Course description

Department/Unit /	KKS / NEK				**Academic Year**	2023/2024
Title	Methods and tools for effective design				**Type of completion**	Pre-Exam Credit
Long Title	Methods and tools for effective design engineering					
Accredited/Credits	Yes, 2 Cred.				**Type of completion**	Combined
Number of hours	Tutorial 2 [Hours/Week]					
Occ/max	Status A	Status B	Status C		**Course credit prior to**	NO
Summer semester	0 / -	0 / -	0 / -		**Counted into average**	NO
Winter semester	0 / -	0 / -	0 / -		**Min. (B+C) students**	10
Timetable	Yes				**Repeated registration**	NO
Language of instruction	Czech				**Semester taught**	Summer semester
Optional course	Yes				**Internship duration**	0
Evaluation scale	S|N					
No. of hours of on-premise						
Auto acc. of credit	Yes in the case of a previous evaluation 4 nebo nic.					
Periodicity	K					
Substituted course	None					
Preclusive courses	N/A					
Prerequisite courses	N/A					
Informally recommended courses	N/A					
Courses depending on this Course	N/A					

Course objectives:

The aim of the course is to provide students with a system of methodical knowledge to support effective design engineering of technical products. The participants gain the knowledge on the system of design engineering activities (clarification of the task, searching for solution, evaluation and decision making, solution communication, verification and checking, etc.) and learn to apply fundamental methods and tools that enable them to successfully cope with these in the highly effective way. In contrast to traditional procedural design methodology, design methods and tools are classified into the rational hierarchical system. It strongly enhances the student's ability of system thinking and supports a creative approach to applying these methods and tools in the various design tasks.

Requirements on student

Continuous assessment:
- minimal 75% active participation in seminars (only for presence studies)
- fulfilment of the tutorial tasks assignment until the limit deadline at the latest

Content

1. "Make a start" - basic information on the course, introductions
2. "Get together" - exercise of engineering design team cooperation
3. "Be part of a (great) team" - cooperation, working group vs. team, potential of individuals and team, communication in team, dynamics of team
4. "Designing" - aim, structure of design engineering activities, design exercise assignment
5. "Parallel support of design operations" - verification and checking, representation, collection and elaboration of information, management
6. "Clarification of the Task" - aim, methods, exercise
7. "Searching for solution" - aim, strategies, methods, exercise
8. "Revealing creativity" - creativity, influencing factors, training
9. "Evaluation and decision making" - aim, general approach, exercise
10. "Solution communication" - aim, approaches, design project documentation, protection of intellectual property

11. "Presentation" - seeking inspiration from video talks, design of presentation, ppt presentation examples
12. "Revealing presentation skills" - individual presentation
13. "Reflections" - discussion

Fields of study

Guarantors and lecturers

- **Guarantors:** Prof. Ing. Stanislav Hosnedl, CSc. (100%)

Literature

- **Basic:** Hosnedl, S. *Systémové navrhování technických produktů*. Plzeň, ZČU, FST, 2009.
- **Recommended:** Bradbury, Andrew. *Jak úspěšně prezentovat a přesvědčit*. Brno : Computer Press, 2007. ISBN 978-80-251-1622-7.
- **Recommended:** Hubka, Vladimír. *Konstrukční nauka : obecný model postupu při konstruování*. Zürich : Heurista, 1995. ISBN 80-901135-0-8.
- **Recommended:** Chalupa, Bohumír. *Tvořivé myšlení : tvořivost jako dobrodružství poznání*. Vyd. 1. Brno : Barrister & Principal, 2005. ISBN 80-7364-007-4.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Graduate study programme term essay (40-50)	40
Contact hours	26
Total:	**66**

assessment methods

Knowledge - knowledge achieved by taking this course are verified by the following means:

Skills demonstration during practicum

Individual presentation at a seminar

prerequisite

Knowledge - students are expected to possess the following knowledge before the course commences to finish it successfully:

be well informed in the basic preparatory subjects of mechanical education

design general machine parts on the level of engineering design knowledge in the bachelor study

understand the basic knowledge of strength and deformation calculations of general machine parts

Skills - students are expected to possess the following skills before the course commences to finish it successfully:

represent engineering design ideas and solutions in the form of sketches

perform the basic static, kinematic, strength and deformation calculations of basic general machine parts

work with basic MS Office SW modules

teaching methods

Knowledge - the following training methods are used to achieve the required knowledge:

Seminar

Task-based study method

Individual study

Students' portfolio

learning outcomes

Knowledge - knowledge resulting from the course:

describe and explain the decomposition of engineering designing of a technical product into basic serial and parallel operations of a general creative problem solving

describe and explain the requirements specification on the designed technical product focused on its key properties

describe and explain the prediction and evaluation of the basic properties of the designed technical product

describe and explain the evaluation and objective selection of the most appropriate alternative of the designed technical product

Skills - skills resulting from the course:

design a simple technical product using basic operations of a general creative problem solving

solve basic engineering design operations in a creative way with the support of corresponding basic methods and SW tools

document, present and justify in a rational and comprehensible manner the process and results of the engineering design of a technical product

Course is included in study programmes: