COURSE DESCRIPTION CARD - SYLLABUS

Course name
Selected aspects of industrial structures designing [S2Bud1-IPB>WAPKP]

Course

Field of study
Civil Engineering

Year/Semester
2/3

Area of study (specialization)
Construction Engineering and Management

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

2,00

Coordinators

dr hab. inż. Zdzisław Pawlak prof. PP
zdzislaw.pawlak@put.poznan.pl

dr hab. inż. Zbigniew Pozorski prof. PP
zbigniew.pozorski@put.poznan.pl

Lecturers

Prerequisites

Knowledge, skills and competences acquired during the education process. The ability to formulate and solve technical problems in the field of civil engineering.

Course objective

To acquaint students with the current problems of designing and implementing industrial facilities.

Course-related learning outcomes

Knowledge:
1. The student has extended and detailed knowledge of material strength, modelling and constructing; have knowledge of theoretical principles of the finite element method as well as general rules of non-linear calculations of engineering structures. (KB_W04)
2. The student knows in detail the rules of design, construction and operation of selected building units. (KB_W07)

Skills:
1. The student is able to correctly define a computational model and carry out an advanced linear analysis of complex building units, their elements and connections; is able to apply basic nonlinear computational techniques together with a critical evaluation of numerical analysis results. (KB_U05)
2. The student is able to dimension complex construction details of selected elements of building structures. (KB_U07)

Social competences:
1. The student is ready to autonomously complete and broaden (extend) knowledge in the field of modern processes and technologies of building engineering. (KB_K03)
2. The student can realise that it is necessary to improve professional and personal competence; is ready to critically evaluate the knowledge and received content. (KB_K05)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Passing the lectures on the basis of a positive grade (minimum 3.0) of the final written test.
The condition for passing the design exercises is correct and timely execution of the design task and positive defense of the design.

Programme content

Design principles of large-area hall structures.
Modeling of basic structural elements.
Modeling of reinforced concrete structures: beams, columns, frames, slabs, foundations.
Supporting structures for machinery, tanks, installations, suspended transport.
Optimization of building structures.
Diagnosis of damage and strengthening of structural elements.

Course topics

Lectures
1. Principles of designing large-area halls - part 1
2. Principles of designing large-area halls - part 2
3. Modeling of basic construction elements
4. Modeling of reinforced concrete structures: beams, columns, frames, slabs, foundations
5. Support structures for machines, tanks, installations, suspended transport
6. Optimization of building structures
7. Diagnosis of damage and strengthening of structural elements
8. Final test

Projects
1. Introductory information, program configuration, determining the geometry of the structure.
2. Modeling of the transverse frame: geometry, loads, static scheme
3. Dimensioning of frame elements: girder, columns, foundations
4. Gable wall: cap beam, gable column, static diagrams, dimensioning
5. Multi-span lattice girder: loads, buckling lengths, two-way bent columns
6. Dimensioning of the girder: truss, two-way bent column, foundation
7. Modeling of bracings: static diagrams, stiff or flaccid bars, braces
8. Defense and project evaluation

Teaching methods

Lectures: informative, problem lecture, case study method
Projects: project method

Bibliography

Basic
1. PN-EN 1990:2004 Eurokod - Podstawy projektowania konstrukcji, PKN, Warszawa 2014.

2. PN-EN 1991-1-3 Eurokod 1 - Oddziaływania na konstrukcje. Część 1-3 Oddziaływania ogólne. Obciążenie śniegiem, PKN, Warszawa 2005.
3. PN-EN 1991-1-4 Eurokod 1 - Oddziaływania na konstrukcje. Część 1-4 Oddziaływania ogólne. Oddziaływania wiatru, PKN, Warszawa 2008.
4. PN-EN 1992-1-1 Eurokod 2 -- Projektowanie konstrukcji z betonu. Część 1-1 Reguły ogólne i reguły dla budynków, PKN, Warszawa 2008.
5. PN-EN 1993-1-1 Eurokod 3 -- Projektowanie konstrukcji stalowych. Część 1-1 Reguły ogólne i reguły dla budynków, PKN, Warszawa 2014.
6. Kurzawa Z., Chybiński M., Projektowanie konstrukcji stalowych, Wydawnictwo PP, Poznań 2008.
7. Kozłowski + zespół, Konstrukcje stalowe. Przykłady obliczeń wg PN-EN 1993-1 cz.1, cz.2., Rzeszów 2012.
8. Giżejowski M., Ziółko J., Budownictwo ogólne tom 5, Arkady, Warszawa 2010.
Additional
1. inzynierbudownictwa.pl/konstrukcje-stalowe-hal-wielkopowierzchniowych/
2. www.wolstal.com/projektowanie-hal-wielkopowierzchniowych/
3. traskostal.pl/pl/obudowy,135

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
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)	30	1,00