	<b>Final exam - Seminar work</b>
XVI week	
Final week	Administrative procedures.
XVIII-XXI week	Additional lessons, correction of the final exam and administrative procedures.

**STUDENT WORKLOAD**

<u>per week</u>	<u>per semester</u>
<b>Working hours:</b> 5 credits x 40/30 = 6 hours and 40 minutes.	<b>Teaching and the final exam:</b> (6hours and 40 minutes) x 16 = 106 hours and 40 minutes.
<b>Working hours structure:</b> 3 hours for teaching 1 hour for exercises 2 hours and 40 minutes for individual work, including consultations.	<b>Necessary preparation</b> (before semester): 2 x (6hours and 40 minutes) = 13hours and 20 minutes.
	<b>Total work hours for the course:</b> 150hours
	<b>Additional hours</b> for preparing correction of the final exam, including the exam taking: up to 30hours.
	<b>Work hours structure:</b> 106hours and 40 minutes (lectures) + 13hours and 20 minutes (preparation) + 30hours (additional work)

Lessons attendance is mandatory for students, as well as doing homework and colloquiums and final works.

**Literature:**

**Basic:** *M.Đurović: Upravljanje u realnom vremenu, Univerzitet Crne Gore 1999.*

**The forms of knowledge testing and grading:**

- Homework 5x3 points.
- Activity during semester and attendance to lessons up to 5 points.
- Two colloquiums 2x15 points,
- Final exam 50 points.

Student gets the passing grade by collecting **51** points at least.

**Special remarks for the course:**

Lectures are performed for groups of 30 students. Exercises are performed for groups of max. 6 students.

**Teacher(s) who provided the information:** *PhD Momir Đurović*

**Note:** -