

Course description

Course abbreviation:	KKS/KMTA	Page:	1 / 4
Course name:	Handling Machine Design		
Academic Year:	2023/2024	Printed:	03.06.2024 10:29

Department/Unit /	KKS / KMTA			Academic Year	2023/2024
Title	Handling Machine Design			Type of completion	Exam
Accredited/Credits	Yes, 5 Cred.			Type of completion	Combined
Number of hours	Lecture 3 [Hours/Week] Tutorial 2 [Hours/Week]				
Occ/max	Status A	Status B	Status C	Course credit prior to	YES
Summer semester	0 / -	0 / -	0 / -	Counted into average	YES
Winter semester	0 / -	0 / -	0 / -	Min. (B+C) students	10
Timetable	Yes			Repeated registration	NO
Language of instruction	English			Semester taught	Summer semester
Optional course	Yes			Internship duration	0
Evaluation scale	1 2 3 4			Ev. sc. – cred.	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	KKS/KMT				
Preclusive courses	KKS/DZVT and KKS/VMTB				
Prerequisite courses	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	N/A				

Course objectives:

Overall information about designing a material handling machines as well as a basic numerical computation need for the preliminary design will be provided in this course.

Following areas will be covered:

- General introduction to the history of material handling machines and outline of the latest trends in this field will be presented.
- Classification of material handling machines.
- Basic principles in design and calculations of material handling machines.

Requirements on student

Continuous assessment:

The development of a product in a project setting will be accomplished. Progress will be checked regularly during the tutorial lessons.

Final assessment:

Written examination at the end of the semester. Additional oral examination could be requested if the student is not satisfied with the final grade of the written test. If it is not possible to decide the final grade of the written test the oral examination may occur as an addition to it.

Description of the project: During the semester students will work on a draft design of a crane machine. The term project must be submitted and approved by the lecturer before the exam period.

The quality and grade of the term project is considered in a final evaluation and it is a part of the final grade

Content

The course focuses on the following areas:

- material handling equipment (MHE) for manufacturing plants - design and computational analysis
- elementary classification of handling machines and equipment; drive types and design; design of conveyers for bulk and piece materials

Videos presenting the topics covered by the course are used to complement the lectures.

Topics of lectures according to weeks:

- 1) Introduction (subject content, source literature, requirements on student); history of transport and material handling equipment (MHE). New trends in material handling.
- 2) Basic terms of transport and handling equipment and of transported materials; drives of handling equipment.
- 3) Handling equipment for bulk materials - elementary classification. Vibratory conveyors - classification, design solutions, drives, computing analysis.
- 4) Screw conveyors - classification, design solutions, computing analysis of screw conveyors.
- 5) Scraper conveyors, bucket elevators - classification, design solutions, computing analysis.
- 6) Handling equipment for bulk and piece material - elementary classification. Transport chutes - classification, design solutions, computing analysis.
- 7) Belt conveyors - classification, design solutions, drives, computing analysis.
- 8) Handling equipment for piece material - elementary classification. Roller conveyors - classification, design solutions, computing analysis of vibratory conveyors.
- 9) Chain conveyors - design solutions, computing analysis. Overhead conveyors - classification, design solutions, computing analysis.
- 10) Cranes - classification, design solutions, drives, computing analysis.

Fields of study

Studijní opory pro studenty jsou umístěny na COURSEWARE ZČU

Guarantors and lecturers

- **Guarantors:** Ing. Zdeněk Chval, Ph.D. (100%)
- **Lecturer:** Ing. Zdeněk Chval, Ph.D. (100%)
- **Tutorial lecturer:** Ing. Zdeněk Chval, Ph.D. (100%)

Literature

- **Basic:** Aspects of Materials Handling (Dr. K.C. Arora, Vikas V. Shinde)
- **Basic:** Cranes - Design, Practice and Maintenance (Verschoof. J.) - https://www.academia.edu/16184420/Cranes_Design_Practice_and_Maintenance_2nd_Edition >
- **Basic:** Materials Handling Handbook (Raymond A. Kulwiec) - https://books.google.cz/books?id=8Rn72t-L_g8C&printsec=frontcover&hl=cs#v=onepage&q&f=false >
- **Extending:** Materials Handling and Storage (William E. Brock)
- **Recommended:** Materials Handling (Myer Kutz) - <https://books.google.cz/books?id=KsmoQZPbngMC&printsec=frontcover&hl=cs#v=onepage&q&f=f>

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Individual project (40)	40
Preparation for an examination (30-60)	40
Contact hours	50
Total:	130

assessment methods

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

Combined exam

Skills - skills achieved by taking this course are verified by the following means:

Project

Competences - competence achieved by taking this course are verified by the following means:

Combined exam

Project

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

Explain the basic principles of mechanics, strength of materials, rules of design of a machine parts when working on new design of a material handling machine or equipment.

Explain various design solutions of basic constructional parts of machines and equipment

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

Acquire other professional skills based on practical experience independently and study of professional literature, including foreign literature.

To use independently theoretical knowledge in the field of mechanics, strength of materials, rules of design of a machine parts when designing a new machine component.

Competences - students are expected to possess the following competences before the course commences to finish it successfully:

N/A

N/A

N/A

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

Individual study

Interactive lecture

Skills - the following training methods are used to achieve the required skills:

Practicum

Competences - the following training methods are used to achieve the required competences:

Lecture with visual aids

Practicum

learning outcomes**Knowledge - knowledge resulting from the course:**

Explain the pros and cons of the basic representatives of conveyors.

Explain possible design solutions of individual variants of conveyors for handling a bulk material

Explain the basic computational analysis of different types of conveyors

Explain possible design solutions of individual variants of conveyors for handling a bulk and a solid piece material

Explain possible design solutions of individual variants of conveyors for handling a solid piece material

Skills - skills resulting from the course:

To express problems concerning the design of conveyors for transport of a bulk and solid piece material

To create kinematic diagrams of basic conveyors for transport of a bulk and solid piece material

To design main component for conveyors using modern CAE software

Competences - competences resulting from the course:

N/A

N/A

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
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Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Design of Power Machines and Equipment	Postgraduate Master	Full-time	Manufacturing Machines and Technologies	1	2021	2023	Povinně volitelné předměty 1. roč. LS	B	1	LS