COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mechanics 1 [S1Arch1E>MECH1]

Course

Field of study
Architecture

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

4,00

Coordinators

Lecturers

dr hab. inż. arch. Anna Sygulska
anna.sygulska@put.poznan.pl

Prerequisites

1. Knowledge: Preparation from trigonometry and algebra. Vector calculations. Fundamentals of differential and integral calculus. 2. Skills: Solving trigonometric problems, adding, subtracting, multiplying vectors. Student can calculate derivatives and integrals for simple functions. 3. Social competences: Student is prepared to work actively in a group

Course objective

The course is designed to introduce students to the principles of structural statics and to prepare them for the design simple and complex building structures. Students will gain knowledge about statically determinate member systems and develop skills in calculating reactions for free-supported, cantilevered, and three-hinged systems. They will learn two methods for calculating forces in truss members: the method of joints and the method of sections. Additionally, students will explore the definitions of internal forces in beams and frames, including bending moments, shear forces, and normal forces. Based on this understanding, they will learn how to create internal force diagrams.

Course-related learning outcomes

Knowledge:

Student knows and understands:
B.W4. mathematics, space geometry, statics, material strength, shaping, construction and dimensioning of structures, to the extent necessary to formulate and solve tasks in the field of architectural and urban design;
B.W5. issues of construction, construction technologies and installations, construction and building physics, covering key issues in architectural, urban and planning design as well as issues related to fire protection of buildings;

Skills:
Student can:
B.U4. develop solutions for individual building systems and elements in terms of technology, construction and materials;

Scocial competences:
Student is capable of:
B.S2. reliable self-assessment, formulating constructive criticism regarding architectural and urban planning activities.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Two tests during the semester.
2. One design work to be passed, checked by the teacher, with active consultations.
Formative assessment:
Assessment of knowledge, computational skills and projects carried out during exercises.
Final grading scale: 2.0; 3.0; 3.5; 4.0; 4.5; 5.0
Summative assessment:
The grade obtained during written tests and design works as well as the grade from the oral answer concerning the lectures.
Assessment scale: 2,0; 3.0; 3.5; 4.0; 4.5; 5.0

Programme content

Calculation of reactions for statically determinate systems. Calculation of internal forces in trusses, beams and frames. Geometrical characteristics of the section.

Course topics

Vectors, forces, moments. Supports. Forces acting on a structure. Equations of static equilibrium. Calculation of support reactions in beams and frames. Construction of trusses and calculation of internal forces using the method of joints and method of sections. Calculation of internal forces (normal forces, shear forces and bending moments) in beams and statically determinate frames. Calculation of geometrical characteristics of sections

Teaching methods

1. Lecture.
2. Exercises based on the study of specific examples.
3. Projects - calculation example individual for each student, with active consultations with the teacher of the subject.
4. eLearning Moodle (a system supporting the teaching process and distance learning).

Bibliography

Basic:
1. Kenneth R. Lauer, Structural engineering for architects, McGraw-Hill Book Company 1981
2. Philip Garrison, Basic structures for engineers and architects, Blackwell Publishing 2005

Additional:
1.Edmond Saliklis, Architectural Structures, Visualizing Load Flow Geometrically, Routledge 2022
2. Paulo B. Lourenço, Angelo Gaetani, Finite Element Analysis for Building Assessment Advanced Use and

Practical Recommendations, Routledge 2022
3. Sygulska A., The study of the influence of the ceiling structure on acoustics in contemporary churches, Archives of Acoustics, Vol. 44, No. 1, pp. 169-184, 2019.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00