

Course title: *Digital signal processing (advanced course)*

Course code	Course status	Semester	Number of ECTS credits	Lecture hours
PA2205	Elective	II	5	3L+1E

Study program:

Graduate academic studies, ELECTRICAL ENGINEERING, study program: Electronics, Telecommunications and Computer engineering (studies last for 4 semesters, 120 ECTS credits).

Prerequisites:

Digital signal processing – basic course.

Course aims:

Students will be introduced in actual issues related to signal processing, mainly using time-frequency signal analysis.

Teacher(s) first and last names : *Prof. dr Ljubiša Stanković*

Studying method:

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

Course synopsis:

Preliminary week	Preparation and semester enrolment.
I week	Introduction, Digital signal processing, signal classification, instantaneous frequency, group delay
II week	Signal representation: time, frequency, scale; Two-dimensional representation
III week	Time-frequency analyses, STFT, spectrogram, WD
IV week	Cohen class of time-frequency distributions
V week	Practical aspects of signal processing using time-frequency analysis
VI week	<i>I colloquium (seminar work);</i>
VII week	<i>Free week</i>
VIII week	S-method
IX week	Analysis of noise influence on time-frequency distributions
X week	Instantaneous frequency estimation
XI week	Estimation of signal's amplitude and energy
XII week	Higher order time-frequency distributions
XIII week	<i>II colloquium (seminar work);</i>
XIV week	<i>Wavelet transform</i>
XV week	Applications of time-frequency and wavelet tools in digital signal processing
XVI week	<i>Final exam</i>
Final week	Administrative procedures.
XVIII-XXI week	Additional lessons, correction of the final exam and administrative procedures.

STUDENT WORKLOAD

<p><u>per week</u></p> <p>5 credits x 40/30 = 6 h and 40 min</p> <p>Working hours structure:</p> <ul style="list-style-type: none"> 3 h for lectures 1 h for exercises 2 h and 40 min for individual work, including consultations 	<p><u>per semester</u></p> <p>Teaching and the final exam: (6 h 40 min) x 16 = 106 h 40 min</p> <p>Necessary preparation (before semester): 2 x (6h i 40 min) = 13 h and 20 min</p> <p>Total work hours for the course: 5x30 = 150 h</p> <p>Additional hours for preparing correction of the final exam, including the exam taking: up to 30 hours.</p> <p>Work hours structure:</p> <p>106 h and 40 min. (Lectures)+13 h and 20 min. (Preparation)+30 h (additional work)</p>
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Lessons attendance is mandatory for students, as well as doing homeworks and colloquiums, etc.

Literature:

L.J. Stanković et. al., Time Frequency Signal Analysis, monografija, 2001
B. Boashash: Time-Frequency signal analysis – a comprehensive reference, ELSEVIER, 2003

The forms of knowledge testing and grading:

- 5 homeworks - 20 points in total (4 points for each homework),
- 2 colloquiums (seminar work) - 20 points each (40 points in total)
- Final exam - 40 points.

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

Special remarks for the course : If needed, the course can also be taught in English.

Teacher(s) who provided the information: *Prof. dr Ljubiša Stanković, Doc. dr Miloš Daković*

Note: Additional information are available at <http://www.dos.cg.ac.yu/>