

SYLLABUS

1. Data about the program of study

1.1	Institution	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	Civil Engineering (English) / Civil Engineer
1.7	Form of education	Full time
1.8	Subject code	28.00

2. Data about the subject

2.1	Subject name			Statics and stability of constructions I							
2.2	Subject area			Civil Engineering							
2.3	Course responsible/lecturer			Assoc.prof. F.-Zsongor GOBESZ – go@mecon.utcluj.ro							
2.4	Teachers in charge of seminars			Assist.prof. Ilinca MOLDOVAN – ilinca.lungu@mecon.utcluj.ro							
2.5	Year of study	2	2.6	Semester	2	2.7	Assessment	E	2.8	Subject category	DID DI

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								10
Supplementary study in the library, online and in the field								4
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								13
Tutoring								–
Exams and tests								3
Other activities								–
3.7	Total hours of individual study	30						
3.8	Total hours per semester	100						
3.9	Number of credit points	4						

4. Pre-requisites (where appropriate)

4.1	Curriculum	none
4.2	Competence	none

5. Requirements (where appropriate)

5.1	For the course	Classroom with blackboard, video projector and screen.
5.2	For the applications	Lab room with blackboard.

6. Specific competences

Professional competences	<p>C1. Recognition of the elements and structures of buildings in the field of Civil Engineering.</p> <p>C1.1. Identifying the structural and functional role of the elements of a construction.</p> <p>Static calculation of statically determinate structures:</p> <ul style="list-style-type: none"> - Understanding the proper way to conform a load bearing structure. Geometric invariability condition; - Use of static equilibrium conditions for all categories of statically determined structures; - Determining the stress for all categories of statically determined structures; - Understanding and anticipating the transmission to the foundation (ground) of the external loads that act on the structures; - Awareness of the importance of accurate calculation of inner forces that ultimately lead to the dimensioning of structural elements of buildings; - Drawing the influence diagrams of the internal forces for all the categories of statically determined structures; - Distinguish between a stress diagram and an influence diagram; - To know how to draw the elastic deformed shape of the structure from the action of external loads; - Qualitative assessment of the structural response under the action of external loads, in terms of stress and displacements; - Drawing stress diagrams for all categories of statically determinate structures; - Using the principle of virtual mechanical work in order to determine stress and influence diagrams for all categories of statically determinate structures; - Calculation of the maximum stress from the action of mobile loads; - The general expression for calculating the displacements of points; - Calculation of point displacements for all categories of statically determined structures. <p>The rigor of engineering calculation.</p>
Cross competences	<p>Knowledge and experience of employing efficient and responsible work strategies, punctuality, seriousness and liability based on the principles, norms and values of professional ethics.</p> <p>Applying efficient technics in team work.</p> <p>Development of self-expression, vocabulary and technical culture.</p>

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

7.1	General objective	Acquiring the basic notions regarding the deployment of the static analysis of the main categories of statically determinate structures and the awareness of the high importance of the accurate calculations.
7.2	Specific objectives	<p>Assimilation of theoretical knowledge about the static analysis for different categories of structures.</p> <p>Developing the skills for the correct use of solving methods for statically determinate structures;</p> <p>Understanding how statically determinate structures work under the action of different types of loads.</p>

8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
1. Introduction. The objectives of statics. Fundamental hypotheses for static analysis.	Oral and written presentation with	
2. Straight beams. Beams with cantilevers and pinned connections.		
3. Planar frames. Force diagrams.		

4. Planar frames. The use of structural symmetry.	examples and comments (stimulating interactivity)		
5. Planar structures loaded normal to their plane.			
6. Planar arches. Shapes of coincidence.			
7. Planar trusses. Simplifying hypotheses. Solving methods.			
8. Static analysis of different types of planar trusses. Automation of the node isolation method.			
9. The principle of virtual mechanical work. Use of the principle in order to obtain the inner forces.			
10. Influence diagrams: straight beams, Gerber beams, planar frames.			
11. Influence diagrams: planar arches and trusses.			
12. Maximum inner forces from mobile loads.			
13. Elastic deformation of planar frames. The theorem of the virtual mechanical work's reciprocity (Betti).			
14. Elastic deformation of planar structures. Point displacements.			
Bibliography			
1. Lecture notes.			
2. CĂTĂRIG, AI., PETRINA, M., KOPENETZ, L., CHIRA, N., MÁTHÉ, A., BÂLC, R., <i>Statica construcțiilor: structuri static determinate</i> , Cluj-Napoca, Editura U.T. Press, 2011.			
3. BĂNUȚ, V., TEODORESCU, M. , <i>Statica construcțiilor. Aplicații. Structuri static determinate</i> , București, Editura Matrix Rom, 2003.			
4. http://users.utcluj.ro/~go/ (handouts and further resources)			
8.2. Applications	Teaching methods	Notes	
1. The use of static equilibrium conditions. Computing the reactions.	Short presentation, solving examples with discussion, followed by subjects and individual home works for the students.	Each student has to work individually; the solved topics will be checked and assessed weekly by the teacher.	
2. Straight beam. Beams with cantilevers and hinges. Stress diagrams.			
3. Planar frames with fixed loads. Stress diagrams.			
4. Planar frames with fixed loads. Stress diagrams.			
5. Planar frames. The use of structural symmetry. Stress diagrams. <i>Partial exam (problem): solving a frame.</i>			
6. Planar arches. Internal forces. <i>Partial exam (problem): computing the inner forces in a cross-section of an arch.</i>			
7. Planar trusses. Assessment of the efforts in case of simple trusses.			
8. Planar trusses. Assessment of the inner forces in case of composed trusses. <i>Partial exam (problem): solving a truss.</i>			
9. Use of the principle of virtual mechanical work in order to obtain inner forces.			
10. Influence diagrams. Gerber beams and planar frames.			
11. Influence diagrams. Planar arches.			
12. Influence diagrams. Planar trusses. <i>Partial exam (problem): drawing 3 influence lines.</i>			
13. Calculating the maximum cross-sectional forces in case of mobile loads.			
14. Elastic deformations. Assessing the displacements of some points in case of beams and planar frames.			

Bibliography

1. Class notes and hand-outs.
2. CHIRA N., BÂLC R. MOJOLIC C., et alii: *Statica construcțiilor. Structuri static determinate - Îndrumător de laborator*, Editura U.T. PRESS, Cluj- Napoca, 2014.
3. CĂTĂRIG, AI., PETRINA, M., KOPENETZ, L., CHIRA, N., MÁTHÉ, A., BÂLC, R.: *Statica construcțiilor: structuri static determinate*, Cluj-Napoca, Editura U.T. Press, 2011.
4. <http://users.utcluj.ro/~go/> (samples and further resources)

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 by engineers working in building design, construction and/or research (also in education).

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Theory (T)	Exam: written test.	1/3
10.5 Applications	Activity during the semester (L)	Assessment of each lab work and home work.	1/3
	Solving problems (A)	Exam: 4 practical written test (on-site partial exams) or 4 assignments (on-line partial exams).	1/3
10.6 Minimum standard of performance			
Solving and handing in the home works according to the deadlines, obtaining at least 5 points for the activity, also at the 4 practical/written tests, at least 4.5 points at the theory ($L \geq 5$ and $A \geq 5$ and $T \geq 4.5$). The final grade will result from $(T + L + A)/3$ (rounded to the nearest integer value). In order to obtain the credits the final grade must be at least 5 (five). Note: the score from the theory (T) is recognized only in the current session.			

Date of filling in:		Title Surname Name	Signature
17.06.2025	Lecturer	Assoc.prof. F.-Zsongor GOBESZ	
	Teachers in charge of application	Assist. Ilinca MOLDOVAN	

Date of approval in the department of Structural Mechanics

19.06.2025

Head of department
Assoc.Prof. Anca G. POPA

Date of approval in the Faculty of Civil Engineering

25.06.2025

Dean
Prof. Daniela L. MANEA