

Study program / course: Mechanical Engineering				
Type and level of study: Bachelor academic studies				
Course: Measurement and Control				
Lecturers: Radonjić Rajko, Nikolić Ž. Ilija, Milovanović M. Dobrica i Petar M. Todorović				
Status of course: Obligatory, joint for all modules, V semester				
Number of ECTS: 6				
Precondition: None				
The objective of course Introducing of students with measuring principals of basic physical values and with technical systems controlling and principals.				
The outcome of course Students should be capable to choose corresponding measuring method for set physical value. Students should have the notion of measurement error and the knowledge of basic methods for measurement results processing. Students should be capable to understand the need for controlling, correlation in between measurement and controlling. Students should also know the role and significance of basic elements of controlling systems. Students should be capable to recognize the basic executive organs of controlling systems.				
Syllabus Theoretical study The basic measurement theories, concepts and definitions, measurement error, SI system units, measuring of length, angle, cone and inclination; Measuring of displacement, speed and acceleration; Measuring of temperature and humidity; Measuring of forces and tensions, strain gages, Wheatstone's bridge, Measuring of torque, Measuring of pressure, measuring of level, Volumetric and mass flow measurement, Data acquisition systems (DAS), Measurement results processing; Controlling principals, Open loop and closed loop control systems, Laplace's transformation, System response and its determination; The bases of system stability, Transfer function, Block diagrams; Dynamical characteristics of first and second degree systems, Amplitude-frequent and phase-frequent characteristic; Executive organs of automatic control systems, electromotor (step, DC and AC), hydraulic and pneumatic executive organs, regulation valves, the basic controlling laws, The basis of digital controlling systems, PLC.				
Recommended reading 1. Scripts in printed and electronic form. (Radonjić Rajko, Ilija Nikolić, Dobrica Milovanović i Petar Todorović) 2. Grujović A., Osnovi teorije merenja, Mašinski fakultet u Kragujevcu, 1999. 3. Sekulić M., Osnovi teorije automatskog upravljanja, Naučna knjiga Beograd, 1975. 4. Matijević M., Jakupović G., Car J., Računarski podržano merenje i upravljanje, MFK, 2005.				
The number of hours of active teaching:				Other classes: 1
Theory: 2	Practical classes: 2	Other forms of teaching: 1	Research study: 0	
Methods of teaching Teaching is performed through lectures, auditorium and laboratory exercises. Attending of more then 70% of lectures and exercises is obligated. Student's activities are rated during the teaching (70 points) and during the final exam (30%). Collecting of points is cumulative. Students obtain the right to participate in the final exam if they achieve more then 35 points during teaching.				
Evaluation of knowledge				
Pre-final exam obligations	points	Final exam	points	
Activities during the classes:	10	Final exam	30	
Practical classes:	10			
Colloquiums(s) :	40			
Seminar(s) :	10			