SYLLABUS

1. Course title:

Fundamentals of mechatronic

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   VI

9. Weekly contact hours and student workload:

				(for two-semester courses)	Workload: (hours)	
Semester (1)	I	Semester (2)				
9.1. Lectures	2				Classes:	33,75
9.2. Seminars	1				Individual work:	56
9.3. Laboratory / Practice classes	0				In total:	89,75

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Production engineering

12. Lecturer:

Ph.D. Mirza Bećirović

13. Course aims:

The main goal of teaching the subject "Fundamentals of Mechatronics" is to understand the nature, function and role of the elements that make up a mechatronic system and to master the necessary theoretical and practical skills in the field of studying the subject in order to increase knowledge in the field of mechatronic systems as well as the competitive

advantages of mechatronic systems through improving process efficiency and their successful integration with other segments in production processes.

14. Learning outcomes:

After successfully completing the course, the student will be able to:
• Define the basic concepts and principles of mechatronics as an interdisciplinary field.
• Identify key components of mechatronic systems (sensors, actuators, controllers).
• Explain the function and principle of operation of basic types of sensors and actuators.
• Understand the basic principles of controlling mechatronic systems.
• Apply basic modeling methods for simple mechatronic systems.
• Recognize the applications of mechatronics in various engineering fields.

15. Course content:

1. Introductory lectures, introducing students to the course syllabus, exam methods, etc.
2. Basic concepts of mechatronics; Concept and definition of a system;
3. Actuators; Division and their role in a mechatronic system;
4. Types of actuators; New actuators;
5. Sensors; Division and their role in a mechatronic system;
6. Types of sensors;
7. Modeling; Mathematical modeling of a mechatronic system; Models of mechatronic systems;
8. First test;
9. Algebra of transfer functions;
10. Automatic control of systems; Types of regulators;
11. Control with open and closed feedback;
12. Robot control;
13. Artificial intelligence-neural networks;
14. Programmable logic controllers;
15. Second test.

16. Learning methods:

- Lectures – theoretical lectures, active two-way communication between student and professor, mandatory student attendance;
- Laboratory exercises – problem solving with assignments related to the topic of the subject being studied, active two-way communication between student and assistant, mandatory attendance at exercises;
- Written (from the theoretical part and assignments);
- Seminar/graphic works – independent work of the student on solving the given problem;
- Consultations – clarification of any ambiguities related to the topic

17. Assessment methods:

Defense of seminar/graphic works – the student defends his/her work before the professor/assistant – answers the questions asked;
- Written (from the theoretical part and assignments) – the student solves the questions/assignments in a given period of time related to the topic of study;
- Laboratory exercise report – submitting a report on activities related to the implementation of certain laboratory exercises, answering the questions asked by the assistant;
- Final exam – oral answer to the questions asked by the professor;
- Make-up exam (written) – solving the questions/assignments in a given period of time related to the topic of study;
- Make-up exam (oral) – oral answer to the questions asked.

Grading system: (20)+(20)+(40)+(20)=(100) points

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:
- Seminar/Graphic work = 20 points.
- Test tasks (2x10) = 20 points.
- Theory tests (2x20) = 40 points.

- **Pre-exam obligations = 80 points.**
- **Final exam = 20 points.**
- **Total = 100 points.**

When solving the obligations related to knowledge testing, the student must earn more than 50% of the maximum number of points prescribed for a given activity. If the student does not earn the required number of points from a certain form of knowledge testing, he/she will take a make-up exam from the given segment of knowledge testing.

19. Mandatory reading list:

1. Šarić B, Trakić E. , Osnovi mehatronike sa rješenim zadacima, Univerzitet u Tuzli, Mašinski fakultet 2019.
2. Iserman R., 2003. Mechatronic Systems. London: Springer-Verlag;

20. Additional reading list:

1. Nordmann R. und Birkhofer H.: Maschine-elemente und Mechatronik I.Shaker Verlag, Aachen, 2002. ;

21. Web sources:

https://www.mtu.edu/mechatronics/

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: