

SYLLABUS

1. Course title:

Digital Control Systems and Signal Processing I

2. Code:

AR301

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course: Mandatory Elective**6. Prerequisites:**

[AR102] Linear Dynamic Systems and Signals, [AR201] Linear Automatic Control Systems II

7. Class restrictions:**8. Duration / semester:**

1

7

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:

Phd. Zenan Šehić, full professor

13. Lecturer's e-mail:

zenan.sehic@untz.ba

14. Web site:

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15. Course aims:

The aim of the course is to familiarize students with modern discrete (digital) systems and methods for the management and control of dynamical systems. To introduce students to discrete systems, and methods of discretization, implementation and simulation of discrete systems. Stability analysis and canonical forms of systems of records. Digital filters. System analysis in discrete time in state space. Controller in state space.

16. Learning outcomes:

Learning outcomes are that students overcome the modern discrete (digital) systems and methods for the management and control of dynamical systems.

17. Course content:

Fourier analysis and sampled signals. Z-transform and inverse Z-transform. Discrete and fast Fourier transform. Equations of state functions and portable discrete control systems. The relationship between response and eigenvectors. Discrete fundamental matrix and state transition matrix. The equilibrium state of a discrete system. The response of a discrete non-homogeneous systems. Simulation and realization of discrete system frequency response of the system, discrete equivalents of continuous transfer functions. Methods of transformation (bilinear method and stepped invariance). Canonical forms. Analysis of observability, controllability and stability. The controller and observer states. The behavior of the system between the sampling points. Control of the system with time delay.

18. Learning methods:

Planned activities: concrete experience, observation and reflection, creation of abstract concepts and active experimentation. Preferred learning styles are: visual style, auditory, verbal, kinesthetic, logical-mathematical, social and independent. The most important learning methods are:

- Lectures with the use of multimedia resources, active learning techniques and with student's active participation and discussion;
- Auditive exercises;
- Preparation and presentation of group and individual seminar papers

19. Assessment methods:

The exam is conducted orally and in writing. The written exam is a combination of theoretical issues and computational examples done on lectures and laboratory exercises. The final exam is oral exam consisting of theoretical issues.

20. Assessment components:

Student's obligations	Points
Attendance at lectures	5
Attendance at exercises	5
Seminar	10
Mini tests	30 (2x15)
Total preexam obligations	50
Final exam up to	50

21. Required reading list:

D.Matko, "Diskretni regulacijski sistemi", Založba FER, Ljubljana 1991
K.Ogata: "Discrete time control", Prentice-Hall, 1990
K.Astrom, B. Wittenmark: "Computer Controlled Systems", Prentice-Hall, 1997

22. Web sources:**23. Applicable starting from the academic year:**

2016/2017

24. Adopted in the Faculty/Academy session:

04.04.2016