

Course description

Course abbreviation:	KKS/CMS2A	Page:	1 / 3
Course name:	Machine Components and Mechanisms 2		
Academic Year:	2023/2024	Printed:	03.06.2024 07:30

Department/Unit /	KKS / CMS2A			Academic Year	2023/2024
Title	Machine Components and Mechanisms 2			Type of completion	Exam
Accredited/Credits	Yes, 4 Cred.			Type of completion	Combined
Number of hours	Lecture 2 [Hours/Week] Tutorial 2 [Hours/Week]				
Occ/max	Status A	Status B	Status C	Course credit prior to	YES
Summer semester	0 / -	0 / -	2 / -	Counted into average	YES
Winter semester	0 / -	0 / -	3 / -	Min. (B+C) students	10
Timetable	Yes			Repeated registration	NO
Language of instruction	English			Semester taught	Winter, Summer
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	No				
Periodicity	K				
Substituted course	KKS/CMS2				
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 coarse is to provide students with informations about basic and complex transmission mechanisms:

- To teach students to fundamental properties of the transmission mechanisms and shapes, sizes and materials which are produced from
- To apply knowledge of mechanics and stress-strain analysis at the design and checking of transmission mechanisms

Requirements on student

Conditions for evaluation of seminar coarse and credit:

- Minimal 75% participation in seminars, 7th and 11th week compulsory attendance
- Handover of two sketch tasks in the required date and time and quality
- Two written seminar test
- Fulfilling all given tasks in the required date and time
- Credits composed in the previous academic year will not be accepted.

Content

The course is intended to give students a good insight into the following areas:

mechanisms, basic facts; spur, bevel, worm gears; motion screws and nuts; chain drives; friction and belt drives; gears, basic facts. During the seminars students practice gearbox design and perform computations for typical gearboxes, both in the traditional manner and with the aid of computers; results are tested and verified in the laboratory.

The lecture topics:

1. Transmission, basic facts. Direct-link (three-member) gears using shaped elements. Law of gearing.
2. Spur gearing, geometry characteristics of uncorrected external gearing.
3. Correction, division into individual wheels. Dimensions of corrected wheels, engagement line, engagement duration. Helical tooth geometry.
4. Geometry of direct gearing - internal gearing.
5. Building structure. Accuracy of gearing. Properties.
6. Knowledge for design and control, gear wheels materials. Force conditions in gearing. Dimensioning and strength check of spur

gears.

7. Bevel gears. Geometry and dimensions. Engagement conditions, correction. Force conditions in gearing. Dimensional and strength check.

8. Screw gears, cylindrical. Theoretical background, geometry. Engagement ratios, efficiency.

9. Worm gears. Geometry, main dimensions of spinal and general worm. Efficiency. Force conditions in gearing. Dimensioning and strength check of worm gear.

10. Motion screw - motion nut.

11. Friction gears. Gears with indirect coupling (four members) using shaped elements.

12. Transfers with indirect link (4-member) using friction.

13. Gear mechanisms - gearboxes

Fields of study

Viz COURSEWARE

Guarantors and lecturers

- **Guarantors:** Doc. Ing. Václav Kubec, Ph.D. (100%)
- **Lecturer:** Mgr. Ing. Josef Dvořák, Ph.D. (100%), Doc. Ing. Václav Kubec, Ph.D. (100%)
- **Tutorial lecturer:** Mgr. Ing. Josef Dvořák, Ph.D. (100%), Doc. Ing. Václav Kubec, Ph.D. (100%)

Literature

- **Basic:** General Mechanical Engineering parts 2 (Krátký, Jaroslav; Krónerová, Eva; Hosnedl, Stanislav)
- **Extending:** Dudley, Darle W. *Gear handbook : the design, manufacture, and application of gears*. New York ; McGraw-Hill, 1962.
- **Recommended:** Budynas, Richard G.; Nisbett, J. Keith. *Shigley's mechanical engineering design*. Eleventh edition. 2020. ISBN 978-1-260-56999-5.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Preparation for comprehensive test (10-40)	30
Undergraduate study programme term essay (20-40)	30
Contact hours	52
Total:	112

assessment methods

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

- Oral exam
- Written exam

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

- Written exam
- Oral exam

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

- Combined exam
- Self-evaluation

prerequisite

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

- to represent gear transmission mechanisms according to technical standards (technical drawing)
- to use the dimensioning and tolerance prescriptions based on the knowledge of the part's function (GPS - Geometrical Product Specification)
- to use information about technical standards and design documentation of fundamental transmission mechanisms
- to apply the topic introduction to the issue of engineering designing of structural groups

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

- to design (for specified load) priority functional dimensions of the transmission mechanism parts
- to use the knowledge of properties of technical materials and theoretical knowledge of mechanics, elasticity and strength
- to use theoretical methods for calculation of dimensional and for strength, stiffness and lifetime analysis of transmission mechanisms parts

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

N/A

N/A

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

- Interactive lecture
- Practicum

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:

- Collaborative instruction
- Self-study of literature

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

- to determine dimensions of the fundamental transmission mechanisms and gearboxes
- to sketch the gearboxes shafts with transmission elements including their bearings
- to perform checking calculations of proposed transmission mechanisms

Skills - skills resulting from the course:

- to apply technical drawing knowledge for sketching transmission mechanism assemblies
- to apply knowledge of properties of technical materials, mechanics, strength and elasticity for the design of part dimensions of transmission mechanisms
- to apply knowledge of properties of technical materials, mechanics, strength and elasticity for the complex analysis of part dimensions of transmission mechanisms

Competences - competences resulting from the course:

N/A

Course is included in study programmes: