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	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	CCIA English/Engineer
1.7	Form of education	Full time
1.8	Subject code	33.00

2. Data about the subject

2.1	Subject name	Statics II					
2.2	Subject area						
2.3	Course responsible/lecturer	Prof. dr .ing. Mircea Petrina/Asist. ing.Moldovan Ilinca					
2.4	Teachers in charge of seminars	Asist. ing.Moldovan Ilinca					
2.5 Year of study	III	2.6 Semester	1	2.7 Assessment	Exam	2.8 Subject category	DID

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	40
Supplementary study in the library, online and in the field	12
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	28
Tutoring	6
Exams and tests	-
Other activities	-

3.7	Total hours of individual study	86
3.8	Total hours per semester	156
3.9	Number of credit points	6

4. Pre-requisites (where appropriate)

4.1	Curriculum	Courses of Mechanics I, Strength of Materials I,Statics I
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	Amphitheater with blackboard
5.2	For the applications	Classroom with blackboard, calculators

6. Specific competences

Professional competences	Theoretical knowledge: -applying building and design codes; -idealizing structures- simplified physical model of the structure and its supports as well as the applied loads; -establish the determinacy, indeterminacy, and stability of structures; -equations of static equilibrium and construction conditions; -writing expressions for internal forces at any section in terms of external loads; -constructing the internal forces curves; -sketching the deflected shapes of loaded beams and frames; -how to position live loads to maximize the value of a certain type of force at a designated section of a structure.
Cross competences	The structural engineer interacts continuously with other engineers and architects. The structural engineer is responsible for the creation of a structural system in harmony with each of the architectural alternatives, sizing the elements in the structure to determine the feasibility and to estimate the construction cost. A large number of structural engineers are engaged in the research field.

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

7.1	General objective	Fundamental concepts must be mastered by any student to applying them to the solution of problems through using classical method, which focus on specific modes of structural response and behavior, before proceeding with the more general matrix methods. Structural analysis teaches the student to determine the response of a structure to specified loads and actions, response measured by establishing the forces and deformations throughout the structure.
7.2	Specific objectives	The engineer will be required to make many technical decisions about structural system: selecting an efficient, economical and attractive structural form, evaluating its safety (stiffness and strength), and planning its erections under temporary construction loads.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1.	Limit states. Ultimate and serviceability limits. Characteristic material strengths and Characteristic actions. Partiak factors of safty. Combinations of actions.	Lecture with discussions	
2.	Analysis of indeterminate structures by the flexibility method:concept of a redundant,fundamentals of flexibility method. Analysis of indeterminate structures by the flexibility method:support settlements,temperature change and fabrication errors.		
3.	Analysis of indeterminate structures by the flexibility method: analysis of structures with several degrees of indeterminacy,beam on elastic supports,practical design.		
4.	Analysis of indeterminate structures by the flexibility		

	method:continuous beams with three-moment equation.		
5.	Space structures:pin-jointed space frames (space truss structures),stability and determinancy,joint equilibrium equations (matrix method),plane structures loaded normal to their plane.		
6.	Analysis of indeterminate beams and frames by the slope-deflection equations:kinematic indeterminacy,derivation of the slope-deflection equations,use of symmetry.		
7.	Analysis of structures without sidesway and analysis of structures that are free to sidesway.		
8.	Moment Distribution:Hardy Cross procedure,development of the M.D. method,frames with no joint translation.		
9.	Moment Distribution: frames with side sway, support settlements, fabrication errors and temperature change(linear and nonlinear).		
10.	Influence lines for indeterminate structures:construction of influence lines using moment distribution,Muller-Breslau principle,qualitative influence lines for beams and frames,influence lines for continuous beams,live load patterns to maximize forces in multistory buildings.		
11.	Approximate analysis of indeterminate structures:guessing the location of inflection point,estimating deflections of trusses.		
12.	Approximate analysis of indeterminate structures:approximate analysis of a multistory rigid frame for given loads,analysis of unbraced frames for lateral loads by portal and cantilever method.		
13.	Plastic analysis:moment-rotation characteristics of general cross section,plastic hinge,plastic moment,effect of axial force on the plastic moment capacity.		
14.	Matrix structural analysis-truss structures		

8.2. Applications/Seminars		Teaching methods	Notes
1.	Flexibility method applied to a frame statically indeterminate of degree one:internal forces curves.	Problems solving with discussions	
2.	Flexibility method applied to a frame statically indeterminate of degree two:internal forces curves.		
3.	Flexibility method applied to a frame statically indeterminate of degree one,loaded with support settlement,temperature change and fabrication error,internal forces curves.		
4.	Continuous beams solved with the three-moment equation.		
5.	Slope-deflection method:frames without sidesway(frame with one joint),internal forces curves.		
6.	Slope-deflection method:frames without sidesway(frame with two joints),internal forces curves.		
7.	Slope-deflection method:frames with sidesway.		

8.	Slope-deflection method:frames without sidesway solved with Cross method.		
9.	Slope-deflection method:frames with sidesway solved with Cross method(one joint frame).		
10.	Slope-deflection method:frames with sidesway solved with Cross method(two joints frame).		
11.	Influence lines for indeterminate frames.		
12.	Influence lines for continuous beams.		
13.	Approximate analysis of indeterminate structures :analysis of unbraced frames for lateral loads by portal and cantilever method.		
14.	Plastic analysis:plastic hinge.		

Bibliography

1. White, R.N., Gergely, P., Sexsmith, R.G., Structural Engineering, volume 1 and 2, John Wily&Sons, NY., 1976.
2. West,H.H., Fundamental of Structural Analysis, John Wily&Sons, NY., 1993.
3. Kassimali, A., Structural analysis, PWS-KENT publishing Co., Boston, 1993.
4. Gali, A., Neville, A.M., Structural Analysis-a unified classical and Matrix Approch, E&FN Spon , London, 1997.
5. Catarig, Al, Petrina, M., Statica Constructiilor-Metode de calcul si aplicatii, Ed. Dacia, Cluj-Napoca, 1991.
6. Mazilu, P., Statica Constructiilor, vol. 1 and 2, Ed. Tehnica, Bucuresti, 1955, 1959.
7. Catarig, Al, s.a., Statica Constructiilor(Teorie si aplicatii)- Structuri static determinate, Vol.1. Editura U.T.Pres, Cluj-Napoca,2003.

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

Acquired skills will be needed for civil engineers who work in design and buildings firms, and are fundamental for those who will follow master and doctoral programmes in the field of Civil Engineering.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
Course	2 theory subjects	Written examination	40%
Applications	3 problems	Written examination	60%
10.4 Minimum standard of performance			
The minimum average mark of the two theory subjects is 5 (five). Attendance at laboratory works, solving and submitting homework is mandatory under the provisions of ECTS Regulation.			

Date of filling in
October, 10-2019

Date of approval in the department

Teachers in charge of seminars
Asist.ing.Moldovan Ilinca
Prof. dr. ing. Mircea Petrina
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