

## DISCIPLINE SHEET

### 1. Program data

1.1 Higher education institution	Technical University of Cluj-Napoca
1.2 Faculty	Civil Engineering
1.3 Department	Structures
1.4 Field of studies	Civil Engineering
1.5 Cycle of studies	Master
1.6 Study program / Qualification	Artificial Intelligence in Civil Engineering and Management (Engl)
1.7 Form of education	Continuous Learning
1.8 Discipline code	11.00

### 2. Discipline data

2.1 Name of discipline	Monitoring and safety evaluation of existing and new concrete structures using digital infrastructure						
2.2 Course manager	Associate Prof. PhD. Eng. Bogdan Heghes <a href="mailto:bogdan.heghes@dst.utcluj.ro">bogdan.heghes@dst.utcluj.ro</a>						
2.3 The holder of the seminar / laboratory / project	Associate Prof. PhD. Eng. Bogdan Heghes <a href="mailto:bogdan.heghes@dst.utcluj.ro">bogdan.heghes@dst.utcluj.ro</a>						
2.4 Year of study	I	2.5 Semester	2	2.6 Evaluation type	Exam	2.7 Discipline regime	DS/DI

### 3. Estimated total time

3.1 Number of hours per week	2	Of which: 3.1 course	1	3.3 seminar / laboratory	1
3.4 Total hours from the curriculum	100	Of which: 3.5 course	14	3.6 seminar / laboratory	14
Distribution of time fund hours					hours
Study according to the textbook, course support, bibliography and notes					32
Additional documentation in the library, on specialized electronic platforms and in the field 20					20
Preparation of seminars / laboratories, assignments, reports, portfolios and essays 17					17
Tutorial					1
Examinations					2
Other activities .....					-
3.7 Total hours of individual study	69				
3.8 Total hours per semester	72				
3.9 Number of credits	4				

### 4. Prerequisites (where applicable)

4.1 curriculum	Reinforced and prestressed concrete I, II
4.2 competence	Not applicable

### 5. Conditions (where applicable)

5.1. of the course	Not applicable
5.2. of conducting the seminar / laboratory / project	Not applicable

## 6. Specific skills accumulated

Professional skills	<p>Knowledge about:</p> <ul style="list-style-type: none"> <li>- To know the concept of monitoring and evaluating the safety of concrete structures</li> <li>- To know methods of structural systems, types of actions, methods of static and dynamic testing, determination of material qualities</li> <li>- To know methods of visual inspection and in-situ testing of materials</li> <li>- To know measurement methods: analog and digital equipment</li> <li>- To be able to apply the implementation of measurement systems and data acquisitions as well as their statistical evaluation and implementation</li> <li>- To use the digital infrastructure in the implementation of the previous paragraph</li> </ul> <p>After completing the course, students will be able to:</p> <ul style="list-style-type: none"> <li>- To monitor, evaluate and destructively and non-destructively test reinforced concrete or prestressed concrete elements and structures subjected to different types of stress.</li> <li>- To know how to determine the objectives of construction tests. Characteristic parameters. Measuring methods and devices in the load test of constructions - in static and dynamic mode. Methods and devices for destructive and non-destructive tests non-destructive.</li> <li>- To organize and design in-situ tests, to monitor their behavior over time</li> <li>- To create digital systems for transmitting monitoring information After completing the course, students will have the ability to:</li> <li>- To determine the bearing capacity of reinforced concrete elements after fire using non-destructive methods.</li> </ul> <p>After completing the course, students will have the ability to:</p> <ul style="list-style-type: none"> <li>- To determine the bearing capacity of reinforced concrete elements after fire using non-destructive methods.</li> </ul>
Transversal skills	<ul style="list-style-type: none"> <li>- Drafting and presentation of a trial project and a technical report containing the organizational brief, test stages and the test report</li> </ul>

## 7. Objectives of the discipline (resulting from the grid of specific skills accumulated)

7.1 The general objective of the discipline	The development of competences regarding the monitoring and evaluation of the safety of existing and new concrete structures using the digital infrastructure, testing by loading of constructions - in static and dynamic mode, methods and devices for testing, the use of the digital infrastructure for monitoring
7.2 Specific objectives	Assimilation of theoretical and practical knowledge for the organization and design of trials. Testing of reinforced and prestressed concrete elements and constructions. Non-destructive testing

## 8. Contents

8.1 Course	Teaching methods	Observations
General considerations . Introduction to the concept of monitoring and the necessity of tests. The objectives of construction tests. The methodology of the experimental study of constructions, technical and performance concepts - course 1 and 2	Video projector -on site pptx presentation, Exposure, applications, assignments, specific tables, onsite or online laboratory work on the Microsoft Teams platform.	<b>Power Point Presentations</b>
Structures and materials: structural systems, types of actions, static and dynamic test methods		

[illegible]

methods of the structures. – 2 laboratories		
Preparation of measurement chains, data acquisition systems and monitoring during testing of the deformation parameters of elements and structures. – 2 laboratories		
Numerical acquisition problems: filters, physical limitations in data acquisition. Statistical interpretation of data – 2 laboratories		
The use of digital monitoring information transmission systems - 2 laboratories		
<b>Bibliography</b> <ul style="list-style-type: none"> <li>• Z. Kiss, T. Oneț – Betonul armat, UT Press 1999</li> <li>• Z. Kiss, T. Oneț – Proiectarea structurilor de beton după SR – EN 1992-1, Abel 2010</li> <li>• C. Măgureanu și colectivul – Beton Armat – Îndrumător de laborator, UT Press, 2007</li> <li>• C. Măgureanu, T. Oneț – Betonul, UTPres, 1996</li> <li>• S. Balan , M. Arcan – Incercarea constructiilor.Ed Tehnica. Bucuresti 1965.</li> <li>• I. Terteia, T. Onet – Verificarea calitatii constructiilor</li> <li>• I. Buchman , C. Bob , E. Jebeleanu , C. Badea , L. Iures – Controlul calitatii liantilor , mortarelor si betoanelor.</li> <li>• SR EN 12504, NP137-2014, C26-85</li> <li>• P130-1999 Normativ privind comportarea in timp a constructiilor in forma actualizata</li> <li>• GE 035 – 1999 Ghidul si programul de calcul cadru al responsabilului cu urmarirea in exploatare a constructiilor</li> <li>• MP 031-2003 Metodologia privind programul de urmarire in timp a comportarii constructiilor din punct de vedere al cerintelor functionale</li> </ul>		

**9. Corroboration of the contents of the discipline with the expectations of representatives of the epistemic community, professional associations and representative employers in the field related to the program**

The skills acquired will be necessary for employees working in design firms and those in the field of execution (site and supply)	
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**10. Evaluation**

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight on the final grade
10.4 Course	Solving at least 2 theory questions	Oral test - 10min/student (note T)	50%
10.5 Seminar/Laboratory	The average of the partial marks for Homework	Continuous assessment during the semester; (note Ho)	50%
10.6 Minimum Performance Standard			
(a) Eligibility condition for appearing in the exam: presence in the laboratory according to the ECTS regulation and the delivery of the papers (assignments) on time.			
(b) Grade for the project (Homework): min. 5 (five);			

Homework – Will be registered in the electronic catalog

(c) Theory grade (T): min. 5 (five)

**E= 0.50\*(T) + 0.50\*(Homework);**

**E- Registers in the electronic catalog**

The condition for passing/obtaining credits:  $E \geq 5$ , if  $T \geq 5$  and Homework  $\geq 5$

NOTE:

When determining the final grade, the student's involvement during the semester will also be considered: participation in debates, scientific sessions, attendance, etc.

Data of completion:	Holders	First Name Last Name	Signature
05.07.2024	Course	Associate Prof PhD Eng. Bogdan Heghes	
	Aplications	Associate Prof PhD Eng. Bogdan Heghes	

Date of approval in the Council of Department of Structures	Director of the Structures Departament
05.07.2024	Associate Prof PhD. Eng Attila PUSKAS
Date of approval in the Council of the Faculty of Construction	Dean
12.07.2024	Professor PhD Eng Daniela Lucia MANEA