STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Technology of Concrete		**1010104151010111404**
Field of study: **Civil Engineering First-cycle Studies**	Profile of study (general academic, practical): **(brak)**	Year /Semester: **3 / 5**
Elective path/specialty: **-**	Subject offered in: **Polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time): **part-time**	
No. of hours: Lecture: **8** Classes: **-** Laboratory: **10** Project/seminars: **-**		No. of credits: **2**
Status of the course in the study program (Basic, major, other): **(brak)**	(university-wide, from another field): **(brak)**	
Education areas and fields of science and art: **technical sciences**		ECTS distribution (number and %): **2 100%**

Responsible for subject / lecturer:

Dr hab. inż. Krzysztof Zieliński, prof. nadzw. PP
email: krzysztof.zielinski@put.poznan.pl
tel. 61 665 21 68
Faculty of Civil and Environmental Engineering
ul. Piotrowo 5, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of the following subjects: mathematic, physics, chemistry. Knowledge concerning classification and assessment of construction materials.
2	**Skills**	Ability to obtain information from literature and other sources. Capability to select optimum building material for a particular building/ structure.
3	**Social competencies**	Understanding the need to continue education throughout the professional career. Understanding the necessity of co-operation and team work.

Assumptions and objectives of the course:

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

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Student knows basic principles of designing concrete mixes - [K_W14] - [-]
2. Student knows construction materials used with concrete (their classification and application range) - [K_W06, K_W14] - [-]
3. Student knows the principles of preparing, transporting and applying concrete mix - [K_W12, K_W14] - [-]

Skills:

1. Properly perform standard concrete works - [K_U20, K_U21] - [-]
2. Design concrete mixes for making common concrete meeting required characteristics - [K_U20, K_U21] - [-]
3. Carry out basic laboratory tests of aggregates and cements - [K_U13] - [-]

Social competencies:

1. Student is capable of working individually as well as co-operating within a team on a given assignment - [K_K01] - [-]
2. Student is responsible for the accuracy of results obtained and is able to provide interpretation - [K_K02] - [-]
3. Student individually expands his/ her knowledge concerning modern techniques and technologies - [K_K03] - [-]

Assessment methods of study outcomes

Lectures:

- oral or written test,

Laboratory classes:

- oral test of knowledge before the start of laboratory classes,
- preparation and defence of concrete mix prepared by student,
- final test after completing the classes.

Course description

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. 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 ingredients).

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. Study of the compressive strength of concrete by destructive method. Determining the actual strength of the designed concrete.

Basic bibliography:

1. Jamroży Z., Beton i jego technologie, Warszawa ? Kraków, Wydawnictwo Naukowe PWN 2000
2. Zieliński K., Podstawy technologii betonu, Wydawnictwo Politechniki Poznańskiej, Poznań 2012

Additional bibliography:

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.

Result of average student's workload

Activity	Time (working hours)
1. participation in lectures	8
2. participation in laboratory classes.	10
3. preparation/ revision for laboratory classes	10
4. designing concrete mix composition (in volume and quality terms) ? at home	10
5. participation in consultations	5
6. preparation/ revision for summary test and presence during the test	20

Student's workload

Source of workload	hours	ECTS
Total workload	63	2
Contact hours	23	1
Practical activities	10	1