



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Timber structures [S2Bud1E-IOB>KD]

Course

Field of study

Civil Engineering

Year/Semester

1/2

Area of study (specialization)

Smart and resilient buildings

Profile of study

general academic

Level of study

second-cycle

Course offered in

English

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

30

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

3,00

Coordinators

dr hab. inż. Volodymyr Semko
volodymyr.semko@put.poznan.pl

dr inż. Marcin Chybiński
marcin.chybinski@put.poznan.pl

Lecturers

Prerequisites

KNOWLEDGE: The student starting this subject should have knowledge of mathematics, physics, chemistry, strength of materials and mechanics of buildings. He should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of the team. **SKILLS:** A student starting this subject should have the ability to obtain information from the indicated sources, interpret them, draw conclusions, formulate and justify opinions and be ready to cooperate within the team. **SOCIAL COMPETENCES:** A student starting this subject should be aware of the responsibility for the reliability of the results of his / her work and their interpretation, should be ready to independently supplement and expand knowledge in the field of construction, and should be aware of the need to increase professional and personal competences and understand the need for continuous training out.

Course objective

The main aim of the course is to familiarize students with issues related to the design, execution reinforcement of timber structures as well as the design of timber structures in fire conditions.

Course-related learning outcomes

Knowledge:

1. Student know in detail the principles of analysing, constructing and dimensioning elements and connections in selected building structures.
2. Student know in detail currently utilised construction materials and products, their properties and testing methods as well as production and assembly technologies.
3. Student know in detail the rules of design, construction and operation of selected building units.
4. Student have structured and theoretically based knowledge of the processes in the full life cycle of building structures and their management rules. They also know and understand the need for systematic evaluation and maintenance of structure technical condition.
5. Student know in detail the Act of Building Law, standards and recommendations for building unit design: Polish standards (PN) and European standards (EN) as well as the technical conditions of constructing selected building units.

Skills:

1. Student can prepare an evaluation and statement of strengths influencing both simple and complex building units.
2. Student can design elements and connections in complex building units, working both individually and in a team.
3. Student can perform a classical static and dynamic analysis and stability analysis of statically determinate and non-determinate bar structures (trusses, frames and strands); as well as surface construction (discs, plates, membranes and shells).
4. Student are able to prepare a building unit design and technical documentation in the environment of selected CAD software, including the usage of BIM technology.

Social competences:

1. Student take responsibility for the reliability of working results and their interpretation.
2. Student are ready to autonomously complete and broaden (extend) knowledge in the field of modern processes and technologies of building engineering.
3. Student can realise that it is necessary to improve professional and personal competence; are ready to critically evaluate the knowledge and received content.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lectures is verified through a written exam.

Grading scale:

- <90 to 100%> of points - very good (A)
- <80 to 90%> of points - good plus (B)
- <70 to 80%> of points - good (C)
- <60 to 70%> of points - a satisfactory plus (D)
- <50 to 60%> of points - satisfactory (E)
- below 50% of points - insufficient (F)

The knowledge acquired during the laboratory classes verified while performing tasks in class.

Programme content

Lectures: Repetition of basic information on timber structures in the field of first-cycle studies. Wooden materials and products - setting parameters, sorting, quality, etc. Construction of timber buildings. Beams with a complex cross-section joined with nails. Glued laminated beams. Design of timber structures in fire conditions. Spatial timber structures. Frame construction systems. Constructions made of glued laminated timber, knots. Strengthening of timber structures.

Laboratory classes: Implementation of tasks related to modeling and analysis of selected timber structures.

Course topics

Lectures: Repetition of basic information on timber structures in the field of first-cycle studies. Wooden materials and products - setting parameters, sorting, quality, etc. Construction of timber buildings. Beams with a complex cross-section joined with nails. Glued laminated beams. Design of timber

structures in fire conditions. Spatial timber structures. Frame construction systems. Constructions made of glued laminated timber, knots. Strengthening of timber structures.

Laboratory classes: Implementation of tasks related to modeling and analysis of selected timber structures.

Teaching methods

Lecture: information lecture, problem lecture, demonstration

Laboratory classes: method of design and demonstration

Bibliography

Basic:

1. EN 1995-1-1 Eurocode 5: Design of timber structures. Part 1-1: General. Common rules and rules for buildings.
2. EN 1995-1-2 Eurokod 5: Design of timber structures. Part 1-2: General Structural fire design.
2. H.J. Larsen and V. Enjily, Practical Design of Timber Structures to Eurocode 5, Thomas Telford Ltd, p. 280, 2009.
3. J. Porteous and P. Ross, Designers' Guide to Eurocode 5: Design of Timber Buildings, ICE Publishing, p. 220, 2013.
4. J. Porteous, A. Kermani, Structural Timber Design to Eurocode 5, 2nd Edition, Wiley Blackwell, p. 640, 2013.

Additional:

1. Kotwica E., Konstrukcje drewniane - przykłady obliczeń, Stowarzyszenie Producentów Płyt Drewnopochodnych w Polsce, 2015
2. Kotwica J., Konstrukcje drewniane w budownictwie tradycyjnym, Arkady, Warszawa, 2006
3. Lis Z., Rapp P., Drewno i materiały drewnopochodne. Rozdział 10 w: Budownictwo ogólne, tom I, Arkady, Warszawa 2005, 2006
4. Mielczarek Z., Budownictwo drewniane, Arkady, 2014
5. Neuhaus H., Budownictwo drewniane, Polskie Wydawnictwo Techniczne, Rzeszów, 2004
6. Nożyński W., Przykłady obliczeń konstrukcji budowlanych z drewna. Wyd. 2. WSiP, Warszawa 2004
7. Rudziński L., Kroner A. Przykłady obliczeń wybranych konstrukcji drewnianych, Wydawnictwo Naukowe PWN, 2018
8. Wajdzik Cz., Wieżby dachowe. Wyd. Akad. Roln. we Wrocławiu, Wrocław, 2001
9. Marcin Chybiński, Łukasz Polus, Theoretical, experimental and numerical study of aluminium-timber composite beams with screwed connections, Construction and Building Materials 226, 317-330, 2019.
10. Marcin Chybiński, Łukasz Polus, Experimental and numerical investigations of laminated veneer lumber panels, Archives of Civil Engineering 67(3), 351-372, 2021.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	1,50