

Course title:	Control theory
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Course code	Course status	Semester	Number of ECTS credits	Lecture hours
131005057	Mandatory	V	6	3+2

Study program:

Basic academic studies, ELECTRICAL ENGINEERING, study program: Power systems and Control (studies last for 6 semesters, 180 ECTS credits).

Prerequisites:

No prerequisites required.

Course aims:

To familiarize students with the basic concepts of control theory. Students will be able to implement their knowledge gained in the field of control systems analysis and synthesis during the course on laboratory exercises.

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

Ph.D. Zdravko Uskoković – teacher
M.Sc. Aleksandar Vučinić – assistant

Studying method:

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

Course synopsis:

Preliminary weeks	Preparation and semester enrolment.
I week	Basic elements of control theory. Control systems classification.
II week	System components modelling: time-, complex- and frequency-domain.
III week	Characteristic transfer function. Characteristic polynomial. State-space model.
IV week	Solution of state equation. Controllability and observability.
V week	Stability. Stability criteria.
VI week	First test
VII week	Free week
VIII week	Control systems analysis. System performances specification: steady state, transients, relative stability, disturbance rejection, system sensitivity.
IX week	Determination of characteristic parameters in time-, complex- and frequency-domain.
X week	General methods for analysis and synthesis: Nyquist method, Bode method, Evans (root locus) method.
XI week	Control system synthesis. Structural synthesis. Controller types: P, I, D, PI, PID.
XII week	Controller types: integral, differential, integral-differential. Feasibility of controllers.
XIII week	Second test
XIV week	System compensation using Bode method: synthesis of integral, differential and integral-differential controller.
XV week	System compensation using Evans method: synthesis of integral, differential and integral-differential controller.
XVI week	Final exam
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>
Working hours: 6 credits x 40/30 = 8 hours.	Teaching and the final exam: (8 hours) x 16 = 128 hours.
Working hours structure:	Necessary preparation (before semester): 2 x (8 hours) = 16 hours.
2 hours for teaching	Total work hours for the course: 6 x 30 hours = 180 hours
1 hour for exercises	Additional hours for preparing correction of the final exam, including the exam taking: up to 36 hours.
2 hours for laboratory exercises	Work hours structure:
3 hours for individual work, including consultations.	128 hours (lectures) + 16 hours (preparation) + 36 hours (additional work)

Lessons attendance is mandatory for students, as well as doing home and laboratory exercises and both tests.

Literature:

Stojić.M.: Kontinualni sistemi automatskog upravljanja, Nauka, Beograd.
Kovačević B.: Zbirka zadataka iz automatskog upravljanja.
Z.Uskoković, L.J. Stanković, I. Đurović, Matlab for Windows, Univerzitet Crne Gore.

The forms of knowledge testing and grading:

- Home exercises carry 3x1 points.
- Laboratory exercises carry 7 points.
- Each test carries 20 points (40 points total).
- Final exam carries 50 points.

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

Special remarks for the course: The teaching is organized for student groups with approximately 40 students, and laboratory exercises for groups with 6 students.

Teacher(s) who provided the information: Ph.D. Zdravko Uskoković

Remark: