

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Communications and Information Technologies - System Engineering and Radio-Communications		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Measurements in Telecommunications		
Lecturer (for lectures)		Dončov S. Nebojša		
Lecturer/associate (for exercises)		Atanasković S. Aleksandar		
Lecturer/associate (for OFE)		Atanasković S. Aleksandar, Eferica M. Predrag		
Number of ECTS	6	Course status (obligatory/elective)	Obligatory	
Prerequisites				
Introduce students to the working principle and architecture of fundamental instruments for measurements in telecommunications. Acquisition of basic knowledge of measurement methods, their applications and limitations. Training to work with measurement equipment and software tools to automate the measurements.				
Course objectives				
Ability for proper selection and use of measuring instruments and measurement methods. Ability to process and use the results of measurements in assessing the performances of communication systems.				
Course outcomes				
Ability for proper selection and use of measuring instruments and measurement methods. Ability to process and use the results of measurements in assessing the performances of communication systems.				
Course outline				
Specific aspects of measurements in communication systems. Instrumentations for measurement (spectrum analyzers, frequency counters, power meters and appropriate power sensors, time domain reflectometers and optical reflectometers - OTDR, scalar and vector network analyzers, BERTS measuring instruments, protocol analyzers, etc.) Measurement methods and principles. Measurements in time and spectral domain. Measuring frequency of RF and microwave signals. Time domain reflectometry for testing telecommunication cables with metal conductors. Optical reflectometry. Microwave scalar and vector measurements. Measurements in optical communication systems. Specific measurements on optical fibers. Measurements in digital communication systems. Automation of measurement. Software tools for data acquisition and automation of the measurement procedure. Virtual instrumentations. Algorithms and techniques for control of measurement equipment and receiving and processing of different types of communication signals.				
Theoretical teaching				
Auditory exercises. Practical laboratory work with instruments for measuring the basic performances of communications systems. Processing of measurement data.				
Practical teaching (exercises, OFE, study and research)				
Auditory exercises. Practical laboratory work with instruments for measuring the basic performances of communications systems. Processing of measurement data.				
Textbooks/references				
1	Clyde F. Coombs, Electronic Instrument Handbook, 3rd edition, McGraw-Hill Professional, 2000.			
2	Robert A.Witte, Spectrum and Network Measurements, 2nd edition, SciTech Publishing, 2014.			
3	Christoph Rauscher, Fundamentals of Spectrum Analysis, 5th edition, Rohde & Schwarz, 2007.			
4	Richard Collier, Doug Skinner, Microwave measurements, 3rd edition, IET, 2007.			
5	Nebojša S. Dončov, Measurement in telecommunications (in Serbian), script, 2010.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	2	0	0
Teaching methods				
Lectures, auditory exercises, laboratory work, consultations.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures		5	Written exam	20
Exercises		40	Oral exam	20
Colloquia		15		
Projects				