MINISTRY OF EDUCATION

TECHNICAL UNIVERSITY
OF CLUJ-NAPOCA, ROMANIA

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	Buildings and Management
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Civil, industrial and agricultural buildings
1.7	Form of education	Full time
1.8	Subject code	49

2. Data about the subject

2.1	Subject name			Buildings III				
2.2	Subject area			Civil Engineering				
2.3	Course responsible/lecturer			Assoc. Prof. Moga Ligia – ligia.moga@ccm.utcluj.ro				
2.4	Teachers in charge of seminars			TA Pălăcean Sebastian - Sebastian.Palacean@ccm.utcluj.ro				
2.5 Year of study		4	2.6 Semester	1	2.7 Assessment	E	2.8 Subject category	DS/DOB

3. Estimated total time

3.1 Number of hours per week	5	3.2 of which, course:	3	3.3 applications:	2
3.4 Total hours in the curriculum	70	3.5 of which, course:	42	3.6 applications:	28
Individual study					hours
Manual, lecture material and notes, bibliography					14
Supplementary study in the library, online and in the field					-
Preparation for seminars/laboratory works, homework, reports, portfolios, essays					28
Tutoring					7
Exams and tests					11
Other activities					-

3.7	Total hours of individual study	60
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	Strengths of Materials, Buildings 1, Buildings 2
4.2	Competence	Calculation abilities based on strengths of materials knowledge

5. Requirements (where appropriate)

5.1	For the course	Class attendance is not mandatory, but it taken into account for the final grade. Photography and filming are prohibited during the course.
5.2	For the applications	Class attendance is mandatory.

6. Specific competences

Professional competences	C1.1. Identificarea rolului structural şi funcţional al elementelor unei construcţii civile, industriale şi agricole C1.2 Explicarea alcăturirii constructive a diferitelor construcţii civile, industriale şi agricole. C1.4 Aprecierea calităţii unei construcţii civile, industriale şi agricole utilizând criterii de evaluare termo-energeticăspecifice domeniului construcţiilor. C1.5 Particularizarea conţinutului şi detalierea studiilor de fundamentare pentru documentaţii tehnice pe faze de promovare a investiţiei pentru construcţii civile, industriale şi agricole. C2.1 Identificarea materialelor de construcţii si a tipurilor de structuri în construcţii C2.2 Descrierea acţiunilor şi stabilirea încărcărilor prin corelare cu factorii de amplasament C2.3 Utilizarea metodelor de calcul specifice tipurilor de structuri şi metodelor de dimensionare a elementelor componente ale unei construcţii civile, industriale şi agricole întocmirii unei documentaţii tehnice specifice. C2.4 Evaluarea, selectarea şi utilizarea optimă a diferitelor materiale care intră în alcătuirea elementelor de construcţie. C2.5 Transpunerea rezultatelor calculelor de dimensionare termică în documentele tehnice ale proiectului pentru construcţii civile, industriale şi agricole. C5.1 Identificarea şi utilizarea reglementărilor tehnice specifice construcţiilor civile, industriale şi agricole. C5.2 Adaptarea metodelor de calcul folosite in construcţii civile, industriale şi agricole la particularitaţile de comportare ale acestora C5.3 Respectarea principiilor şi utilizarea metodelor de alcătuire şi calcul specifice construcţiilor civile, industriale şi agricole şi cerinţelor identificate în întocmirea unei documentaţii terhnice C5.4 Aplicarea prevederilor standardelor de calitate pentru proiectarea unei construcţii civile, industriale şi agricole.
Cross competences	CT1. Aplicarea strategiilor de muncă eficientă şi responsabilă, de punctualitate, seriozitate şi răspundere personală, pe baza principiilor, normelor şi a valorilor eticii profesionale. CT3. Documentarea în limba română şi într-o limbă străină, pentru dezvoltarea profesională şi personală, prin formare continuă şi adaptarea eficientă la noile specificaţii tehnice

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

7.1	General objective	Getting the necessary knowledge used in design of reinforced concrete walls structures.
7.2	Specific objectives	1. Proper design through calculations of the reinforced concrete walls structures that are subjected to vertical and horizontal loads. 2. Elaboration of technical documentation necessary for the execution of buildings with reinforced concrete walls structure.

8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
1. Structures with structural reinforced concrete walls. Types of buildings and floor. Reinforced concrete structural walls – Definition. Advantages & Disadvantages. Diaphragms classification	Exposure	Blackboard Video projector
2. Preliminary design requirements. Determination of the structural walls area sizes: walls and connecting beams. Determination of the geometric characteristics – Walls & Connecting beams		
3 Vertical loads assessment – Uniformly distributed loads & Concentrated loads. The effect of vertical loads eccentricity. Preliminary verification of structural walls sections. Preliminary verification of the structural walls sections based on ductility		
4. Characteristic level. Rigidity of the structural walls – General notions and Definition. Lateral displacement and rigidity for solid and structural walls with openings.		
5. Horizontal load distribution on levels – wind & seism. Seismic force distribution to structural walls – the effect of displacement. Mass and rigidity centre – definition & determination		
6. The torsion moment action. Possible cases. General torsion effect. Additional load determination. Total seismic loads distributed on walls. Seismic distribution in the case of structural walls arranged on different directions		
7. General principles in determining the sectional efforts from horizontal loads. Static calculation of structural walls. Distortions – Definition.		
8. Distortion rigidity of a wall and connecting beams. The influence of wall axial deformation.		
9. Determination of bending moments on equivalent frame		
10 Solving the equivalent frames with coefficients, transmission and distribution method of unbalanced moments. Sectional efforts (M,N,V) from horizontal loads.		
11. Eccentric compression calculation. Connecting beams reinforcement.		
12. Eccentric compression calculation.		
13. Connecting beams reinforcement.		
14. Shear force calculation. Constructive requirements.		

Bibliography
1. Marusciac Dumitru si colectiv, Proiectarea structurilor etajate pentru constructii civile, Editura Tehnică, Bucuresti, 2000.
2. Radu Agent, Tudor Postelnicu, Calculul structurilor cu diafragme din beton armat, Editura Tehnică, Bucureşti, 1982
3. Ion Brînzan, Mihai Barbaiani, Calculul şi aclătuirea structurilor etajate cu diafragme, Editura Tehnică, Bucureşti, 1976.
4. *** Cod pentru proiectarea constructiilor cu pereti structurali din beton armat, Indicativ CR2-1-1.1-2013.

5. *** Cod de proiectare seismică - Partea I - Prevederi de proiectare pentru clădiri, Indicativ P100/1-2013.
6. *** SR EN 1992-1-1, Eurocode 2: Proiectarea structurilor de beton. Partea 1-1: Reguli generale si reguli pentru clădiri

8.2. Applications/Seminars	Teaching methods	Notes
1. Design tasks: Blocks of flats with reinforced concrete diaphragms structure.	Exposure and applications	Software usage
2. Constructive details (walls, floors, basement wall) – Current floor plan.		
3. Diaphragms geometric characteristics – Cross section		
4. Loads evaluation: self-weight, imposed loads for buildings, snow loads		
5. Loads evaluation: wind loads, seismic load		
6. Diaphragms preliminary verifications		
7. Diaphragms and connecting beams geometric characteristics		
8. Diaphragms and connecting beams rigidity. Equivalent moments of Inertia		
9. Mass and rigidity centre. Seismic load distribution.		
10. Calculation of diaphragms with medium openings with equivalent frame method.		
11. Calculate sectional efforts: M, N, T for walls and connecting beam		
12. Calculation of reinforcement in diaphragms (for eccentric compression and shear) and connecting beam		
13. Plans with diaphragms reinforcement and characteristic details.		
14. Project submission and verification.		

Bibliography
1. ***** Cod pentru proiectarea constructiilor cu pereti structurali din beton armat, Indicativ CR2-1-1.1-2013.
2. ***** Cod de proiectare seismică - Partea I - Prevederi de proiectare pentru clădiri, Indicativ P100/1-2013.
3. ***** SR EN 1992-1-1, Eurocode 2: Proiectarea structurilor de beton. Partea 1-1: Reguli generale si reguli pentru cladiri

Software
1. AutoCAD, Student Version
2. Allplan Engineering, Student Version
3. Excel Office
4. Mathcad

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

The gained knowledge will be necessary for employees that will work in building structural design field.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Voluntary Intermidiate assessment Theory exam – 5 questions	Multiple choice Questionnaire Written part – 90 minutes	15% 65% (or 50%)
10.5 Applications	The project submission containing the final calculations and the drawing part.	Project presentation – 15 minutes	35%
10.6 Minimum standard of performance			
VIA ≥5, Written Theory exam ≥5, Project Grade P≥5;			

Date of filling in: Sept.2019		**Title Surname Name**	**Signature**
	Lecturer	Assoc.Prof. Moga Ligia	
	Teachers in charge of application	TA Pălăcean Sebastian	

Date of approval in the department

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Head of department
Assoc. Prof. Aciu Claudiu

Date of approval in the faculty

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Dean
Assoc. Prof. Chira Nicolae