

Course description

Course abbreviation:	KME/DR1	Page:	1 / 4
Course name:	timber Structures		
Academic Year:	2023/2024	Printed:	03.06.2024 09:19

Department/Unit /	KME / DR1			Academic Year	2023/2024
Title	timber Structures			Type of completion	Exam
Accredited/Credits	Yes, 4 Cred.			Type of completion	Combined
Number of hours	Lecture 2 [Hours/Week] Tutorial 2 [Hours/Week]			Course credit prior to	YES
Occ/max	Status A	Status B	Status C	Counted into average	YES
Summer semester	9 / -	0 / -	1 / -	Min. (B+C) students	10
Winter semester	0 / -	0 / -	0 / -	Repeated registration	NO
Timetable	Yes			Semester taught	Summer 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	No				
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 main scope of the course is the design of timber structures and their possible use.

Requirements on student

Requirements for credit:

The student will elaborate and hand in a semestral project of an adequate level.

Credit obtained in previous years of study is not accepted.

Requirements for exam:

Active knowledge of the content of the course, ability to apply the knowledge to solve practical exercises.

Content

1st week: Process of design of structures, durability, situations for design, principles for reliability-based design, resistance of a structure, ultimate limit state, serviceability limit state, materials for timber structures, classes of humidity.

2nd week: Design of timber elements using the standard ČSN EN 1995. Ultimate limit state, serviceability limit state.

3rd week: Main types of solicitation. Traction, compression, stability of an ideal element, local stability, effective length for planar buckling, effective length for torsion, effective lengths for single beams, systems of beams and frames. Second order theory, buckling resistance, bearing capacity of a compressed element, composed beams.

4th week: Bending, bearing capacity for bending, tridimensional bending, stability during bending.

5th week: Combination of solicitations, tension and bending, compression and bending, bending and torsion.

6th week: Glued connections, nailed connections, clipped connections, bolted connections, peg connections, screwed connections, carpenter connections, dowel connections.

7th week: Serviceability limit state, deformation, slippage in connection points, limit deformations, oscillation of structures.

8th week: Planar timber structures, beams, full beams, truss girders, details of structures, purlins.

9th week: Tridimensional stiffness of timber structures, ways of increasing, timber roof systems.

10th week: Timber structures for simple buildings.

11th week: Design of timber structures considering the effects of fire, main principles, main procedures for the design.

12th week: Methods for stating the fire resistance of a structure.

13th week: Protection of timber structures, structural protection of wood, wood-destroying funguses, wood-destroying insects, means for protecting wood.

Fields of study

Guarantors and lecturers

- **Guarantors:** Ing. Luděk Vejvara, Ph.D. (100%)
- **Lecturer:** Ing. Luděk Vejvara, Ph.D. (100%)
- **Tutorial lecturer:** Ing. Pavel Hejduk, Ph.D. (100%)

Literature

- **Basic:** ČSN EN 1995-1-1 (73 1701) Eurokód 5: Navrhování dřevěných konstrukcí. Část 1-1, Obecná pravidla - Společná pravidla a pravidla pro pozemní stavby = Eurocode 5: Design of timber structures - Part 1-1: General - Common rules and rules.
- **Basic:** Petr Kuklík. Dřevěné konstrukce. 2005.
- **Basic:** Petr Kuklík, A. Kuklíková, K. Mikeš. Dřevěné konstrukce 1- cvičení.
- **Recommended:** ČSN EN 1990 (73 0002) Eurokód: Zásady navrhování konstrukcí. Praha : Český normalizační institut, 2004.
- **Recommended:** ČSN EN 1991 - Zatížení stavebních konstrukcí.
- **Recommended:** Wald Fr. a kolektiv. Výpočet požární odolnosti stavebních konstrukcí. ČVUT Praha, 2005.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Contact hours	52
Preparation for an examination (30-60)	30
Undergraduate study programme term essay (20-40)	23
Total:	105

assessment methods

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

Seminar work

Combined exam

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

Combined exam

prerequisite

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

The student knows:

- main principles used in structures, main materials and their use from the courses Constructions I, II and III, Construction materials and Reliability and safety of structures
- the basis of the theory used in mechanics, elasticity, plasticity and statics

name non - load - bearing building structures including partitions, floors, coverings and surfaces

know the basics and curriculum of structural mechanics and structural engineering for the design of simple structures

know the subject of elasticity and strength in the range of basic stresses - pressure, tension, bending, shear, torsion

know the procedures and normative requirements for determining loads and their combinations for calculations according to limit states

recognize building materials, especially wood-based ones

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

determine load-bearing and non-load-bearing structures of buildings

assemble loads and their combinations according to valid standards EN 1990 Design principles

recognize basic cases of stress - pressure, tension, bending, shear, torsion

read and create simple construction drawings - floor plan, section

calculate internal forces on simple structures - simple and continuous beam, bracket, verticals, diagonals

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:

Lecture

Practicum

Lecture with visual aids

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

Practicum

Lecture

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

Lecture

learning outcomes

Knowledge - knowledge resulting from the course:

to gain knowledge about traditional and modern load-bearing wooden structures of buildings

gain knowledge and technical information about wood materials

gain knowledge about the design of load-bearing timber structures

gain knowledge about the design of bent, pressed and draw elements made of wood and wood-based materials

gain knowledge about the design of joints of wooden elements

gain knowledge about pests, degradation and wood protection

to gain knowledge about fire protection of wood and determination of fire resistance

Skills - skills resulting from the course:

define the differences between the individual structures
 be familiar with the use of wood-based materials Bottom Up Edit
 choose suitable wooden structures for placement in the building and for the given type of building
 solve material design and design of individual vertical and horizontal structures, design of their profile and joints
 design protection of wood against pests, moisture or fire

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.
Civil Engineering	Bachelor	Full-time	Building Structures	1	2023	2023	Povinné předměty	A	3	LS
Civil Engineering	Bachelor	Full-time	Building Structures	1	2018	2023	Povinné předměty	A	3	LS
Civil Engineering	Bachelor	Full-time	Building Structures	1	2022	2023	Povinné předměty	A	3	LS
Stavební inženýrství - Bachelor Pozemní stavby		Full-time	Stavební inženýrství - Pozemní stavby	1	2023	2023	Povinné předměty	A	3	LS
Stavební inženýrství - Bachelor Pozemní stavby		Full-time	Stavební inženýrství - Pozemní stavby	1	2021 akr	2023	Povinné předměty	A	3	LS