UNIVERSITY OF TUZLA UNIVERZITET U TUZLI

SYLLABUS

1. Course title:

Mechatronics modules

2. Code:

3. Cycle of study:

I

4. ECTS credits:

5

5. Type of course:

Mandatory

6. Prerequisites:

No

7. Class restrictions:

No

8. Duration / semester(s):

I | VII

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
	4			
9.1. Lectures	3		Classes:	45
9.2. Seminars	0		Individual work:	92,67
9.3. Laboratory / Practice classes	1		In total:	137,7

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Mechatronics

12. Lecturer:

Dr. sc. Mirza Bećirović, Assistant professor

13. Course aims:

Training students to solve engineering problems when designing mechatronic modules.

14. Learning outcomes:

At the end of the semester/course, successful students, who continuously did their homework during the entire teaching period obligations, will be trained to: master basic knowledge in the field of mechatronic modules.

15. Course content:

During the course, the following will be analyzed and presented: term, definition and concept of modeling, classification of models (descriptive, physical, mathematical); basics of mathematical modeling of mechanical systems of zero first, second and higher order; transfer function of linear and dynamic mechatronic system; analogy of dynamic systems; solving the "black box" problem with the aim of managing and regulating technical systems in a closed loop; the concept of making a mechatronic module, a component of a mechatronic system; integration of electromechanics, electronics, computer equipment and software support; simulation methods, tools and software for simulation.
According to the calendar, the indicated topic will be covered through the following topics:
1. Introduction, term, definition and concept of modeling.
2. Definition of mechatronic module
3. Modeling
4. An example of analysis of a mechanical dynamic system and creation of a mathematical model.
5. Analysis in the field of complex variables.
6. Analysis in the field of complex variables.
7. Example of analysis of a mechatronic system with electro-hydraulic actuators, creation of a mathematical model, simulation of action.
8. First partial test.
9. An example of integration of a complex dynamic system, creation of a mathematical model, simulation of action.
10. Example of integration of a complex mechatronic system, creation of a mathematical model, simulation of action.
11. Electro-mechanical analogy
12. Management and regulation of the mechatronic system
13. Electro-mechanical analogy
14. An example of modeling and simulation of a DC motor
15. Second partial test

16. Learning methods:

Lectures, laboratory exercises, graphic works, consultations, interactive communication with course participants, company tour.

17. Assessment methods:

The concept of knowledge assessment is based on continuous work with students during the semester. Knowledge assessment methods include: knowledge assessment through partial exams during class, creation of graphic works as well as final exam in written and/or oral form. This allows all students who have different affinities one treatment (written and/or oral knowledge test).

18. Assessment components:

Evaluation will be based on the following activities:

Pre-examination requirements	
- Written partial test I	**20 points.**
- Written partial test II	**20 points.**
- Assignments, project paper / graphic works	**25 points.**
Total pre-exam requirements	**65 points.**
Final exam	**35 points.**
Total maximum	**100 points.**

Grading scale is as follows:

Grade	**Descriptive**	**Letter**	**For the number of points achieved**
5 (five)	**"does not meet the minimum criteria"**	**"F,FX"**	**<54 points**
6 (six)	**"meets the minimum criteria"**	**"E"**	**54-64 points**
7 (seven)	**"generally good, but with significant shortcomings"**	**"D"**	**65-74 points**
8 (eight)	**"average, with noticeable errors"**	**"C"**	**75-84 points**
9 (nine)	**"above average, with some errors"**	**"B"**	**85-94 points**
10 (ten)	**"exceptional success with no errors or with minor errors"**	**"A"**	**95-100 points**

19. Mandatory reading list:

1. D.G.Alciatore, M.B.Histand: Introduction to Mechatronics and Measurement Systems, McGraw-Hill , New York, 2012.

2. Using Simulink and Stateflow in Automotive Applications, https://www.mathworks.com/, 2017.
3. M.Milojković, D.Antić, S.Nikolić: Praktikum za modeliranje i simulaciju dinamičkih sistema, Elektronski fakultet u Nišu, 2018.

20. Additional reading list:

1. A. Emadi: Handbook of Automotive Power Electronics and Motor Drives, Taylor & Francis Group, New York, 2005.
2. W. Stadler: Analytical robotics and mechatronics, McGraw-Hill, 1995.

21. Web sources:

1. https://www.mathworks.com/help/simulink/control-design.html?s_tid=CRUX_topnav
2. https://www.mathworks.com/help/simulink/examples.html?s_tid=CRUX_topnav&category=control-design

22. Applicable from the academic year:

23. Adopted in the Faculty/Academy session: