SYLLABUS

1. Course title:

Opto-mechatronics systems

2. Code:

3. Cycle of study:

I

4. ECTS credits:

3

5. Type of course:

Elective

6. Prerequisites:

No

7. Class restrictions:

No

8. Duration / semester(s):

I | VI

9. Weekly contact hours and student workload:

Semester (1)	VI	Semester (2)		(for two-semester courses)	Workload: (hours)
9.1. Lectures	2			Classes:	33.75
9.2. Seminars	0			Individual work:	54.67
9.3. Laboratory / Practice classes	1			In total:	88.42

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Mechatronics

12. Lecturer:

Dr. Sc. Mirza Bećirović, assistant professor

13. Course aims:

The main goal of teaching the subject "OPTO-MECHATRONIC SYSTEMS" is to understand the nature, function and role of optical elements that make up an opto-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 opto-mechatronic systems as well as

improve efficiency and their successful integration with other segments in production processes. Programming opto-mechatronic systems in Matlab software.

14. Learning outcomes:

At the end of the semester/course, successful students, who have continuously performed their duties throughout the entire teaching period, will be trained in the field of programming, control and regulation of mechatronic systems, i.e. they will be able to independently equip a mechanical system with adequate components - optical elements, with the aim of converting it into an opto-mechatronic system (laser scanners, laser engravers, MEMS, AFM microscopes and others).

15. Course content:

1. Understanding opto-mechatronic technology/systems and its applications, historical development of opto-mechatronic technology.
2. Opto-mechatronic integration - optical revolution.
3. Main functions and basic roles of optical elements in opto-mechatronic systems.
4. Practical opto-mechatronic systems.
5. Classes of opto-mechatronic systems.
6. Optical elements embedded in a mechatronic system and mechatronic elements embedded in optical systems.
7. Test I.
8. Opto-mechatronic products and processes.
9. Basic and opto-mechatronic design.
10. Optical transducers, fiber optic sensors.
11. Optical range sensors - optical displacement measurement.
12. Optical and direct optical actuators.
13. Solving problems of control and monitoring of processes and systems in mechanical engineering.
14. Application of intelligent sensor, actuation and integrated digital control systems.
15. Test II.

16. Learning methods:

Lectures, laboratory exercises, project assignment and consultations.
- Lectures using multimedia tools, active learning techniques and with active participation and discussions of students;
- Laboratory exercises, solving practical problems related to the topic of the studied subject, active two-way communication student - assistant (practical and software simulation of opto-mechatronic systems).
- Project assignment (independent work of the student on solving the given problem)
- Consultations (five hours per week);

17. Assessment methods:

Methods of knowledge assessment are: tests, project assignment and final exam.
• Theory tests are a form of continuous assessment in which students solve theoretical questions from certain areas. During the semester, students solve 2 tests. For each test, a student can earn up to 20 points, which makes a total of a maximum of 40 points. In order to successfully pass the test, a student must earn a minimum of 10 points from each test.
• During the semester, students create a project assignment and submit it to a course assistant. A student can earn a maximum of 30 points for creating a project assignment.
• The student takes the final exam in writing/orally after previously fulfilling the conditions related to regular attendance and activity in classes and laboratory exercises, where they can earn a maximum of 25 points. The final exam consists of theoretical questions.
In order to pass the course, a student must earn a minimum of 54 cumulative points.

18. Assessment components:

The grade on the exam is based on the total number of points that the student earned by fulfilling pre-exam obligations and passing the exam, as follows:

Pre-examination requirements	
Attendance at classes and exercises	**5**
Project assignment	**30**
Test I	**20**
Test II	**20**

Total pre-examination requirements	**75**
Final exam	**25**

Total maximum points	**100**

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**

19. Mandatory reading list:

1. H. Cho.: "Opto-mechatronic systems - techniques and applications", 2003.
2. G. Obinata, A. Dutta.: "Vision systems - applications", 2007.

20. Additional reading list:

1. H. Cho.: "Opto-mechatronic systems - fusions of optical and mechatronic enigneering", 2006.

21. Web sources:

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: