SYLLABUS

1. Course title:

Optimization Methods in Electrotechnics

2. Code:

EEMS103

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

(•) Mandatory ( ) Elective

6. Prerequisites:

[MAT1] Mathematics I

7. Class restrictions:

8. Duration / semester:

1 5

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 optimization 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: to formulate and recognize the optimization problems of different types specified in the Course Content, to solve constrained and unconstrained nonlinear problems of different types; Model and solve specific problems that are commonly in the calculations of power grids.

17. Course content:

Nonlinear programming: Traditional approach, Lagrange Multipliers. Problem definition in electrotechnics. Univariate optimization: Fibonacci method, Polynomial approximation methods. Unconstrained optimization: derivative and nonderivative methods: Hooke-Jeeves and Powellov method, Cauchy method, Variable metric methods. Application: Optimal Power Flow and other problems in electrotechnics. Convex Optimization: Kuhn-Tucker optimality conditions, stability of linear and convex programs, gradient methods, method of feasible directions. Application. Nonconvex programming: Penalty function methods, interior-point method, Methods of extended Langrangian functions. Introduction to quadratic, fractional, separable, geometrical, multiogoal programming. Integer linear programming: branch and bound method, method of implicit enumeration, Monte-Carlo-methods. Application: Unit-commitment problem and other combinatorial problems. Introduction to Stochastic programming: Global optimization methods. Application.

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:

J.Petrić, S.Zlobec, "Nelinearno programiranje", Beograd, 1983
M.S.Bazaraa, H.D.Sherali, C. M. Shetty, "Nonlinear Programming: Theory and Algorithms", John Wiley, 1993.
V.Levi, D.Bekut, "Primena računarskih metoda u elektroenergetici", 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