SYLLABUS

1. Course title:

Matrix Methods in Electrical Engineering

2. Code:

EEMS004

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

(•) Mandatory ( ) Elective

6. Prerequisites:

7. Class restrictions:

8. Duration / semester:

1 3

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 Tokić, full professor

13. Lecturer's e-mail:

amir.tokic@untz.ba

14. Web site:

15. Course aims:

The main objective of this course is to give the basic knowledge and skills of applied matrix methods in electrical engineering. It is necessary to introduce the applicative possibilities of different methods of matrix algebra in static and dynamic electrical systems.

16. Learning outcomes:

At the end of the course, students will be able to: know and to successfully use the mathematical algebra, to know a great number of matrix methods, to know how to present electrical and electromechanical systems in matrix form, and to know how to apply matrix methods in the analysis of static and dynamic systems.

17. Course content:

Matrix representation of static and dynamic systems. Application to electrical and electromechanical systems. Matrix algebra in electrical engineering: homogeneous and nonhomogeneous systems, the rank of matrix, factorization. Application of decomposition in electrical engineering: orthogonal decomposition and singular value decomposition. Least squares method: the applied problems in electrical engineering. Eigenvalues, eigenvectors and the spectrum of the matrix in electrical engineering. The relationship of eigenvalues and time constants in the system. Application of Cayley-Hamilton theorem in electrical engineering. State-space representation of continuous and discrete electrical systems. The relation between transfer functions and state-space representation of the system. Transition matrix, the solution of state-space equations. Application of splines in computer drawing.

18. Learning methods:

Lectures and exercises - the classic learning approach using the board and table is applied.
Laboratory exercises - mandatory attendance of students and active participation in class. Exercises are performed in a computer center using the appropriate software packages.

19. Assessment methods:

The exam is written and oral. The written exam is a combination of theoretical issues and computational examples done on lectures and exercises. The final exam is oral exam consisting of discussion of theoretical issues.

20. Assessment components:

Rating exam is based on the total number of points that student earned by completing pre-exam and a final exam. The student can achieve a maximum of 100 points according to the following scale:
Test 1 - 45
Test 1 - 45
Total Prerequisites: 90
Final exam: 10

21. Required reading list:

S. D. Meyer: "Matrix Analysis and Applied Linear Algebra, SIAM, New York, 2000.
S. Turk, L. Budin: "Analiza i projektiranje računalom", Školska knjiga, Zagreb, 1989.
B. Stefanini, S. Babić, M. Urbiba-Feuerbach: "Matrične metode u analizi električnih mreža", Školska knjiga, Zagreb, 1975.

22. Web sources:

23. Applicable starting from the academic year:

2016/2017

24. Adopted in the Faculty/Academy session:

04.04.2016.