Study program: Mechatronics				
Type and level of studies: Master studies (second level of studies)				
Course unit: Modeling and Numerical Analysis of Mechatronic Structures				
Teacher in charge: Marko Popović				
Language of instruction : English				
ECTS: 6				
Prerequisites: Technical mechanics, Technical drawing, Mechanical elements, Basics of designing				
Semester: Winter Semester				

Course unit objective

The aim of this course is to introduce students to advanced modeling techniques and numerical analysis of mechatronic bearing structures. Students master the application of parametric CAD technology in the modeling part process, assemblies and generation of technical documentation. Also, based on the application of the finite element method, students master the application of CAE technology for implementing various types of simulation and analysis of load-bearing structures.

Learning outcomes of Course unit

Course unit contents

Theoretical classes

Theoretical basics of structure modeling. Numerical simulation and stress analysis using finite element method. Modelling of parts, subassemblies, assemblies and generating technical documentation in CAD parametric softwares. Managing appearance of models and technical documentation. Theoretical studies of the application of computer and CAE softwares in the analysis of bearing mechatronic designs and principles of their optimization. Stress state and deformation of bearing structures analysis and using finite element method on a real design examples.

Practical classes

In practical classes students solve practical examples from all the areas covered in lectures. Students are individually guided through their work (seminars) which is done in the final exam. Practical classes include the very process of modeling of parts, subassemblies, assemblies and generating technical documentation. In addition, examples involve solving and analyzing the state of stress and deformation of various load-bearing structures.

Literature

[1] O.C. Zienkiewicz, R.L. Taylor and J.Z. Zhu, „The finite element method: Its Basis and Fundamentals“, Butterworth-Heinemann, United Kingdom, 2013.

[2] Debasis Deb, „Finite Element Method“, Prentice-Hall of India Pvt.Ltd, 2006.

[3] Sham, T., "SolidWorks 2011", Mikro-knjiga, Beograd 2011.

[4] Sham, T., Vivek, S., "CATIA V5R18", Mikro-knjiga, Beograd 2009.

Number of active teaching hours				**Other classes: 0**
Lectures: 2	Practice: 2	Other forms of classes:	Independent work: 0	

Teaching methods

Theoretical and practical classes, individual work (seminar) and final test.

In theoretical classes (lectures), students are introduced to the theoretical foundations necessary for understanding of matter and solving practical examples. In practical classes, students acquire practical knowledge and skills of use of specific software tools in a particular area.

Evaluation of knowledge is done through the development of projects (seminars) and final project (during the examination period). Passed individual works are the prerequisite for taking an exam.

Examination methods (maximum 100 points)

Exam prerequisites	**No. of points:**	**Final exam**	**No. of points:**
Student’s activity during lectures	**10**	oral examination	
Practical classes/tests	**15**	written examination	**45**
Seminars/homework	**30**	....	
Project	**-**		
Other			

Grading system

Grade	**No. of points**	**Description**
10	**91-100**	Excellent
9	**81-90**	Exceptionally good
8	**71-80**	Very good
7	**61-70**	Good
6	**51-60**	Passing
5	**less than 50**	Failing