

SYLLABUS

1. Course title:

Power System Substations

2. Code:

EEMS106

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course: Mandatory Elective**6. Prerequisites:**

[EEMS006] Low Voltage Electrical Installation

7. Class restrictions:**8. Duration / semester:**

1

6

9. Weekly contact hours:

9.1. Lectures:

3

9.2. Seminars:

1

9.3. Laboratory/Practice classes:

1

10. Faculty:

Faculty of Electrical Engineering

11. Department/study program:

Electrical Engineering and Computer Science

12. Lecturer:

Ph.D. Suad Halilčević, full prof.

13. Lecturer's e-mail:

suad.halilcevic@untz.ba

14. Web site:

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15. Course aims:

Planning, designing, building, management and maintenance of the electric power substations.

16. Learning outcomes:

At the end of the semester/course, successful students who continuously fulfilled their duties throughout the teaching period, will be able to design and to participate in development and management of power system substations.

17. Course content:

Introduction. Sorts of the Power System Substations. Insulation Coordination. Testing Voltages. Calculation of Short-Circuit Currents. Method of the equivalent voltage source. Method IEC 60909. The Impedance Method. Protection from the unallowed voltages in LV electricity instalation. The Primary Electrical Circuits. Buses. Input-Output Cell. Measurement Cell. Transformer Cell. Connection Cell. Circuit Breakers. Design and Directions of Development. Other switchgear equipment. Insulators. Current and Potential Transformers. Scheme of Electrical Substations. UHV, EHV, and HV. Substations with the switches - IEC 265 and IEC 420. Gas Insulated Substations. Modular Designs. Transformer substations in distribution of electrical energy. The Auxiliary Current Circuits; control, signalization, and blocking. Batteries. Communications in Power Systems. Methods of telemetering. Grounding. Lightning protection. SCADA. Reliability. Aging of equipment. Strategy, Management, and Decision Making on Substations as the Integrally Parts of Power System. EU directives.

18. Learning methods:

Observation and reflection, creation of abstract concepts and active experimentation, concrete experience. The most important learning methods are:

- Lectures with the use of multimedia resources, active learning techniques and with active participation and discussion of students;
- Auditive exercisers;
- Preparation and presentation of group and individual seminar papers.

Styles of learning: visual style, auditive, verbal, kinesthetic, logical-mathematical, social and independent.

19. Assessment methods:

Continuous assessment during the semester is performed through two periodical tests and final verbal exam.

20. Assessment components:

Arithmetic mean of assessment methods grades.

21. Required reading list:

K.Nakanishi, Switching Phenomena in High-Voltage Circuit Breakers, Marcel Dekker, 2000.
M.A.Salam, H.Anis, A.El-Morshedy, R.Radan, High-Voltage Engineering, Marcel Dekker, 2005.
D.J.McDonald, Electric Power Substations Engineering, CRC Press, 2007.

22. Web sources:**23. Applicable starting from the academic year:**

2016/2017

24. Adopted in the Faculty/Academy session:

04.04.2016