SYLLABUS

1. Course title:

Linear Automatic Control Systems I

2. Code:

AR103

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

(●) Mandatory ( ) Elective

6. Prerequisites:

[MAT1] Mathematics I, [MAT2] Mathematics II, [FIZ1] Physics I, [FIZ2] Physics II

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. Naser Prljača, full professor

13. Lecturer's e-mail:

naser.prljaca@untz.ba

14. Web site:

15. Course aims:

The main goal of the course is to present the fundamental knowledge of the theory of automatic control systems. It introduces the basic techniques of analysis and design of continuous linear control systems in the transfer function domain. It also represent a modern software and hardware tools for analysis, design and implementation of control systems.

16. Learning outcomes:

Students will develop a systematic mathematical approach to the analysis and design of automatic control systems, and will be able to model, analyze and design a so-called conventional (classical) control system for systems of medium complexity.

17. Course content:

Basic concepts and principles of automatic control systems. Open and closed loop control. Mathematical modelling of continuous linear and nonlinear systems. Mathematical modeling of mechanical, electrical, electromechanical, hydraulic, pneumatic and thermal systems. Linearization of nonlinear system models. Solving the model of linear time-invariant systems. Laplace transform and transfer function definition. Block diagrams. Block diagram algebra and signal flow graph. Mason formula. Automatic control system performance specifications, transient and steady state specifications. Stability of dynamical system. Stability analysis by algebraic methods. Root locus method. The design of the linear pole placement regulator in the transfer function domain . All stabilizing regulators. Integro-differential compensators. Regulators of PID type. The design of PID controller using the root locus method. The experimental tuning of the PID controllers. Advanced control schemes.

18. Learning methods:

19. Assessment methods:

20. Assessment components:

21. Required reading list:

N. Prljača, Z. Šehić, Automatsko Upravljanje – Analiza i Dizajn, Mikroštampa , Tuzla, 2008
R. Dorf, R. Bishop, Modern Control Systems, Prentice Hall, 2010
Z. Gajić, M. Lelić, Modern Control Systems Engineering, Prentice Hall, 1996

22. Web sources:

23. Applicable starting from the academic year:

2016/2017

24. Adopted in the Faculty/Academy session:

04.04.2016