SYLLABUS

1. Course title:

Numerical Methods in Electrotechnics

2. Code:

EEMS005

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

(•) Mandatory ( ) Elective

6. Prerequisites:

7. Class restrictions:

8. Duration / semester:

1 4

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. Amir Nuhanović, full prof.

13. Lecturer's e-mail:

amir.nuhanovic@untz.ba

14. Web site:

15. Course aims:

The goal of this course is to introduce students with the most commonly used numerical methods for solving problems in electrical engineering. Solving practical problems of smaller dimensions in the field of electrical engineering, especially problems related to the electrical networks, in the oral and laboratory exercises, to acknowledge using a combination of different methods.

16. Learning outcomes:

After accepting of subject matter students are qualified for: understanding of meaning and need for numerical problem solving using computers/machines for approximate calculation; The iterative process, the convergence of the iterative series and the ways of estimating the approximate solution error; Model the simpler problems of linear electric networks and grids and apply the subject numerical methods for their solution.

17. Course content:

Floating Point Arithmetic. Round-off Errors. Solution of Nonlinear Equations, Simple Iterative Method. Newton Method. Examples in electrotechnics. Solution of Nonlinear Systems. Iterative Methods. Newton-Raphson Method. Related Application Examples: Nonlinear Electrical Cirquits. Polynomials, Finding Roots of Polynomials. Interpolation, Operators of Numerical Analysis, Polynomial Interpolation. Hermite olynomials. Approximation: Least-Squares approximation. Numerical Differentiation. Numerical Integration: Newton-Cotes integration formulas. Romberg algorithm. Gauss integration. Multivariate integration. Examples in electrotechnics. Direct and Iterative Methods for Systems of Linear Equations. LU-decomposition. Gauss and Gauss-Jordan algorithm. Jacobi and Gauss-Seidel algorithm, Applications. Finding Eigenvalue and Eigenvector. Modal Analysis. Application in stability analysis of electrical systems. Numerical Solution of Ordinary Differential Equations, Euler Method. Runge-Kutta Methods. Multistep Algorithms. Predictor-corrector Formulas. Stability of Numerical methods. Problem types in electrotechnics and their solution. Differential Equation Systems, Application in Dynamic Analysis of Electrical Networks.

18. Learning methods:

Lectures, oral and laboratory exercises: The lectures cover theoretical basics with simpler examples when needed, on oral part students work on numerical exercises, and in laboratory exercises, students solve problem solving using the appropriate software tool.

19. Assessment methods:

At the half of the semester written examination of the knowledge that covers up the half of subject matter is organized, enabling the student to achieve a maximum of 45 points. The attendance at the course is evaluated from 0 to 5 points, with 5 points being awarded if the student is present at all lectures and exercises, and each absence is penalized with one point. The final exam makes 50 points and consists of a written and/or oral exam of the second part of the subject matter.

20. Assessment components:

The examination mark is based on the total number of points the student has obtained by fulfilling the preconditions and passing the final exam. Students can achieve a maximum of 100 points (5 + 45 + 50).

21. Required reading list:

A.Nuhanović, M.Avdić, "Numeričke metode i Fortran 90", Univerzitet u Tuzli, 2006.
D.Tošić, "Uvod u numeričku analizu", Akademska misao, Beograd, 2004.
V.Levi, D.Bekut, "Primena računarskih metoda u elektroenergetici", Stylos, Novi Sad, 1997.

22. Web sources:

23. Applicable starting from the academic year:

2016/2017

24. Adopted in the Faculty/Academy session:

04.04.2016