

SYLLABUS

1. Course title:

Flexible automation

2. Code:

3. Cycle of study:

4. ECTS credits:

5. Type of course:

6. Prerequisites:

7. Class restrictions:

8. Duration / semester(s):

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
	<input style="width: 40px; height: 20px;" type="text" value="I"/>	<input style="width: 40px; height: 20px;" type="text"/>		
9.1. Lectures	<input style="width: 40px; height: 20px;" type="text" value="2"/>	<input style="width: 40px; height: 20px;" type="text"/>	Classes:	<input style="width: 40px; height: 20px;" type="text" value="33,75"/>
9.2. Seminars	<input style="width: 40px; height: 20px;" type="text" value="0"/>	<input style="width: 40px; height: 20px;" type="text"/>	Individual work:	<input style="width: 40px; height: 20px;" type="text" value="51,83"/>
9.3. Laboratory / Practice classes	<input style="width: 40px; height: 20px;" type="text" value="1"/>	<input style="width: 40px; height: 20px;" type="text"/>	In total:	<input style="width: 40px; height: 20px;" type="text" value="85,58"/>

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, analyze and apply flexible technologies and automation systems in modern industrial environments.

14. Learning outcomes:

After successfully completing the course, the student will be able to:

Understand the concepts and principles of flexible automation systems, including modularity, reconfigurability, and adaptability.

- Design and implement control strategies for flexible automated processes.
- Evaluate the performance and efficiency of flexible automation systems.
- Identify and apply relevant technologies (e.g., robotic systems, sensors, software solutions) in the context of flexible automation.

15. Course content:

1. Introduction - Fundamentals of automation system theory.
2. Measuring devices.
3. Measurement and processing of measurement results.
4. Measurement of linear and angular displacement.
5. Measurement of speed and acceleration.
6. Measurement of force, torque and pressure.
7. Measurement of level and flow.
8. First test
9. Measurement of temperature and humidity.
10. Sensors in robotics.
11. Industrial communication networks and protocols.
12. Software-designed automation. LabView environment and application.
13. Application of microcontrollers and software tools in measurement and acquisition systems.
14. Intelligent automatic 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 15 points and from the test-theory 17.5 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 scoring system is the same as for the first test. As part of the pre-exam requirements, students are required to prepare an individual or group seminar paper on a given topic. The seminar paper is submitted in writing to the subject teacher, and then presented orally. All students in the group participate in the preparation and presentation of the group seminar paper, whose participation is evaluated individually. For the completed and presented seminar paper, a student can achieve from 0-25 points.

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 questions correctly. The maximum number of points on the final oral exam is 10.

In order to pass the course, a student must achieve a minimum of 54 cumulative points.

Grading system: $(25)+(30)+(35)+(10)=100$

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
Seminar paper	25
Test - tasks (2x15 points)	30
Test - theories (2x17.5 points)	35
FINAL EXAM - oral (total points):	10
TOTAL:	100

19. Mandatory reading list:

1. Avdić S. (2003). *Fleksibilna automatika*. Tuzla: Univerzitet u Tuzli.
2. Pedro P. Cruz; Fernando D. Figueroa (2010). *Intelligent Control Systems with LabVIEW*. London: Springer-Verlag

20. Additional reading list:

1. Regtien, P., & Dertien, E. (2018). *Sensors for Mechatronics*. Elsevier

21. Web sources:

<https://www.kth.se/student/kurser/kurs/EL1010?l=en>

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: