SYLLABUS

1. Course title:

Electrical Substations

2. Code:

ESKE301

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

(•) Mandatory ( ) Elective

6. Prerequisites:

Power Networks

7. Class restrictions:

Faculty of Electrical Engineering students, study program "Electrical Engineering and Computer Science" with fulfilled

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:

PhD Mensur Kasumović, assistant professor

13. Lecturer's e-mail:

mensur.kasumovic@untz.ba

14. Web site:

www.fet.ba

15. Course aims:

Course aim is to learn students basic knowledge about electrical substations for electrical energy transmission and distribution. Presented knowledge will ensure observation of this area through three aspects: functions and charasteristics of substation elements, their construction and working principle.

16. Learning outcomes:

After completing the course, the students will be able: for basic design and analysis of electrical substations, from their parameter calculations to finally selection of equipment on the standard and regulations base.

17. Course content:

Historical review of electrical substations. Voltage and current stresses in electrical substations. Impedance of power system elements. Short circuit calculation - current and voltage calculation. The standards and regulations for short circuit calculations. Types of short circuit calculations for substation elements selection. Constuction of electrical substations. Gas insulated substations. Air insulated substations. Single and double buses, main and auxiliary buses, ring buses, comparison between different configurations. Charasteristics of main electrical substations elements (buses, insulators, switches, circuit breakers and fuses). Power transformers and criterion for its selection. Measurement transformers. Main electrical circuits basic schemes. Protection equipment in electrical substations. Measurement in electrical substations. Automation in electrical substations: data acquisition, online and offline monitoring, communication equipment in substations. Reactive power compensation. Operational grounding.

18. Learning methods:

Lectures, seminars and laboratory classes. One part of teaching process is with classical methods (frontally using board), and the other one is using multimedial content (presentation, video clips and computer animations). During semester, for better understanding of teoretical knowledge, students goes to visit some electrical substations for energy transmission and distribution.

19. Assessment methods:

The final grade is based on the continuous assessments, which are performed throughout the semester and the final exam.
Continous assesment throughout the semester consists two tests, which are combination of theoretical questions and tasks. Maximum number of points on every test is 35. Test become organized in 8. and 15. week of semester.
During semester students gain points (maximum 10 points) throughout lessons presence and activity on laboratory classes.
Maximum number of points on the final exam is 20.
Minimal number of points for succesfully passed exam is 54.

20. Assessment components:

Student can achieve maximal 100 points based on this scale:

Test I	35
Test II	35
Lessons presence	5
Laboratory activities	5
Total during semester	80
Final exam	20
Total	100

21. Required reading list:

1. H. Požar, Visokonaponska rasklopna postrojenja, Tehnička knjiga, Zagreb, 1990.
2. J.D. McDonald, Electric Power Substations Engineering, CRC Press, 2003.
3. D.F. Warne, Electrical Power Engineering Handbook, Elsevier, 2005.

22. Web sources:

(max. 687 characters)

23. Applicable starting from the academic year:

2016/17

24. Adopted in the Faculty/Academy session:

04.04.2016