

SYLLABUS ¹

1. Information about the program

1.1 Higher education institution	Politehnica University Timișoara
1.2 Faculty ² / Department ³	Faculty of Civil Engineering/ Department of Steel Structures and Structural Mechanics - CMMC
1.3 Chair	—
1.4 Field of study (name/code ⁴)	Civil engineering/80
1.5 Study cycle	Bachelor
1.6 Study program (name/code/qualification)	Civil engineering (in English)/ 10/ Engineer)

2. Information about the discipline

2.1 Name of discipline/ formative category ⁵	Structural Analysis 2 / DD						
2.2 Coordinator (holder) of course activities	Prof.dr.ing. Raul Zaharia						
2.3 Coordinator (holder) of applied activities ⁶	Lect.dr.ing. Ioan Both						
2.4 Year of study ⁷	III	2.5 Semester	5	2.6 Type of evaluation	E	2.7 Type of discipline ⁸	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) ⁹

3.1 Number of fully assisted hours / week	4 of which:	3.2 course	2	3.3 seminar / laboratory / project	2
3.1* Total number of fully assisted hours / semester	56 of which:	3.2* course	28	3.3* seminar / laboratory / project	28
3.4 Number of hours partially assisted / week	of which:	3.5 training		3.6 hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	3.5* training		3.6* hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	2.5 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			0.5
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			1
3.7* Number of hours of unassisted activities / semester	35 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			7
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			14
3.8 Total hours / week ¹⁰	6.5				
3.8* Total hours /semester	91				
3.9 Number of credits	4				

4. Prerequisites (where applicable)

4.1 Curriculum	• Mathematics, Mechanics, Mechanics of Materials , Structural Analysis I
4.2 Competencies	• Documentation in Romanian and English technical language, Knowledge of

¹ The form corresponds to the Discipline File promoted by OMECTS 5703 / 18.12.2011 and to the requirements of the ARACIS Specific Standards valid from 01.10.2017.

² The name of the faculty which manages the educational curriculum to which the discipline belongs

³ The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.

⁴ The code provided in HG no.140 / 16.03.2017 or similar HGs updated annually shall be entered.

⁵ Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).

⁶ Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

⁷ Year of studies in which the discipline is provided in the curriculum.

⁸ Discipline may have one of the following regimes: imposed discipline (DI), optional discipline (DO) or optional discipline (Df).

⁹ The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.

¹⁰ The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

	fundamental mechanics and basic notions related to the mechanics of materials, Knowledge about the calculation of internal forces and displacements on statically determinate structures
--	--

5. Conditions (where applicable)

5.1 of the course	<ul style="list-style-type: none"> Classroom of medium capacity
5.2 to conduct practical activities	<ul style="list-style-type: none"> Classroom of medium capacity

6. Specific competencies acquired through this discipline

Specific competencies	<ul style="list-style-type: none"> Determine the response of a structural system to external actions
Professional competencies ascribed to the specific competencies	<ul style="list-style-type: none"> Recognizing typical structures and structural elements, specific to the graduated study programme Design of structural elements in civil engineering, specific to graduated study programme
Transversal competencies ascribed to the specific competencies	<ul style="list-style-type: none"> Documentation in Romanian and foreign language, in view of professional and personal development, via continuous learning and efficient adaptation to the new technical specifications

7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	<ul style="list-style-type: none"> The Structural Analysis courses give students the understanding of the importance of structural analysis and the tools available to determine the response of a structural system to external actions. The second part of the Structural Analysis course aims to provide the students with the necessary knowledge to analyze the behavior of the statically indeterminate structures, using both flexibility and displacement methods, to analyze the stability of structures and to analyze the behavior of structures subjected to mobile loads
7.2 Specific objectives	<ul style="list-style-type: none"> After completion of the course, the student should be able to calculate the internal forces and displacements within statically indeterminate frames, trusses and arches, to determine the critical load for a structure and the buckling lengths of the elements, and to determine the internal forces within a structure subjected to mobile loads, using influence lines.

8. Content ¹¹

8.1 Course	Number of hours	Teaching methods ¹²
1. Statically indeterminate trusses	3	Lecture, conversations, explanations,
2. Statically indeterminate arches	4	
3. The displacement method for the analysis of statically	5	

¹¹ It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".

¹² Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

indeterminate structures		examples
4. Structural instability. Bifurcation of equilibrium. Buckling of columns.	4	
5. Second order analysis. Displacement method in the second order theory	3	
6. Stability analysis using the displacement method	3	
7. Influence lines for statically determinate structures	6	
8. Influence lines for continuous beams		

Bibliography ¹³ Maquoi R., Franssen J. M., Mécanique des Structures, Cours destinée aux étudiants de 3ème Bachelier Génie Civil, Université de Liège - Faculté des Sciences Appliquées, Edite par la centrale des Cours de l'AEES, asbl, Liège, 2008
Harry H. West, Analysis of structures – an integration of classical and modern methods, John Wiley & Sons, New York, 1980, ISBN 0-471-02036-2
Ivan M., Vulpe A., Bănuț V., Statica, stabilitatea și dinamica construcțiilor, Editura Didactică și Pedagogică, București, 1985
Ivan M., Botici A., Dogaru E., Ivan A., Balekics G., Negru A., Statica, stabilitatea si dinamica construcțiilor – Teorie si Probleme, Editura Tehnica, Bucuresti, 1997, ISBN 973-31-0776-X
Zaharia R. Both I., Structural Analysis – Applications for statically indeterminate structures, Orizonturi Universitare, Timisoara, 2013, ISBN 978-973-638-536-0

8.2 Applied activities ¹⁴

	Number of hours	Teaching methods
1. Statically indeterminate trusses – flexibility method	4	Examples, conversations, explanations, comparative analysis
2. Statically indeterminate arches – flexibility method	4	
3. Statically indeterminate frames – displacement method	5	
4. Second order analysis – displacement method	4	
5. Stability analysis – displacement method	4	
6. Influence lines for statically determinate Gerber beams	4	
7. Influence lines for statically indeterminate continuous beams	3	

Bibliography ¹⁵ Maquoi R., Franssen J. M., Mécanique des Structures, Cours destinée aux étudiants de 3ème Bachelier Génie Civil, Université de Liège - Faculté des Sciences Appliquées, Edite par la centrale des Cours de l'AEES, asbl, Liège, 2008
Harry H. West, Analysis of structures – an integration of classical and modern methods, John Wiley & Sons, New York, 1980, ISBN 0-471-02036-2
Ivan M., Vulpe A., Bănuț V., Statica, stabilitatea și dinamica construcțiilor, Editura Didactică și Pedagogică, București, 1985
Ivan M., Botici A., Dogaru E., Ivan A., Balekics G., Negru A., Statica, stabilitatea si dinamica construcțiilor – Teorie si Probleme, Editura Tehnica, Bucuresti, 1997, ISBN 973-31-0776-X
Zaharia R. Both I., Structural Analysis – Applications for statically indeterminate structures, Orizonturi Universitare, Timisoara, 2013, ISBN 978-973-638-536-0

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- The graduates must have knowledge about the analytical calculation of internal forces and displacements in civil engineering structures

10. Evaluation

Type of activity	10.1 Evaluation criteria ¹⁶	10.2 Evaluation methods	10.3 Share of the final grade
------------------	--	-------------------------	-------------------------------

¹³ At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.

¹⁴ Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".

¹⁵ At least one title must belong to the discipline team.

¹⁶ Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

10.4 Course	Applications and theoretical subjects	Written examination	60 %
10.5 Applied activities	S: Solving the applications in the classroom. There are approximately 3-4 homework assignments during the semester	Presentation of the homework, responses to the questions during the seminars	30 %
	L:		
	P¹⁷:		
	Pr: Students are expected to attend and participate in every class session.	The attendance is monitored	10 %
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified ¹⁸)			
<ul style="list-style-type: none"> The answers to the exam subjects must accumulate a minimum score of 5 points out of 10 possible 			

Date of completion

25.01.2018

**Course coordinator
(signature)**

.....
**Date of approval in the Faculty
Council ¹⁹**

12.02.2018

**Coordinator of applied activities
(signature)**

.....
**Dean
(signature)**

**Head of Department
(signature)**

.....

.....

¹⁷ In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.

¹⁸ It will not explain how the promotion mark is awarded.

¹⁹ The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.