# SYLLABUS

**1. Course title:**

Power System Relaying

**2. Code:**

EEMS108

**3. Cycle of study:**

1

**4. ECTS credits:**

6

**5. Type of course:**

(•) Mandatory ( ) Elective

**6. Prerequisites:**

[EEMS002] Theory of Electrical Circuits

**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:**

**15. Course aims:**

Introduction to the power system relaying world. Planning, designing, building, management and maintenance of the power system relaying schemes.

**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 power system relaying and managing schemes and to work on maintenance and correction of the power system relaying protection.

**17. Course content:**

Introduction. The Role of Relaying in a Power System. Protective Relaying. Basic Demand for Relaying. Development. Electromechanical Relay. Static Relay. Microprocessor-based (digital) relays. Current Relays. Differential Current Relays. Relays of the Symmetrical Components. Voltage Relays. Power Relays. Distance (impedance) Relays. Frequency Relays. Directional relays. Time Relays. Auxiliary Relays. Signal Relays. General Mathematical Theory of Relays as a Comparator. PC Applications in Short Circuit Studies for Designing Relaying Scheme. Protection of generator. Protection of power transformer. Protection of transmission lines. Bus Protection. Electromotor protection. Typical algorithm of digital protection. Design of the digital based protection. The Algorithms of digital protection based on Walsh function and Fourier analysis. The specifics of complex network relaying.

**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:**

A.T. Johns, S.K. Salman, Digital Protection for Power Systems, IEE, UK, 1995.
F. Božuta: „Automatski i zaštitini uređaji elektroenergetskih sistema“, Svjetlost, Sarajevo, 1987.
L.P. Singh, Digital Protection – Protective Relaying from Electromechanical to Microprocessor, H.S. Poplai for New Age International Limited, 1997.
P.M.Anderson: "Power System Protection, IEEE Press, 1998.
Y.G.Paithankar, Transmission Network Protection; Theory and Practice, Marcel Dekker, Inc., New York, 1998.
G.Ziegler, Numerical Distance Protection; Principles and Applications, Siemens AG, Berlin, 1999.
A.G.Phadke, J.S.Thorp: "Computer Relaying for Power Systems, John Wiley & Sons Inc., 2009.

**22. Web sources:**

**23. Applicable starting from the academic year:**

2016/2017

**24. Adopted in the Faculty/Academy session:**

04.04.2016