



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Technology of Concrete

### Course

Field of study

Civil Engineering First-cycle Studies

Area of study (specialization)

buildingobligatory

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

II/3

Profile of study

general academic

Course offered in

c

Requirements

compulsory

### Number of hours

Lecture

10

Laboratory classes

10

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Krzysztof Zieliński, prof. PP

Responsible for the course/lecturer:

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### Prerequisites

Knowledge: Basic knowledge of the following subjects: mathematic, physics, chemistry. Knowledge concerning classification and assessment of construction materials.

Skills: Ability to obtain information from literature and other sources. Capability to select optimum building material for a particular building/ structure.

Social competencies: Understanding the need to continue education throughout the professional career. Understanding the necessity of co-operation and team work.

### Course objective

Passing on engineering knowledge regarding design of concrete mixes, classification and scope of applications in construction as well as carrying out standard concrete work.

### Course-related learning outcomes

Knowledge

1. have advanced knowledge of building materials and their properties, research methods, basic



elements of design as well as performance and assembly technologies (including environment-friendly materials).

2. have detailed knowledge of the technologies of building engineering and rules of selecting tools, machines, and equipment to perform construction works.

3. 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.

#### Skills

1. are able to design and carry out simple lab experiments dedicated to evaluate the building material and engineering structure quality; are able to clearly present and interpret the results and draw conclusions.

2. are able to analyse the architectural and urban planning needs of investor and select building and installation materials for the intended purpose.

3. are able to gather information from literature, databases and other properly selected information sources; can synthesize the obtained information, interpret and evaluate it, as well as draw conclusions, formulate, discuss and justify opinions and positions.

#### Social competences

1. take responsibility for the accuracy and reliability of work results and their interpretation.

2. are ready to autonomously complete and broaden knowledge in the field of modern processes and technologies of building engineering.

3. understand the need of team work, are responsible for the safety of their own work and team's work.

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:

- oral or written test,

Laboratory classes:

- oral test of knowledge before the start of laboratory classes,

- preparation and defence of concrete mix,

- final test after completing the classes.

#### Programme content

Lectures



Basic information on standardization and classification of cement concrete types. Concrete composition/ ingredients, properties of concrete mix and hardened concrete. Methods of designing concrete composition. Basic technological processes connected with preparation, transport, application and maintenance of concrete. Quality control of concrete. Admixtures (division, study methods, evaluation and discussing major varieties). Additives (ashes, bits, complex admixtures). Design of concrete with additives and admixtures, concrete application at low temperatures, application of large masses of concrete. Special concretes. Light concrete (distribution, application, basic components). Basic principles of lightweight concrete design.

#### Laboratory classes

Design of concrete mix (one of the four methods) with selected characteristics of consistency and strength class. Study of ingredients (aggregates, cement, water) with focus on suitability (compliance with relevant standards) to make concrete. Preparation of concrete mix. Study of basic characteristics of the mix (texture, volume) preparation of concrete samples. Testing the impact of various types of additives on the mix characteristics (plasticizing, binding time). Study of the compressive strength of concrete by destructive method. Determining the actual strength of the designed concrete.

#### Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board

Laboratory classes: multimedia presentation illustrated with examples given on a blackboard and performance of tasks given by the teacher - practical exercises.

#### Bibliography

##### Basic

1. Jamróży Z., Beton i jego technologie, Warszawa ? Kraków, Wydawnictwo Naukowe PWN 2000
2. Zieliński K., Podstawy technologii betonu, Wydawnictwo Politechniki Poznańskiej, Poznań 2015

##### Additional

1. Neville A. M., Właściwości betonu, Kraków, Stowarzyszenie Producentów Cementu 2012
2. Szymański E., Materiałoznawstwo budowlane z technologią betonu, cz. 2, Warszawa, Oficyna Wydawnicza Politechniki Warszawskiej 1999
3. Technical magazines dealing with concrete technology, the Internet



### Breakdown of average student's workload

|  | Hours | ECTS |
|--|-------|------|
| Total workload   | 75    | 3,0  |
| Classes requiring direct contact with the teacher  | 20    | 1,0  |
| Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, ) <sup>1</sup> | 55    | 2,0  |

<sup>1</sup> delete or add other activities as appropriate