

American Code of Reinforced Concrete (ACI)

- 1. Course number and name:** 020ACIGS3 American Code of Reinforced Concrete (ACI)
- 2. Credits and contact hours:** 2 ECTS credits, 1x1.25 hours
- 3. Name(s) of instructor(s) or course coordinator(s):** Kamal SAFA
- 4. Instructional Materials:**
 - a.** Building Code Requirements for Structural Concrete and Commentary (ACI 318M-19 Code).
 - b.** Design of Concrete Structures (by Arthur Nilson, David Darwin and Charles Dolan - Thirteenth Edition - McGraw-Hill, 779 pp);
 - c.** Reinforced Concrete Mechanics and Design (by James Wight and James MacGregor - Fifth Edition – Parson Education Inc. USA, 1112 pp);
 - d.** Reinforced Concrete Design (by Kenneth Leet and Dionisio Bernal - Third Edition - McGraw-Hill, 546 pp);
 - e.** Reinforced Concrete Design To ACI Building Code (Instructor Lecture Notes – Version 0217-01, 214 pp “including a selection of 30 design examples with solution and 26 homework problems with answers”).
- 5. Specific course information**
 - a. Catalog description:** Design of reinforced concrete structures according to American Building Code ACI requirements.
 - b. Prerequisites or co-requisites:** 020RDMGS2 Strength of materials.
 - c. Required:** Required major course of Buildings and Engineering Management and Public Works and Transportation students.
- 6. Educational objectives for the course**
 - a. Specific outcomes of instruction:**
 - i.** A fair selection of numerical design examples (with solutions) and stimulating homework problems (with answers) are added to enable the students to grasp the essential concepts most easily;
 - ii.** In a carefully sequenced, step-by-step approach, each topic is broken down into the simplest and most essential components so that students, in turn, learn how

to break down and deal with any structure – no matter how complex – by looking at the basic behavior of each component;

- iii. Encouraging students to take into account the basic behavior and characteristics of reinforced concrete allows them to understand the rationales behind the provisions of the ACI Code and prepares them to deal knowledgeably with design situations not covered directly by the Code;
- iv. Enable students to understand and explain the principles of reinforced concrete;
- v. Provides the essential background and procedures for proportioning (designing) and analyzing (i) singly- / doubly-reinforced concrete Rectangular / T-Beams / One-way Slabs for flexure, shear and torsion (ii) Flat Slabs, Structural Walls and Footings for shear (iii) reinforced concrete Rectangular / Circular Short / Slender Columns for axial loads, biaxial bending and shear - using ACI Code;
- vi. Develop the students’ ability to perform an elastic section analysis, find moments of inertia for cracked / uncracked sections (which is an important skill for designers of concrete structures), and calculate (/ limit) deflection / crack width of flexural reinforced concrete members - as per ACI Code requirements.
- vii. The selected design examples, while getting to the heart of the concept under discussion, help the students to enhance their writing and presentation skills; the solutions are presented in a format similar to how a designer would present an engineering design in practice - For example, the problem is clearly stated, the appropriate code requirements cited, and the basis for selection from different design alternatives fairly described, with neat sketches accompanying the associated solution.

b. PI addressed by the course:

PI	1.1	1.4	3.1
Covered	yes	yes	yes
Assessed			

7. Brief list of topics to be covered:

Chapter	Title	Number Sessions	Volume Hours	Remark
1	Introduction	0.5	0.625	n/a
2	Materials	1.5	1.875	n/a
3	Design of Beams for Flexure	5.0	6.25	n/a
4	Serviceability	2.0	2.50	
5	Shear and Diagonal Tension	3.5	4.375	n/a
6	Torsion	1.5	1.875	n/a
7	Bond, Anchorage and Reinforcing Details	Not covered by this “Repeated” Course.		
8	Design of Columns	4.0	5.00	n/a
TOTAL		18.0	22.50	n/a