



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Concrete structures III [N1Bud1>KB3]

### Course

Field of study

Civil Engineering

Year/Semester

4/8

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

elective

### Number of hours

Lecture

12

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

20

### Number of credit points

6,00

### Coordinators

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### Lecturers

### Prerequisites

The student 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. A student should have the ability to obtain information from the indicated sources, interpret them, draw conclusions, formulate and justify opinions and be ready to cooperate as part of a team. A student should be aware of the responsibility for the reliability of the results of his / her work and their interpretation, should be ready to independently 2 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

Acquiring skills in the design (construction and dimensioning) of simple bending, compression and tension elements of concrete structures in terms of the ultimate and serviceability limit states.

### Course-related learning outcomes

Knowledge:

1. Have the basics of general knowledge in mathematics, physics, chemistry, biology and other fields of

science, forming theoretical principles appropriate to formulate and solve tasks related to building engineering - [P6S\_WG (O)]

2. Knows detailed rules of constructing and dimensioning concrete elements and building facilities - [P6S\_WG(I)]

3. Have advanced knowledge of construction theory and analysis of bar systems in the field of statics - [P6S\_WG (I)]

4. Know the rules of constructing and analysing civil engineering - [P6S\_WG (I)]

5. Have basic knowledge of the operation of algorithms used in selected software (including applications of BIM technology) supporting calculations, design of building structures - [P6S\_WG (O/I)]

Skills:

1. Can prepare statements of strengths influencing the building units and perform static analysis of statically determinate and non-determinate bar structures - [P6S\_UW (I)]

2. Are able to correctly utilise numerical, analytical, simulation and experimental methods, in order to identify and solve problems in the field of building engineering; to obtain and verify the results - [P6S\_UW (I)]

3. Are able to use advanced information and communication technologies (ICT) appropriate to perform typical engineering tasks - [P6S\_UW (O/I)]

4. Are able to use modern software supporting the design decisions in building engineering, including programs based on the BIM technology; are able to critically estimate the results of numerical analysis of building facilities - [P6S\_UW (O/I)]

5. Are able to design selected elements and simple concrete constructions, working individually or as part of a team - [P6S\_UW (I)]

6. Can classify buildings building structures - [P6S\_UW (O/I)]

Social competences:

1. Understand the need of team work, are responsible for the safety of their own work and team's work - [P6S\_KO (O)]

2. Take responsibility for the accuracy and reliability of work results and their interpretation - [P6S\_KK (O)]

3. Are ready to autonomously complete and broaden knowledge in the field of modern processes and technologies of building engineering - [P6S\_KR (O)]

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Examination of the content of the lecture in writing.

Design exercises (design of the core building elements - computer modeling of the structure):  
substantive assessment of the project and assessment of defense.

Grading scale (max. 50 points):

45,5-50 very good (A)

42,5-45,4 good plus (B)

37,5-42,4 good (C)

32,5-37,4 sufficient plus (D)

25,0-32,4 sufficient (E)

less than 25 insufficient (F)

## Programme content

Geometrically and physically nonlinear analysis of reinforced concrete structures, taking into account geometric imperfections

## Course topics

Lecture:

Global analysis of stiffened and unstiffened structures according to Eurocode 2: geometric imperfections, geometrically nonlinear analysis - taking into account second-order effects, taking into account a nonlinear material model - the method of nominal stiffness. Bidirectionally bent flat slab ceilings - shaping, calculation and construction. Puncture of floor slabs and foundation slabs. Analysis of

the building's spatial stiffness - stiffening walls and shafts. Foundation plates - inverted ceiling method.

Design exercises:

Design of core building elements with flat ceilings using computer modeling: ceilings, walls and shafts as well as foundation plates.

## Teaching methods

Monographic lecture with multimedia presentation.

Design exercises - practical implementation of an engineering task. Preliminary discussion of the task, phased preparation of calculations and drawing documentation by students. Consulting and approving individual stages of work. Explaining repeated errors, ambiguities and doubts by the tutor to all students. The basis for passing the test is a systematic project, confirmed by an entry from the consultation, and its defense (oral or written form).

## Bibliography

Basic

PN-EN 1990 Podstawy projektowania konstrukcji

PN-EN 1991-1 Oddziaływania na konstrukcje

PN-EN 1992-1 Projektowanie konstrukcji z betonu

PN-EN 1997-1 Projektowanie geotechniczne

Additional

Rawska-Skotniczy A.: Obciążenia budynków i konstrukcji budowlanych według eurokodów. PWN, Warszawa 2013.

Sekcja Konstrukcji Betonowych KILiW PAN: Podstawy projektowania konstrukcji żelbetowych i sprężonych według eurokodu 2. Dolnośląskie Wydawnictwo Edukacyjne, Wrocław 2006

Knauff M.: Obliczanie konstrukcji żelbetowych według eurokodu 2. PWN, Warszawa 2018.

Starosolski W.: Konstrukcje żelbetowe według eurokodu 2 i norm związanych. PWN, Warszawa 2011

Starosolski W.: Wybrane zagadnienia komputerowego modelowania konstrukcji inżynierskich.

Wydawnictwo Politechniki Śląskiej, Gliwice 2003.

Kowalski R.: Konstrukcje żelbetowe w warunkach pożarowych. PWN, Warszawa 2019.

Kapela M., Sieczkowski J.: Projektowanie konstrukcji budynków wielokondygnacyjnych. Oficyna wydawnicza Politechniki Wrocławskiej, Warszawa 2003.

## Breakdown of average student's workload

|                                                                                                                                         | Hours | ECTS |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Total workload                                                                                                                          | 100   | 4,00 |
| Classes requiring direct contact with the teacher                                                                                       | 38    | 1,50 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 62    | 2,50 |