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: Winter

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
Theoretical classes
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.
Practical classes
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: 3	Practice: 1	Other forms of classes: 1	Independent work: 0	

Teaching methods
Lectures are carried out in classrooms, using multimedia presentations. Exercises are carried out in classrooms unders 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 exrcises 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	30
practical classes/tests	20	written examination	
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