SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Civil Engineering
1.3	Department	Structures
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	CCIA English/Engineering
1.7	Form of education	Full time
1.8	Subject code	40.00

2. Data about the subject

2.1	Subject name			RC Structures I (Construcţii de beton armat I)			
2.2	Subject area			Civil engineering			
2.3	Course responsible/lecturer			Prof. Dr. Ing. Călin Mircea			
2.4	Teachers in charge of seminars			Asist. Ing Virag Jacint			
2.5 Year of study	III	2.6 Semester	2	2.7 Assessment	E	2.8 Subject category	DS

3. Estimated total time

3.1 Number of hours per week	5	3.2 of which, course:	2	3.3 applications:	3
3.4 Total hours in the curriculum	70	3.5 of which, course:	28	3.6 applications:	42
Individual study					hours
Manual, lecture material and notes, bibliography					17
Supplementary study in the library, online and in the field					4
Preparation for seminars/laboratory works, homework, reports, portfolios, essays					9
Tutoring					2
Exams and tests					2
Other activities					-

3.7	Total hours of individual study	34
3.8	Total hours per semester	104
3.9	Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	Promoting disciplines BAP I and II, Strength of Materials and Construction Statics
4.2	Competence	Not the case

5. Requirements (where appropriate)

5.1	For the course	Not the case
5.2	For the applications	Presence 90 %

6. Specific competences

Professional competences	- Knowledge of the phenomena associated with the behavior of subassemblies and basic structures of ba at the limit states; - Ability to model the SLS and SLU behavior of structures and elements of reinforced concrete; - Understanding the concept of limit states associated with the behavior of reinforced concrete structures; - Ability to model the behavior of non-determined static structures due to plastic redistribution; - Modeling the time-dependent deformations of the undetermined static reinforced concrete structures; - Understanding the concept of sustainable design of reinforced concrete structures
Cross competences	- Acquire the skills necessary for the work in the design team; - Acquire the concept of professional ethics; - Taking responsibility for the tasks carried out.

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Formation of competence in the field of sustainable design of RC structures
7.2	Specific objectives	Gain general theoretical knowledge for the design of RC structures

8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
1. Introduction to sustainable based design	Exposure	Multimedia equipment
2. Plastic analysis of RC structures: plastic zone, plastic hinge, plastic mechanism of beams		
3. Plastic analysis of RC structures: fundamental conditions for plastic analysis, theorems of plastic analysis, plastic mechanisms of frame structures		
4. Yielding lines theory		
5. Dynamics of RC structures: classification of vibrations, free vibrations		
6. Dynamics of RC structures: lump mass method, free dumped vibrations		
7. Dynamics of RC structures: dumping properties of RC structures		
8. Durability design of RC structures: service life and safety level		
9. Durability design of RC structures: mechanisms of steel corrosion		
10. Durability design of RC structures: durability control by direct method and indirect method		
11. Shrinkage effects upon RC structures: mechanisms and types of concrete contraction		
12. Shrinkage effects upon RC structures: free concrete shrinkage strain and factors of influence		
13. Shrinkage effects upon RC structures: cracking of RC structures due to restrained shrinkage		
14. Reliability of RC structures		
Bibliography		

1. MR Horne, Plastic Theory of Structures, 2nd edition, Pergamon, 1979.
JF Baker and J Heyman, Plastic Design of frames, Cambridge University Press, 1969.
2. A. Ionescu, C. Mircea, Manual pentru proiectarea placilor plane dreptunghiulare din beton armat, Editura RISOPRINT, Cluj-Napoca, 1999.
3. Inman, Daniel J., Engineering Vibration, Prentice Hall, 2001
4. Thompson, W.T., Theory of Vibrations, Nelson Thornes Ltd, 1996
5. Hartog, Den, Mechanical Vibrations, Dover Publications, 1985
6. EN 1992-1-1. Eurocode 2: Design of concrete structures - Part 1: General rules and rules for buildings.
7. C. Mircea, M. Filip, H. Nicoară; Study of Corrosion Damage on Reinforced Concrete Structures Proceedings of the 1st International Conference on Concrete Repair, Saint-Malo, France, 15-17 July 2003, vol. II, p. 705-712.
8. Mehta, P.K., Monteiro, J.M., Concrete: Structure, Properties and Materials, 2nd Edition, Prentice Hall, Inc., 1993, 548 pp.
9. C. Mircea, M. Filip, A. Ioani, Investigation of Cracking of Mass Concrete Members Induced by Restrained Contraction, American Concrete Institute Special Publication SP-246 Structural Implications of Shrinkage and Creep of Concrete (CD-ROM format), pp. 229-244, ISBN: 978-0-87031-250-25. Byfors, J., Plain Concrete at Early Ages, Swedish Cement and Concrete Research Institute, Report 3:80, 1980, 464 pp.
10. Hedlund, H., Stresses in High Performance Concrete Due to Temperature and Moisture Variations at Early Ages, Licentiate Thesis, Luleå University of Technology, Luleå, Sweden, 1996, 240 pp.
11. Mircea, C., Overview Upon Cracking Induced by Restrained Shrinkage of RC Structures, se va publica în Proceeding of the 3rd International Conference on Concrete Repair, Venice/Padua, Italy 29th June to 2nd July 2009., 8 p.
12. ACI Committee 207, 1992, Prediction of Creep, Shrinkage, and Temperature Effects in Concrete Structures (ACI 209R-92), American Concrete Institute, Farmington Hills, MI, 47 pp.
13. ACI Committee 207, 1995, Effect of Restraint, Volume Change, and Reinforcement on Cracking of Mass Concrete (ACI 207.2R-95), American Concrete Institute, Farmington Hills, MI, 26 pp.

8.2. Applications/Seminars	Teaching methods	Notes
Work 1: Calculus of a torsioned girder	Exposure, workshop, , applications	Tabels Eurocode 1 Eurocode 2
Work 1: Calculus of a torsioned girder		
Work 2: Post-elastic calculus of a beam		
Work 2: Post-elastic calculus of a beam		
Work 3: Analysis of a deep beam		
Work 3: Analysis of a deep beam		
Work 4: Calculus of a prefab column with small cantilever		
Work 4: Calculus of a prefab column with small cantilever		
Work 5 : Elastic calculus of a slab		
Work 5 : Elastic calculus of a slab		
Work 6 : Plastic calculus of a slab		
Work 6 : Plastic calculus of a slab		
Work 7: Calculus of a prestressed I beam		
Work 7: Calculus of a prestressed I beam		

Bibliography
1. EN 1992-1: Proiectarea structurilor de ba – Reguli generale şî reguli pentru clădiri
2. P 100-1/2013: Cod de proiectare seismica — Partea I — Prevederi de proiectare pentru cladiri

3. A. Ionescu, C. Mircea, Manual pentru proiectarea placilor plane dreptunghiulare din beton armat, Editura RISOPRINT, Cluj-Napoca, 1999.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The acquired competencies will be necessary to the employees working on design companies, construction and consultancy

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Rezolvation of a problem and detailing two theoretical subjects	Written exam – duration 2 hours	75 %
10.5 Applications	Presentation and arguing works	Verification and discussion	25 %
10.6 Minimum standard of performance			

Date of filling in: 18.09.2019		**Title Surname Name**	**Signature**
	Lecturer	Prof. Dr. Ing. Mircea Călin	
	Teachers in charge of application	Asist. Ing. Drd. Virag Jacint	

Date of approval in the department ……..

Head of department
Conf. Dr. Ing. Attila PUSKAS

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Date of approval in the faculty ……

Dean
Conf. Dr.Ing. Nicolae CHIRA

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