

Course description

Course abbreviation:	KMM/MDMT	Page:	1 / 4
Course name:	Materials for Transp. and Handl. Mach.		
Academic Year:	2023/2024	Printed:	03.06.2024 09:40

Department/Unit /	KMM / MDMT			Academic Year	2023/2024
Title	Materials for Transp. and Handl. Mach.			Type of completion	Exam
Accredited/Credits	Yes, 5 Cred.			Type of completion	Combined
Number of hours	Lecture 3 [Hours/Week] Tutorial 1 [Hours/Week]			Course credit prior to	YES
Occ/max	Status A	Status B	Status C	Counted into average	YES
Summer semester	0 / -	0 / -	0 / -	Min. (B+C) students	10
Winter semester	11 / -	2 / -	3 / -	Repeated registration	NO
Timetable	Yes			Semester taught	Winter semester
Language of instruction	Czech			Internship duration	0
Optional course	Yes			Ev. sc. – cred.	S/N
Evaluation scale	1 2 3 4				
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	KMM/MEZ and KMM/MVT				
Prerequisite courses	N/A				
Informally recommended courses	KMM/SMA				
Courses depending on this Course	N/A				

Course objectives:

To introduce students basic structural steels used in transport and manipulation technology (IF steels, TRIP, BH steels etc.)
 Graduate of the subject obtains the basic view about surface modifications.
 Materials used in combustion motors, aeroplanes, bicycles will be introduced to students in details.
 Students will learn single types of wear for the first time, including prevention.
 The possibilities of powder metallurgy in transport and manipulation technology will be introduced within this subject.
 The graduate will be able to use nonferrous metals in transport and manipulation technology.

Requirements on student

Credit: Elaboration of 3 semestral works
 Examination: Knowledge of studied topics.

Content

- Materials Selection in Mechanical Design
- Denoting of materials according to other principles than Czech standards
- Modern low carbon steels and their usage in transportation
- Modern high strength steels
- New types of heat treatment for transportation
- Powder metallurgy products for transportation
- Corrosion of structural parts in transportation
- Surface coating used in transportation
- Friction and wear in transportation
- Aluminium alloys and parts from aluminium used in transportation
- Titanium and Nickel alloys used in transportation
- Marking and selection of materials
- Creep
- Fatigue life

- Hardening
- Recrystallization
- Defectoscopy

Fields of study

COURSEWARE ZČU

Guarantors and lecturers

- **Guarantors:** Ing. Jiří Hájek, Ph.D. (100%)
- **Lecturer:** Ing. Jaromír Dlouhý (30%), Ing. Jiří Hájek, Ph.D. (70%)
- **Tutorial lecturer:** Ing. Jaromír Dlouhý (30%), Ing. Jiří Hájek, Ph.D. (70%)

Literature

- **Basic:** Michna, Štefan. *Moderní materiály*. Liberec, 2014. ISBN 978-80-7494-154-2.
- **Basic:** Pluhař, Jaroslav. *Nauka o materiálech : Celost. vysokošk. učebnice pro skupinu stud. oborů Strojírenství a ostatní kovodělná výroba*. 1. vyd. Praha : SNTL, 1989.
- **Basic:** Cejp, Jiří; Steidl, Josef. *Perspektivní materiály*. ISBN 80-01-01282-4.
- **Extending:** Weng, Y., Dong, H., Gan, Y. *Advanced Steels*. 2011. ISBN 978-3-642-17664-7.
- **Recommended:** Cantor, Brian. *Automotive Engineering*. ISBN 0-7503-1001-4.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Contact hours	52
Graduate study programme term essay (40-50)	40
Preparation for an examination (30-60)	50
Total:	142

assessment methods

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

- Oral exam
- Written exam
- Test
- Seminar work

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

- Skills demonstration during practicum

prerequisite

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

- Knowledge of materials science and engineering materials.
- General grasp of structural materials.
- Knowledge of Fe-Fe₃C diagram.
- Knowledge of fundamentals of heat treatment.
- Familiarity with manufacture of non-ferrous alloys.
- Knowledge of fundamentals of powder metallurgy.

Characterize basic mechanical properties of metals.

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

Develop a strategy for mechanical testing of metals.
Read technical documentation.
Perform basic statistical evaluation.

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

N/A

teaching methods

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

Lecture
Textual studies
Self-study of literature
Individual study
Multimedia supported teaching

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

Practicum
Skills demonstration
Multimedia supported teaching

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

Multimedia supported teaching

learning outcomes

Knowledge - knowledge resulting from the course:

Obtain the required "know how" for materials selection.
Have a grasp of new types of steels used in transport and handling equipment.
Have a grasp of fatigue life.
Know powder metallurgy products used in transport and handling equipment.
Design an appropriate type of surface finish and treatment.
Become familiar with aluminium and titanium alloy in use.
Become familiar with tribology.

Skills - skills resulting from the course:

Obtain the required "know how" for materials selection.
Have a grasp of new types of steels used in transport and handling equipment.
Have a grasp of fatigue life.
Know powder metallurgy products used in transport and handling equipment.
Be familiar with aluminium and titanium alloy in use.

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan	v. Year	Block	Status	R.year	R.
Design Engineering of Machines and Technical Devices	Postgraduate Master	Combined	Design Engineering of Health and Cooperative Technology	1	2020	2023	Compulsory courses	A	2	ZS
Design Engineering of Machines and Technical Devices	Postgraduate Master	Full-time	Design Engineering of Health and Cooperative Technology	1	2020	2023	Compulsory courses	A	2	ZS
Design Engineering of Machines and Technical Devices	Postgraduate Master	Combined	Design Engineering of Vehicles and Handling Machinery	1	2020	2023	Compulsory courses	A	2	ZS
Design Engineering of Machines and Technical Devices	Postgraduate Master	Full-time	Design Engineering of Vehicles and Handling Machinery	1	2020	2023	Compulsory courses	A	2	ZS

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Certificate Programmes	Postgraduate Master	Full-time	Technologie pro bezpilotní létání	1	2017	2023	Povinně volitelné předměty	B	2	ZS
Certificate Programmes	Postgraduate Master	Full-time	Technologie pro bezpilotní létání	1	2022	2023	Povinně volitelné předměty	B	2	ZS
Certificate Programmes	Postgraduate Master	Full-time	Technologie pro bezpilotní létání	1	2017	2023	Povinně volitelné předměty	B	1	ZS
Certificate Programmes	Postgraduate Master	Full-time	Technologie pro bezpilotní létání	1	2022	2023	Povinně volitelné předměty	B	1	ZS
Industrial Engineering and Management	Postgraduate Master	Full-time	Industrial Engineering and Management	1	2020	2023	Core elective courses "A"	B	1	ZS
Industrial Engineering and Management	Postgraduate Master	Combined	Industrial Engineering and Management	1	2020	2023	Core elective courses "A"	B	1	ZS
Materials Science and Manufacturing Technology	Postgraduate Master	Combined	Materials Science and Manufacturing Technology	1	2020	2023	Elective courses	C	1	ZS
Materials Science and Manufacturing Technology	Postgraduate Master	Full-time	Materials Science and Manufacturing Technology	1	2020	2023	Elective courses	C	1	ZS