SYLLABUS

1. Course title:

Actuators and sensors

2. Code:

3. Cycle of study:

I

4. ECTS credits:

6

5. Type of course:

Mandatory

6. Prerequisites:

7. Class restrictions:

8. Duration / semester(s):

1   VI

9. Weekly contact hours and student workload:

Semester (1)	I	Semester (2)		(for two-semester courses)	Workload: (hours)
9.1. Lectures	3			Classes:	67,50
9.2. Seminars	2			Individual work:	85,08
9.3. Laboratory / Practice classes	1			In total:	152,5

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Mechatronics

12. Lecturer:

PhD Mirza Bećirović, assistant professor

13. Course aims:

The main goal of execution of the subject "Actuators and sensors" is an understanding of the nature and actuators, which form a mechatronic system in order to increase mechatronic systems as well as the competitive advantage of mechatronic systems through improving the efficiency of the process and their successful integration with other segments in

production processes.

14. Learning outcomes:

At the end of the semester, successful students, who continuously performed theirs throughout the teaching period
Obligations shall be trained in the field of management and regulation of mechatronic systems, ie to independently
I can equip some mechanical system with adequate components - sensors and actuators with the aim of converting it to the
mechatronic system (management and control systems).

15. Course content:

1. Introduction to actuators and sensors.
2. Elements of automatic control systems;
3. Actuators; Application and classification of actuators;
4. Mechanical and fluid actuators;
5. Electric actuators;
6. New actuators;
7. Position of actuators in automatic control systems: Actuator control;
8. First test
9. Basic concepts of sensors; Application and classification of sensors;
10. Principles of sensor operation;
11. Sensors in robotics; Internal state sensors;
12. External state sensors;
13. Intelligent sensors;
14. Examples of actuator and sensor integration in mechatronic systems; Latest trends in the application of actuators and sensors within Industry 4.0.
15. Second test

16. Learning methods:

- Lectures – theoretical lectures, active two-way communication between student and professor, mandatory student attendance;
- Auditory and laboratory-practical exercises – solving problems with tasks 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 tasks);
- Seminar/graphic works – independent work of the student on solving the problem set;
- 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 set 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 set 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
Grading scale is as follows:

Grade	Description	Letter/Points
5 (five)	Does not meet minimum criteria	F <54
6 (six)	Meets minimum criteria	E 54-64
7 (seven)	Generally good, but with significant shortcomings	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 with no or minor errors	A 95-100

18. Assessment components:

Grading will be based on the following activities:
- Attendance at classes = 0 points.
- 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, Mehatronički sistemi-senzori sa riješenim zadacima, Univerzitet u Tuzli, Mašinski fakultet, Tuzla 2019. ;
2. Šarić B, Osmanović A., Mehatronički sistemi-aktuatori sa riješenim zadacima, Univerzitet u Tuzli, Mašinski fakultet, Tuzla 2019. ;

20. Additional reading list:

1. Eichmann B.,Gerth W., Popp K., 2006. Mechatronik. Leipzig: Fachbuchverlag.

21. Web sources:

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

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: