

Course title: High-voltage networks and lines

Course code	Course status	Semester	Number of ECTS credits	Lecture hours
131005044	Mandatory	V	4	2+1

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:

Through this course, students are introduced with basic functions of the power system and its basic components. Power lines and networks, at the level of the electrical energy transmission, is studied in details. Students acquire knowledge, necessary for better understanding of the other disciplines during the studies, and for the solving problems which they can meet in their future work practice. Through the exercise lessons, students are introduced with the power transmission system of the Montenegro, and they are solving problems from the areas of mechanical, electrical and technical-economic calculations.

Teacher(s) and assistant(s):

PhD Jadranka Radović - teacher, Mr Snežana Vujošević - assistant

Teaching method:

Lectures (which include exercises) and visiting substations. Studying and individual work on solving problems. Consultations.

Course synopsis:

Preliminary weeks	Preparation and semester enrolment.
I week	Introduction: Structure and basic functioning principles of the power system and subsystem for transmission of the electric energy.
II week	Classification of the power networks. High voltage (HV) networks: functions, configurations.
III week	Overhead power lines: types, realizations. Elements: horizontal and inclined span.
IV week	Mechanical calculation: additional burden, tension, state equation, critical span, critical temperature.
V week	HV cables: types, realizations, cable laying.
VI week	First test
VII week	Free week
VIII week	Parameters calculation for the power lines: resistance, direct inductivity and zero order inductivity
IX week	Direct capacity and zero order capacity, ground influence. Conductivity. Corona
X week	Transmission equations. Power line equivalent schemes.
XI week	Voltage drop and power losses at the power lines. Circle diagram of the power line. Power limit of the power line.
XII week	Influence of the overhead power lines on the telecommunication lines.
XIII week	Second test.
XIV week	Basics of the technical-economic calculation. Uniqueness of the planning and exploitation of the transmission networks.
XV week	An overview of the protection, automation, monitoring and management of the power systems.
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>
<p style="text-align: center;">4 credits x 40/30 = 5 hours and 20 minutes</p> <p>Work hours structure:</p> <ul style="list-style-type: none"> 2 hours for teaching 1 hour for exercises 2 hours and 20 minutes for individual work, including consultations. 	<p>Teaching and the final exam: (5 h 20 min.) x 16 = 85 h 20 min.</p> <p>Necessary preparation (before semester): 2 x (5 h 20 min.) = 10 h 40 min.</p> <p>Total work hours for the course: 4 x 30 hours = 120 hours</p> <p>Additional hours for preparing correction of the final exam, including the exam taking - up to 24 hours (the rest of the time from the first two items, up to the total work hours for the course, 120 hours).</p> <p>Work hours structure:</p> <p>85 h 20 min. (lectures) + 10h 40 min. (preparation) + 24 hours (additional work)</p>

Lessons attendance is mandatory for students, as well as doing home exercises, both tests and participating in substations visits.

Literature: Handout: J. Radović, Visokonaponske mreže i vodovi, Podgorica 2003.

G. Muždeka, N. Rajaković, Zbirka riješenih zadataka iz prenosa električne energije, Beograd, 1992.

The forms of knowledge testing and grading:

- 2 home exercises carry 10 points (5 point each)
- 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: Part of the teaching lessons, as well as individual students' work, must be realized in the computer classroom. Visiting substations is realizing according to the annual plan, uniquely for the groups of the similar courses.

Teacher(s) who gave the information: PhD Jadranka Radović

Remark: