

		Course title: <i>Digital telecommunication systems</i>		
Course code	Course status	Semester	Number of ECTS credits	Lecture hours
<i>PA3201</i>	Mandatory	<i>II</i>	5	3P+1V+1L

Study program:

Postgraduate master studies, ELECTRICAL ENGINEERING, study program: Electronics, Telecommunications and Computer engineering, Department: Telecommunications and Microwave technique (choice subject) (studies last for 10 semesters, 300 ECTS credits).

Prerequisites:

No prerequisites required.

Course aims:

Students will be introduced with basic elements of digital communication systems. The digital modulation, optimal receivers in the condition of the white Gaussian noise and intersymbol interference are studied. Students will be introduced with synchronization of the symbols and carriers. The linear blocks of codes, convolutional codes and code modulations are studied. Students are introduced with multichannel digital communications, transmission by multicarriers and techniques of the transmission by spread spectrum

Teacher(s) first and last names: *Doc. Dr Zoran Veljovic*

Studying method:

Lectures, exercises, laboratory exercises, individual work on practical tasks, consultations.

Course synopsis:

Preliminary week I week II week III week IV week V week VI week VII week VIII week IX week X week XI week XII week XIII week XIV week XV week XVI week Final week XVIII-XXI week	Preparation and semester enrolment. Introduction. Elements of digital communication systems Narrowband digital modulation. Analysis of the systems requests. Criteria of the modulation efficiency Demodulation. Optimal signal receivers in AWGN channel Performances of optimal receivers for modulation without memory Optimal receiver for CPM signals and for signals with random phase in AWGN channel Synchronization of the symbols and synchronization of the carriers I colloquium Free week Capacitance of the channels and coding. Linear block codes. Convolutional codes. Codes modulations. Design of signals for limited band channel. Optimal receiver for channels with ISI and AWGN. Linear equalization. II colloquium Multi – channel digital communications in AWGN channel. Transmission by multi – carriers. Transmission by spread spectrum. Direct sequence. Frequency jumps. Repeated colloquium Final exam
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STUDENT WORKLOAD

<u>per week</u>	<u>per semester</u>
Working hours: 5 credits x 40/30 = 6 h 40 min Working hours structure: 3 hours for teaching 1 hour for exercises 1 hour of laboratory exercises 1h 40min hours for individual work, including consultations.	Teaching and the final exam: (6h 40min) x 16 = 107hours. Necessary preparation (before semester): 2 x (10hours) = 20hours. Total work hours for the course: 5x30=150hours Additional hours for preparing correction of the final exam, including the exam taking: up to 23hours. Work hours structure: 107hours (lectures) + 20hours (preparation) + 23hours (additional work)

Lessons attendance is mandatory for students, as well as doing homeworks and seminar works, etc.

Literature: J.G. Proakis, Digital Communications, 3rd edition, Wiley, January 2000.
 J.B. Anderson, Digital Transmission Engineering, 2nd Edition, Wiley, August 2005.

The forms of knowledge testing and grading:

- Class activity carry **10** points.
- I colloquium and II colloquium carry 20 point (**40** points total).
- Final exam carries 50 points

Student gets the passing grade by collecting **50** points at least.

Special remarks for the course : The lectures are taught to the group of 40 students, laboratory exercises 5 students
Teacher(s) who provided the information: <i>Dr. Zoran Veljovic</i>
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