COURSE DESCRIPTION CARD - SYLLABUS

Course name
Structural mechanics [N1Bud1>MB2]

Course

Field of study
Civil Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
10

Laboratory classes
10

Other (e.g. online)
0

Tutorials
10

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Olga Kawa
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Lecturers

Prerequisites

Knowledge. The student has basic knowledge of the following subjects: mathematics, theoretical mechanics, strength of materials in the field of construction or related studies. Skills. The student is able to skillfully use his knowledge and at the same time obtain it from available bibliographic sources. Student the ability to apply the learned theory to solve practical tasks. Social competence. The student is aware of the need to expand his theoretical knowledge in order to be able to find a justification for its application while practicing the profession. Student understands the necessity of continuous education.

Course objective

Solving frames using the displacement method. Knowledge of basic concepts of dynamics of bar systems and determination of the circular frequency of natural vibrations. Determination of aplitudes of the forced vibrations.

Course-related learning outcomes

Knowledge:
The student acquires knowledge of the mechanics of plane bar systems - frames, beams and trusses.

Skills:
The student is able to determine the distribution of internal forces and calculate generalized displacements in systems under any load, thermal and kinematic influences in plane bar systems.
The student is able to formulate equilibrium equations for simple frames according to the first order theory.
The student is able to calculate the circular frequencies of natural vibrations and the amplitudes of harmonically forced vibrations of planar bar systems with a discrete mass distribution.

Social competences:
The student is able to work independently and cooperate in a team.
The student knows the responsibility resulting from the reliability of the obtained results of their work and is able to interpret them.
The student is aware of the need to systematically supplement and expand his knowledge.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
1) Lectures ending with an exam.
Two exam dates: the first during the regular session, the second during the re-sit session. Duration of each examination: 2 hours. Each student receives an individual set of exam topics.
The grade consists of the sum of the points obtained from the answers; a positive grade on a scale of 2 = insufficient to 5 = very good is obtained after obtaining a minimum of 50% of the maximum number of points. 1 written test at the end of the semester.
2) Auditorium exercises: one knowledge test at the end of the semester.
3) Design exercises: each student receives individual tasks for independent solution and development (projects). Number of projects: 2.
The form of checking: individual consultations during design exercises.
Assessment: defense of the project at the time of its submission by the deadline set at the beginning of the semester.
The scale for the evaluation of results for the test and exam:
> = 90% - 5.0 (very good)
> = 85% - 4.5 (good plus)
> = 75% - 4.0 (good)
> = 65% - 3.5 (sufficient plus)
> = 55% - 3.0 (satisfactory)

Programme content

Solving beams and frames using the displacement method. Determination of the static degrees of freedom of the structure. Dynamic analysis of bar structures. Determination of the dynamic degrees of freedom of the structure. Calculation of the frequency of natural circular vibrations and the amplitudes of forced vibrations. Informative and monographic lecture.

Course topics

1. Slope-deflection formulae for straight beams.
2. Determination of the static degrees of freedom of the structure.
3. Solving beams and frames using the displacement method.
4. Basics of dynamics of systems.
5. Free and forced vibrations of undamped and damped systems.
6. Calculation of the frequency of natural circular vibrations and the amplitudes of forced vibrations.

Teaching methods

Monographic lectures covering theoretical foundations and simple numerical examples.
Auditorium exercises including numerical examples. The examples are solved by the teacher using the "chalk and blackboard" method.
Exercises for self-solution covering two design tasks. The tutor consults the tasks given to students and, as needed, solves similar tasks on the blackboard.

Bibliography

Basic
1. J. Rakowski Mechanika budowli. Zadania część 1 Wydawnictwo PP Poznań 2007.
2. M. Guminiak, J. Rakowski Zbiór zadań z mechaniki budowli Wydawnictwo PWSZ Piła 2008.
3. M. Guminiak, J. Rakowski Mechanika Budowli. Zbiór zadań z elementami ujęcia komputerowego Wydawnictwo PWSZ Piła 2011.
Additional
1. W. Nowacki Mechanika budowli PWN Warszawa 1974.
2. Z. Dyląg i in Mechanika budowli (t.I+II) PWN Warszawa 1989.
3. Z. Cywiński Mechanika budowli w zadaniach (t.I+II) PWN Warszawa 1976.

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	90	3,00