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	Structural Mechanics
1.4	Field of study	Structural Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Civil Engineering/ Civil Engineer
1.7	Form of education	Full time
1.8	Subject code	57.20

2. Data about the subject

2.1	Subject name			Modern Methods in Structural Analysis and Design			
2.2	Course responsible/lecturer			Lecturer PhD Civ. Eng. Petrina Tudor			
2.3	Teachers in charge of seminars			Lecturer PhD Civ. Eng. Petrina Tudor			
2.4 Year of study	IV	2.5 Semester	II	2.6 Assessment	E	2.7 Subject category	DS DOP

3. Estimated total time

3.1 Number of hours per week	3	3.2 of which, course:	2	3.3 applications:	1
3.4 Total hours in the curriculum	126	3.5 of which, course:	28	3.6 applications:	14
Individual study					hours
Manual, lecture material and notes, bibliography					12
Supplementary study in the library, online and in the field					32
Preparation for seminars/laboratory works, homework, reports, portfolios, essays					12
Tutoring					12
Exams and tests					12
Other activities					8

3.7	Total hours of individual study	88
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	N/A
4.2	Competence	N/A

5. Requirements (where appropriate)

5.1	For the course	Projector
5.2	For the applications	1 computer for each student

6. Specific competences

Professional competences	At the end of the course the student will be able to realize a full structural analysis of a steel, reinforced concrete or mixed steel- reinforced concrete real structure. The competence of the student will be on most types of structures. The student will be able to get the data needed to design each element of the structure (stresses, internal forces, displacements) and find optimum shape, structure sections and material.
Cross competences	- computer use; - a set of software; - Romanian and European design codes prescriptions for structural design; - advanced modelling techniques.

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

7.1	General objective	The main goal of this discipline is to assure the student to be able to realise a complete structural analysis and optimization.
7.2	Specific objectives	- knowledge of the software to use; - modelling of the material, structure and supports; - modelling the actions and loads; - modelling devices in structural analysis - optimization of structures.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1.	Main structural design problems. Introduction of FE method.	Power Point presentation, 2 way discussions, solved examples.	
2.	Major modelling programs and building information modelling (BIM).		
3.	Structural systems of tall buildings.		
4.	Earthquake analysis of buildings.		
5.	Global structural analysis.		
6.	Base isolation techniques using passive control.		
7.	Roof isolation techniques and devices.		
8.	Codes and building regulations.		
9.	Structural fire analysis I.		
10.	Structural fire analysis II.		
11.	Blast and impact analysis.		
12.	Case Study – Cluj Arena Stadium.		
13.	Case study – Sf. Gheorghe and Slatina Sports Halls.		
14.	Case Study – 32-Story Multifunctional Building in Cluj		

Bibliography: Feng Fu, Wiley Blackwell “Advanced modelling techniques in structural design”, John Wiley & Sons Ltd., ISBN 978-1-118-82543-3; J.E. Gordon “Structures or Why things don’t fall down” Da Capo Press, ISBN 978-0-306-81283-5

8.2. Applications/Seminars	Teaching methods	Notes

1.	Modelling complex geometries, modelling examples	Direct description of the work, solved example, individual and group explanations.	
2.			
3.	Modelling example of the response spectrum analysis.		
4.			
5.	Determination of the thermal response of structural members.		
6.			
7.	Modelling techniques for structural fire analysis.		
8.			
9.	Modelling examples of impact loading analysis.		
10.			
11.	Full building analysis, given example, modelling, results and interpretation.		
12.			
13.	Final test.		
14.			
Bibliography Autodesk Robot Structural Analysis User Guide, SR EN 1990-1998, Vulcan User Guide, Abaqus User Guide.			

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

The contents of the course and the objective of the discipline is to assure the Civil Engineer the possibility to work within structural engineer consultant companies in Romania and in the European Union. The employers in this field expect the junior civil engineer to be able to analyse a structure, design the structure and draw the execution details. This course assures the first mentioned ability.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
Course	Ability to talk about subjects presented during lectures	Interview	75%
Applications	Ability to analyse a real structure by computer aid	Computer test	25%
10.4 Minimum standard of performance			
- In order to pass the interview the student has to prove good knowledge of lectures contents; - In order to pass the computer test the student should realise at least the correct modelling of the structure and supports by computer aid.			

Date of filling in:	Titulari	Title/name	Semnătura
	Course	Sef Lucrari Tudor PETRINA	
	Aplications	Sef Lucrari Tudor PETRINA	

Date of aproval in Department Board	Head of Structural Mechanics Department Prof.dr.ing. Cosmin Chiorean
Date of aproval in Faculty Board	Dean Conf.dr.ing. Nicolae Chira