SYLLABUS

1. Course title:

Industrial and mobile robots

2. Code:

3. Cycle of study:

I

4. ECTS credits:

5

5. Type of course:

Mandatory

6. Prerequisites:

None

7. Class restrictions:

None

8. Duration / semester(s):

1 VII

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)	
	7				
9.1. Lectures	2			Classes:	45
9.2. Seminars	0			Individual work:	80,13
9.3. Laboratory / Practice classes	2			In total:	125,1

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 teaching the subject "Industrial and Mobile Robots" is to understand the nature, function and role of automatic control and regulation of technical systems, i.e. the application of robotic systems in modern production, 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 robotics as well as the competitive advantages of robotic systems through improving process efficiency and their successful integration with other segments in production processes.

14. Learning outcomes:

At the end of the semester, successful students, who have continuously performed their duties throughout the entire teaching period, will be trained in the field of control and regulation of robotic systems, i.e. they will be able to independently equip a mechanical subsystem with appropriate other subsystems or elements (sensor - control system, actuators), with the aim of obtaining an automated robotic system.

15. Course content:

1. Introduction to robotics.
2. Industrial robots;
3. Robot model;
4. Robot workspace-workspace geometry
5. Robot kinematic analysis; Direct kinematics;
6. Robot kinematic analysis; Inverse kinematics;
7. Robot dynamic analysis;
8. First test;
9. Sensors in robotics;
10. Robot drives;
11. Robot control;
12. Programming in robotics;
13. Fundamentals of mobile robots; Locomotion; Kinematics;
14. Fundamentals of mobile robots; Perception; Localization; Path planning and tracking;
15. Second test;

16. Learning methods:

- Lectures – theoretical lectures, active two-way communication between student and professor, mandatory student attendance;
- 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. Milutinović D.,Industrijska robotika, Univerzitet u Beogradu, Mašinski fakultet, Beograd, 2024.
2. Doleček V., Karabegović I., 2002. Robotika. Bihać: Tehnički fakultet Bihać.

20. Additional reading list:

1.Siegwart R., Nourbakhsh I., Scaramuzza, (2011.), Introduction to Autonomous Mobile Robots, The MIT Press,;

21. Web sources:

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

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: