

<b>Course title:</b>	<b>Automatic Control Systems</b>
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Course code	Course status	Semester	Number of ECTS credits	Lecture hours
131105058	Mandatory	V	4.5	3 + 1

**Study program:**

Basic academic studies, ELECTRICAL ENGINEERING, study program: Electronics, Telecommunications and Computer engineering (studies last for 6 semesters, 180 ECTS credits).

**Prerequisites:** No prerequisites required.

**Course aims:** Course objective is to inform students about basic concepts in automatic control systems. Theoretical knowledge accepted in the lessons, from the area of analysis and synthesis of automatic control systems, students can test at laboratory exercises.

**Teacher(s) and assistant(s):**

PhD Novak Jauković – teacher, MSc Aleksandar Vučinić - assistant

**Teaching method:** Lectures (which include exercises), laboratory exercises, studying, individual work and consultations.

**Course synopsis:**

Preliminary weeks	Preparation and semester enrollment
I week	Basic theory ideas of the automatic control systems. Classification of the control systems.
II week	Mathematic modeling of the system components: time, complex and frequency domain.
III week	Characteristic transfer functions. Characteristic polynomial. System model in space state.
IV week	Solving the state equations. Controllability and observability of the systems.
V week	Stability. Stability criterion.
VI week	<b>First test.</b>
VII week	<b>Free week.</b>
VIII week	Control systems analysis. System performance specification: Steady state, transient regime, relative stability, solving disturbance, system sensitivity to small parameter changes.
IX week	Characteristic values determination in the time, complex and frequency domain.
X week	General analysis and synthesis methods: Nyquist' method, Bode' method, Evans' (root locus) method.
XI week	Control system synthesis. Structured synthesis. Types of the industrial controllers: P, I, D, PI, PID.
XII week	Compensator types: integral, differential, integral-differential. Controllers' physical feasibility.
XIII week	<b>Second test.</b>
XIV week	System compensation by Bode' method: synthesis of the integral, differential, and integral-differential coordinator.
XV week	<b>Final exam</b>
XVI week	
Final week	Administrative procedures.
XVIII-XXI week	Remedial work, correction of final exam and administrative procedures.

**STUDENT WORKLOAD**

<u>Per week</u>	<u>Per semester</u>
<b>4,5 credits x 40/30 = 6 hours</b>	Teaching and final exam: (6 hours)x16= 96 hours
Structure: 2 hours for teaching, 1 hour for exercises, 1 hour for laboratory exercises, 2 hours for individual work	Necessary preparation before and after the lectures (administration): 2x(6 hours)= 12 hours
(including consultations, doing home works, preparation for the tests and final exam).	<b>Total work hours for course: 4.5x30 hours= 135 hours</b>
	Additional work: for preparing correction of final exam, including an exam taking - up to 27.
	Work hours structure: 96 hours (lectures) + 12 hours (preparation) + 27 hours (additional work).

Lessons attendance is mandatory for students, as well as doing home exercises, laboratory exercises and 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:**

- 3 home exercises carry 3 points (each home work carries 1 point),
- Two tests carry 40 points (each test carry 20 point),
- Laboratory exercises carry 7 points,
- Final exam carries 50 points.

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

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

**Teacher(s) who provided the information: PhD Zdravko Uskoković**

**Remark:**