

Course title: Power system analysis I

Course code	Course status	Semester	Number of ECTS credits	Lecture hours
131006083	Mandatory	VI	5.5	2+2+0.5

Study program:

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

Prerequisites:

Electric circuits theory.

Course aims: Power system analysis I comprises mathematical modeling and computations of the working states of systems in the stationary regime. Through this subject students are introduced with basic characteristics, definitions and principles of the systems' mathematical modeling, basic elements, as well as mathematically-numeric computation methods for the power flow and for the voltage and current states in the complex power networks. At the end, the elements of the optimal plant are discussed, as well as basic principles of the voltage frequency regulation.

Teacher(s) and assistant(s):

PhD Ilija Vujošević – teacher, MSc Zoran Miljanić - assistant

Teaching method:

Lectures (which include exercises) and laboratory exercises (performed in the computer classroom or laboratory). Consultations.

Course synopsis:

Preliminary weeks	Preparation and semester enrolment.
I week	I. Introduction. General characteristics of the power systems. Short historical overview. Basic ideas and definitions about energetics, power systems and electrical networks.
II week	II. Mathematical modeling of the power systems. Regime classification. Goal and general modeling method.
III week	An overview of the substitute schemes and mathematical models for the system elements.
IV week	Absolute and unit values method. III. The computation of the voltage and current states.
V week	Evaluation of the networks with injected load current. Iterative methods for solving the network equations.
VI week	First test
VII week	Free week
VIII week	IV. Power flow computation. Goals and importance of the power flow computation. Nodes classification.
IX week	Power flow equations in the concept of the independent nodes method and contour current method.
X week	Gaus-Seidel and Newton-Raphson iterative method.
XI week	The presence of the adjustable transformer. Decoupled "DC" model. V. Basic technical-economic computations. The principles of the economical source engagement.
XII week	Losses equation in power networks. Economical power dispatching.
XIII week	Second test
XIV week	VI. Regulation principles of power systems working regimes. Balance of active and reactive powers. Primary and secondary frequency regulation.
XV week	Voltage regulation in the complex systems.
XVI week	Final exam
Final week	Administrative procedures.
XVIII-XXI week	Additional lessons, correction of the final exam and administrative procedures.

STUDENT WORKLOAD

per week	per semester
5.5 credits x 40/30 = 7 hours and 20 minutes	Teaching and the final exam: (7 h 20 min.) x 16 = 117 h 20 min.
Work hours structure: 2 hours for teaching 2 hour for exercises 0.5 hour for laboratory exercises 2 hours and 50 minutes for individual work, including consultations.	Necessary preparation (before semester): 2 x (7 h 20 min.) = 14 h 40 min. Total work hours for the course: 5.5 x 30 hours = 165 hours Additional hours for preparing correction of the final exam, including the exam taking - up to 33 hours Work hours structure: 117 h 20 min. (lectures) + 14 h 40 min. (preparation) + 33 hours (additional work)

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

Literature:

I. Vujošević: Skripta - kopija predavanja, ETF Podgorica, 2005.
M. Čalović, T. Sarić: Osnovi analize elektroenergetskih mreža i sistema, Akademska misao Beograd, 2004.
N. Rajaković, M. Čalović, A. Savić, P. Stefanov: 100 rešenih zadataka iz analize elektroenergetskih sistema, ETF Beograd, Akademska misao, 2002.

The forms of knowledge testing and grading:

- 5 home exercises carry 5 points (1 point each),
- Laboratory exercises test carries 5 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:

Teacher(s) who gave the information: PhD Ilija Vujošević

Remark:

