UNIVERSITY OF TUZLA UNIVERZITET U TUZLI

SYLLABUS

1. Course title:

Virtual design in mechatronics

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)	3	Semester (2)		(for two-semester courses)	Workload: (hours)
9.1. Lectures	2			Classes:	33,75
9.2. Seminars	0			Individual work:	54,92
9.3. Laboratory / Practice classes	1			In total:	88,67

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Mechatronics

12. Lecturer:

Dr. sc. Mirza Bećirović, Assistant professor

13. Course aims:

The goal of teaching is to acquire theoretical and practical knowledge in the field of virtual design and its application in mechatronics.

14. Learning outcomes:

At the end of the semester/course, successful students, who continuously performed their work during the entire teaching period obligations, they will be able to understand what mechatronics is, to recognize the mechatronic system and independently design mechatronic systems.

15. Course content:

During the course, the following will be analyzed and presented: industrial design basics; product classification criteria; defining a technical problem; basic rules for designing mechanical, electrical, hydraulic and pneumatic systems; solution finding methods; evolution of the creative process from ideas, sketches to the finished product; virtual design tools and techniques; mechatronic approach in the development of new machines and devices; industrially designed technical documentation; conceptualizing and designing printed PCB boards, with virtual support.
According to the calendar, the indicated topic will be covered through the following topics:
1. Introduction, virtual design in mechatronics.
2. Design of mechatronic systems.
3. Production design.
4. Life cycle of the product.
5. An example of ergonomic design.
6. Example of a mechatronic system design, with electro-actuators selection procedure, and catalog components selection procedure.
7. Example of a mechatronic system design where supporting structure is made by machining.
8. First partial test.
9. Industrially designed technical documentation.
10. Example of mechatronic system design, with pneumatic and/or hydraulic actuators selection procedure.
11. An example of a mechatronic system design where supporting structure is made by welding.
12. Examples of the design of mechatronic systems where supporting structure is made by sheet metal stamping.
13. Examples of the design of mechatronic systems where supporting structure is made by forging and casting technologies.
14. An example of conceptualizing and designing printed PCB boards, with virtual support.
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. G. Pahl, W. Beitz,J. Feldhusen, K.-H. Grote:Engineering Design - A Systematic Approach, Springer-Verlag, London, 2007.
2. A.Topčić, D. Tufekčić, E. Cerjaković: Razvoj proizvoda, Mašinski fakultet u Tuzli, 2012.
3. D.Shetty, R.A.Kolk: Mechatronics System Design, Cengage Learning, Stamford, USA 2011

20. Additional reading list:

1. Autodesk Eagle Version 9.5 manual, https://www.autodesk.com/
2. l.Marinescu, G.Boothroyd:Product Design for Manufacture & Assembly Revised & Expanded, Marcel Dekker, New York, 2002.
3. Y. Rong, S.H. Huang, Z. Hou:AdvancedComputer-Aided Fixture Design, Elsevier Inc. 2005.

21. Web sources:

1. https://www.youtube.com/@AutodeskEAGLE
2. https://www.youtube.com/watch?v=j79RRCUsD2c
3. https://www.cadcam-group.eu/hr/rjesenja/po-podrucju/3d-dizajn-i-metodologija/

22. Applicable from the academic year:

23. Adopted in the Faculty/Academy session: