

Study program: Mechanical engineering			
Type and level of studies: Master studies			
Course unit: Machine design			
Teacher in charge: Dr Snežana Ćirić Kostić			
Language of instruction: English			
ECTS: 6			
Prerequisites: Machine elements design 1, Machine elements design 2			
Semester: I			
Course unit objective: The development of creative abilities in defining of ideas for new products (machines) with a correlation of needs, technology and environment. Mastering of procedure of development of machines through combination of engineering design (construction) and industrial/aesthetic design.			
Learning outcomes of the course unit The student has mastered the procedure of abstract thinking and creative idea generation. He has mastered the procedure of defining and processing limitations to be met by a new product (mechanical system). He will able to use methods and tools for the development of mechanical systems. He has mastered the procedures of defining of individual properties (Design for X - DFX) as well as integrated approaches to product development (mechanical systems).			
Course unit contents <i>Theoretical classes</i> The concept of product development. Environment and available resources for product development. Incentives for product development, technical and economic. Generating ideas for new products. The process of product development, resources and navigation. Methods for generating ideas and navigation. Management of the process of product development. The connection between design and product development. Integrated approaches in design. Specific approaches in design (Design for X). Engineering of knowledge (collection, storage and use of knowledge). The aesthetic properties of mechanical components and systems, harmonization of aesthetic properties, the development of the aesthetic qualities. <i>Practical classes</i> Examples of synchronization of resources, needs and environment (state). Examples of generating ideas for new products. Examples of integrated and specific approach to design. Harmonization of aesthetic, ergonomic and ecological characteristics. Procedures of forms visualization. Laboratory realization of shapes and forms. Examples of consistent and optimal mechanical systems.			
Literature Pahl G., Beitz W.: Engineering Design - A Systematic Approach,-Springer-Verlag; Hubka V., Eder E.: Design Science, -Springer-Verlag; Ulrich K., Eppinger S: Product design and development, Mc Graw-Hill, 2008.			
Number of active teaching hours			Other classes
Lectures: 2	Practice: 3	Other forms of classes: 1	
Teaching methods Lectures are carried out in classrooms, using multimedia presentations. Exercises are carried out in classrooms under the supervision of teacher, discussing various product design solutions and methods. The major practical experience students gain during a group project that consists in development of a conceptual model of a product. However, the course is attended by a single student, the lectures and exercises in classroom are replaced by mentoring of the student by the lecturer. On the other hand, the student project comprises autonomous work of the student with consultations with the teacher.			
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	20	written examination	30
Seminars/homework	20	
Colloquia	20		
Other			
Grading system			
Grade	No. of points	Description	
10	95-100	Excellent	
9	85-94	Exceptionally good	
8	75-84	Very good	

7	65-74	Good
6	55-64	Passing
5	Less than 55	Failing