SYLLABUS

1. Course title:

Signal processing in mechatronics

2. Code:

3. Cycle of study:

I

4. ECTS credits:

3

5. Type of course:

Elective

6. Prerequisites:

7. Class restrictions:

8. Duration / semester(s):

I   VIII

9. Weekly contact hours and student workload:

	Semester (1)	I	Semester (2)		(for two-semester courses)	Workload: (hours)	
9.1. Lectures		2			Classes:	33,75	
9.2. Seminars		0			Individual work:	55,83	
9.3. Laboratory / Practice classes		1			In total:	89,58	

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Mechatronic

12. Lecturer:

Ph.D. Almir Osmanović, Associate professor

13. Course aims:

To enable students to understand, apply and implement signal processing techniques for extracting useful information, analyzing behavior and controlling mechatronic systems.

14. Learning outcomes:

After successfully completing the course, the student will be able to:
- Mathematically describe signals, draw signals, and determine signal properties.
- Understand the basic concepts of signals and systems in continuous and discrete time.
- Analyze the time characteristics of continuous and discrete signals.
- Apply Fourier series and Fourier transform to analyze continuous and discrete signals in the frequency domain.
- Understand the process of discretization of continuous signals and apply the Z-transform to analyze discrete systems.

15. Course content:

1. Introduction to signals and systems.
2. Continuous-time signals.
3. Discrete-time signals.
4. Analysis of continuous and discrete signals.
5. Development of continuous signals into Fourier series.
6. Fourier transform of continuous signals.
7. First test.
8. Development of discrete signals into Fourier series.
9. Fourier transform of discrete signals.
10. Analysis of systems in the frequency domain.
11. Discretization of continuous signals.
12. Z-transform.
13. Equations of state of systems.
14. Intelligent control systems.
15. Second test.

16. Learning methods:

Lectures – Lectures present the theoretical part of the material accompanied by examples for easier understanding of the material. Lectures using multimedia tools, active learning techniques and active participation and discussions of students. Practical examples are worked on in laboratory exercises, while acquiring practical skills related to the topic of the subject being studied, active learning techniques and active participation and discussions of students.
Consultations represent an individual or group form of support for students, where they have the opportunity to ask additional questions, clarify ambiguities and receive specific guidelines regarding the teaching material and assignments. Consultations with teachers on a weekly basis.
Part of the teaching can also be organized through "distance learning", which is more closely regulated by the decision of the Senate.

17. Assessment methods:

Attendance at all classes is mandatory and a record is kept of it, on the basis of which the student receives a signature from the subject teacher after each semester. Due to illness or other justified reasons, a student may miss a maximum of 20% of classes.
The student has the right to take each individual knowledge assessment. After half of the semester, students take a written test (1 partial exam - theory test and test tasks) that covers the topics covered in lectures and exercises so far. All students in the course take the test at the same time, which achieves uniformity in the level of knowledge being tested, as well as the conditions under which the student takes the exam. The test consists of tasks, multiple-choice tasks, simple recall tasks or essay tasks. On 1 test - tasks, a student can achieve a maximum of 22.5 points and from the test-theory 22.5 points, and in order to pass the test, they must achieve a minimum of 50% of points. A student who has not passed the exam can take the exam again on the following test dates. The second test (2 partial exams - theory test and test tasks) is taken by students at the end of the semester.
The final exam is oral. In the oral exam, the student answers questions drawn from the subject topics covered in lectures and exercises. The oral exam can be passed if the student answers all the questions correctly. The maximum number of points on the final oral exam is 10.
To pass the course, the student must achieve a minimum of 54 cumulative points.

Grading system: (45)+(45)+(10)=100

Grade	described	by letter	points
5 (five)	Does not meet minimum criteria	F;FX	<54
6 (six)	meets the minimum criteria	E	54 -64
7 (seven)	Generally good, but with significant flaws	D	65-74
8 (eight)	Average, with noticeable errors	C	75-84
9 (nine)	Above average, with some errors	B	85-94
10 (ten)	Exceptional success without mistakes or with minor mistakes	A	95-100

18. Assessment components:

Grading will be based on the following activities:

PRE-EXAM OBLIGATIONS (total points): 90
Test - tasks (2x22.5 points)   45
Test - theories (2x22.5 points)   45

FINAL EXAM - oral (total points):   10

TOTAL: 100

19. Mandatory reading list:

1. Popović M. (2006). Signali i sistemi. Akademska misao.

20. Additional reading list:

1. Matthew N. O. Sadiku; Warsame H. Ali; Sarhan M. Musa (2024). Signals and Systems - A Primer with MATLAB. CRC Press

21. Web sources:

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: