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	Railway, Roads and Bridges
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	CDB/ Engineer
1.7	Form of education	Full time
1.8	Subject code	15.00

2. Data about the subject

2.1	Subject name			BRIDGE STRUCTURES			
2.2	Course responsible/lecturer			Lecturer PhD. Mircea A. Suciu – mircea.suciu@cfdp.utcluj.ro			
2.3	Teachers in charge of seminars			Lecturer PhD. Mircea A. Suciu – mircea.suciu@cfdp.utcluj.ro			
2.4 Year of study	2	2.5 Semester	1	2.6 Assessment	Exam	2.7 Subject category	DS DI

3. Estimated total time

3.1 Number of hours per week	2	3.2 of which, course:	1	3.3 applications:	1
3.4 Total hours in the curriculum	28	3.5 of which, course:	14	3.6 applications:	14
Individual study					hours
Manual, lecture material and notes, bibliography					28
Supplementary study in the library, online and in the field					12
Preparation for seminars/laboratory works, homework, reports, portfolios, essays					28
Tutoring					
Exams and tests					4
Other activities					

3.7	Total hours of individual study	72
3.8	Total hours per semester	100
3.9	Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	N/A
4.2	Competence	N/A

5. Requirements (where appropriate)

5.1	For the course	Large capacity room equipped with: blackboard, video projector
5.2	For the applications	Large capacity room equipped with: blackboard, video projector, calculation technique, software packages.

6. Specific competences

Professional competences	After completing the discipline students must know: • Evolution of bridge structures. Construction of bridges and the function/role of their component elements. • How to use computer software for bridge design. After completing the discipline students will be able to: • Choose the type of superstructure according to the span length and loading size using predimensioning elements or the catalogs of prefabricated elements. • Determine the coordinates of the axis of coincidence with bridges on permanent loads. • To be able to apply European norms regarding the calculation of reinforced concrete bridges, (EC0-Bases of structural design. EC1-Actions on structures. EC2-Design of concrete structures. PD165-2012). • To use the prefabricated catalogs for choosing a concrete bridge superstructure consisting of prefabricated elements. • To use specific software for structural analysys in order to evaluate the sectional stresses and deformations of bridge superstructures. • To use the calculation modules for the execution and loading stages and those for the mobile loads, in order to determine the stresses and deformations in the elements of the bridge structure.
Cross competences	• Familiarity with the roles and activities specific to teamwork. • Carrying out a rigorously documented synthesis work • Drafting and presentation of a calculation summary; • Discussing the solutions of the colleagues in the working group (semigroup); dissemination of results.

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

7.1	General objective	Development of competences regarding compliance with the safety requirements and sustainable behavior of concrete bridge structures, using a coherent and comprehensive system of norms, various design methods and other specific design elements.
7.2	Specific objectives	Obtaining skills for designing concrete bridge structures taking into account the execution and loading stages. Assimilating theoretical knowledge on solving special problems in the field of concrete bridges, using specific software. Use of finite element software for bridge structures.

8. Contents

8.1. Lecture (syllabus) – 14 weeks, 1 hour/week	Teaching methods	Notes
1,2. General presentation of the course, structure, objectives, course, bibliography. Getting started on concrete bridges. Evolution of bridge structures.	Exposition, discussions.	Large capacity room equipped with video projector, blackboard. Computers equipped with
3. Use of prefabricated catalogs for choosing a concrete bridge superstructure.		
4,5,6. Structural analysis software. Determination of sectional characteristics of structural elements. Load evaluation and bridge design using specific software. Lines of influence at bridges for mobile loads.		

7,8,9. Calculation of efforts in the strength elements of a bridge superstructure taking into account the execution and loading in stages.		structural analysis software.
10. Introduction in finite element software of mobile loads to bridges.		
11,12. Determination of the coincidence axis for arch bridges.		
13,14. The advantages of using structural analysis software that allow the calculation of a structure in execution phases and loading stages. Structural optimizations for concrete bridges.		
Bibliography 1. STAS 2924-86 Gabarite pentru poduri, viaducte, pasaje denivelate şi podeţe. 2. PD 165/2012 Normativ privind alcătuirea şi calculul structurilor de poduri şi podeţe de şosea cu suprastructuri monolit şi prefabricate. 3. G. Viorel -Poduri din beton armat. Note de curs. Litografia U.T.Cluj-Napoca, 1998. 4. Z. Kiss, T. Oneţ: Proiectarea structurilor de beton după SR EN 1992-1. Editura Abel, 2008. 5. SR EN 1990, SR EN 1991, SR EN 1992 6. I.R. Răcănel: Căi de Comunicaţii: Poduri. Elemente generale. Conspress, Bucureşti, 2007.		
8.2. Applications/Seminars – 14 weeks, 1 hour/week	Teaching methods	Notes
1. Topics dealt with during working hours. Types of bridges structures.	Exposition, discussions.	Large capacity room equipped with video projector, blackboard. Computers equipped with structural analysis software.
2. Software interface for structural analysis.		
3. Introduction of materials and determination of sectional characteristics.		
4. Loading the influence lines at bridges.		
5,6. Load evaluation and bridge superstructure definition on finite element software.		
7,8,9. Calculation of efforts in the main elements of a bridge superstructure taking into account the execution and loading stages.		
10,11. Introduction in the finite element analysis sotware of mobile loads on bridges. Determination of the winding diagrams of the sectional efforts from the elements of the analyzed structure required for permanent loads and from mobile loads on bridges.		
12. Determination of the coincidence axis at a bridge on the vault.		
13,14. Verification of deformations and stresses with a finite element structural software.		
Bibliography 1. STAS 2924-86 Gabarite pentru poduri, viaducte, pasaje denivelate şi podeţe. 2. PD 165/2012 Normativ privind alcătuirea şi calculul structurilor de poduri şi podeţe de şosea cu suprastructuri monolit şi prefabricate. 3. G. Viorel, E. Prichici, E. Ionescu: Proiectarea podurilor de beton armat şi precomprimat. Îndrumător. Litografia U.T.Cluj-Napoca, 1993. 4. Z. Kiss, T. Oneţ: Proiectarea structurilor de beton după SR EN 1992-1. Editura Abel, 2008. 5. SR EN 1990, SR EN 1991, SR EN 1992 6. Tutorials in pdf and video format with the use of finite element computing programs.		

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

The content of the discipline is correlated with the needs of employers in the field of civil engineering. In order to identify the needs and expectations of the employers in the field, to establish the content of the course was discussed with other faculty within the faculty, with representatives of professional associations and with graduates of the study program.
The content and complexity of the notions taught are permanently correlated with those of the related disciplines in the curriculum and adapt to the evolution of the knowledge required in the field of undergraduate studies.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The answer in writing to 5 theory questions.	Written test - duration of evaluation 1 hour. (T)	33%
10.5 Applications	Solving a problem.	Written test - duration of evaluation 1 hour. (A)	33%
	Bridge project.	Presentation of the project. (L)	33%
10.6 Minimum standard of performance **E= [(A) + (T) + (L)]/3**			
(a) Eligibility condition for the exam presentation: attendance at min. 80% work sessions and project delivery. Note to the works * (is included in the electronic catalog): (L): min. 5 (five) (b) Application note (A): min. 5 (five) (c) Note to theory (T): min. 5 (five)			

Date of filling in:		**Title Surname Name**	**Signature**
21.10.2019	Lecturer	Lecturer PhD. Mircea A. Suciu	
	Teachers in charge of application	Lecturer PhD. Mircea A. Suciu	

Date of approval in the department ……..

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Head of department
Conf.dr.ing. Gavril Hoda

Date of approval in the faculty ……

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Dean
Prof.dr.ing.
Conf.dr.ing. Nicolae Chira