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Assumptions and objectives of the course:					
-The aim of the subject is to teach students how to according to obligatory standards calculate concrete and reinforced					
concrete elements working in different ways.					
Study outcomes and reference to the educational results for a field of study					
Knowledge:					
 History of concrete and reinforced concrete, examples of carried out RC structures, basic properties of concrete [K_W04, K_W14] 	and stee				
2. Ultimate limit state ? rules of calculation: bending, shear and compression elements [K_U07]					
3. Serviceability limit state - rules of calculation: width of vertical cracks, deflections of RC elements [K_U07]					
4. Basic requirements of concrete elements reinforcement - [K_U08]					
Skills:					
1. A student is able to compose possible loads - [K_U02]					
2. A student can calculate internal forces at designed RC section of beams, columns and slabs - [K_U04]					
3. A student can calculate rectangular and T-beam sections of bending beams with tension steel and tension and compression steel - [K_U06, K_U07]					
4. A student can calculate RC sections loaded by moment and compression force - [K_U05, K_U07]					

- 1. A student understand the need for lifelong learning; able to inspire and organize the learning process of others [K1_K06]
- 3. A student correctly identifies and resolves dilemmas associated to his profession [K1_K07]

Assessment methods of study outcomes				
-Lectures ? test in written form ? 1,5h				
Exercises classes ? test in written form (1,5h ? per semester)				
Design classes - evaluation of individual student projects combined with an oral defense of the thesis, test in the exercises (1 per semester - 1.5 hours)				
test in the lectures. (1 per semester - 1.5 hours)				
The evaluation scale:				
more than 100 excellent				
91-100 very good (A)				
81 - 90 good plus (B)				
71 - 80 Good (C)				
61 - 70 is sufficient plus (D)				
51 - 60 satisfactory (E)				
insufficient under 50 (F)				
Course description				
-Material properties ? concrete and steel				
Issue: the bond, the anchorage				
Behavior of RC beam under increasing load, design situations.				
Method of calculation RC sections				
Ultimate limit state ? (calculation according equivalent rectangular stress distribution method)				
Design of bending beams with tension steel and tension and compression steel.				
Shear				
Method of calculation RC sections loaded by moment and compression force				
Serviceability limit state ? cracking and deflection				
Detailing of reinforcement ? general rules.				
Basic bibliography:				
1. 1. PN-EN 1992-1-1 Eurokod 2. Projektowanie konstrukcji z betonu. Część 1-1: Reguły ogólne i reguły dla budynków.				
2. 2. Knauff M.: Obliczanie konstrukcji żelbetowych według Eurokodu, PWN Warszawa 2012				
3. 3. Knauff M., Golubińska A.: Tablice i wzory do projektowania konstrukcji żelbetowych z przykładami obliczeń, PWN Warszawa 2013				
Additional bibliography:				

1. 1. Sekcja Konstrukcji Betonowych KILiW PAN Podstawy projektowania konstrukcji żelbetowych i sprężonych według Eurokodu 2. Dolnośląskie Wydawnictwo Edukacyjne.

Łapko A., Jansen B.C.: Podstawy projektowania i algorytmy obliczeń konstrukcji żelbetowych, Arkady, Warszawa

3. 3. Mosley B., Bungey J., Hulse R.: Reinforced concrete design to Eurocode 2, Palgrave Macmillan New York 2009.

Result of average student's workload

Activity		Time (working hours)
1. Participation in lectures		20
2. Participation in exercise classes		10
3. Participation in design classes		12
4. Complete (at home) works involved in the project		30
5. Participation in the consultations of the exercise and design classes		10
6. Preparing to the test in the field of exercise and design classes		25
7. Preparing to the exams test		25
Student's workload		
Source of workload	hours	ECTS

Total workload	150	6
Contact hours	52	2
Practical activities	80	3