

# SYLLABUS <sup>1</sup>

## 1. Information about the program

1.1 Higher education institution	Universitatea Politehnica din Timisoara
1.2 Faculty <sup>2</sup> / Department <sup>3</sup>	
1.3 Chair	—
1.4 Field of study (name/code <sup>4</sup> )	Inginerie civilă / 10
1.5 Study cycle	Master
1.6 Study program (name/code/qualification)	Advanced design of steel and composite structures

## 2. Information about discipline

2.1 Name of discipline/The educational classe <sup>5</sup>	Construcții metalice din plăci curbe subțiri / Metallic Shell Structures/ DCAV						
2.2 Coordinator (holder) of course activities	Dogariu Adrian						
2.3 Coordinator (holder) of applied activities <sup>6</sup>	Dogariu Adrian						
2.4 Year of study <sup>7</sup>	II	2.5 Semester	3	2.6 Type of evaluation	E	2.7 Type of discipline <sup>8</sup>	D

## 3. Total estimated time (direct activities (fully assisted), partially assisted activities and unassisted activities<sup>9</sup>)

3.1 Number of hours fully assisted/week	3 ,of which:	3.2 course	2	3.3 seminar/laboratory/project			1
3.1* Total number of hours fully assisted/sem.	42 ,of which:	3.2* course	28	3.3* seminar/laboratory/project			14
3.4 Number of hours partially assisted/week	,of which:	3.5 project, research		3.6 training		3.7 hours designing M.A. dizertation	
3.4* Number of hours pasrtially assisted/ semester	,of which:	3.5* project of research		3.6* training		3.7* hours designing M.A. dizertation	
3.8 Number of hours of unassisted activities/ week	2,85 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					0,85
		Study using a manual, course materials, bibliography and lecture notes					1
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					1
3.8* Total number of hours of unasssited asctivities/ semester	40 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					12
		Study using a manual, course materials, bibliography and lecture notes					14
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					14
3.9 Total hrs./week <sup>10</sup>	5,85						
3.9* Total hrs./semester	82						
3.10 No. of credits	7						

## 4. Prerequisites (where applicable)

4.1 Curriculum	•
4.2 Competencies	•

<sup>1</sup> The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex 3), updated based on the Specific Standards ARACIS of December 2016.

<sup>2</sup> The name of the faculty which manages the educational curriculum to which the discipline belongs

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

<sup>4</sup> Fill in the code provided in HG no. 376/18.05.2016 or in HG similars annually updated.

<sup>5</sup> The educational classes of subjects (ARACIS – specific standards, art./paragraph 4.1.2.a) are: fundamental subjects, field subjects, majoring/specialization subjects.

<sup>6</sup> The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

<sup>7</sup> The year of study to which the discipline is provided in the curriculum .

<sup>8</sup> The types of subjects (ARACIS – specific standards, art./paragraph 4.1.2.a) are: extended knowledge subject / advanced knowledge subject and synthetic subject (DA / DCAV and DS).

<sup>9</sup> Within UPT, the number of hours from 3.1\*, 3.2\*, ..., 3.9\* are obtained by multiplying by 14 (weeks) the number of hours from 3.1, 3.2, ..., 3.9.

<sup>10</sup> The total number of hours/week is obtained by summing up the number of hours from 3.1, 3.4 și 3.8.

## 5. Conditions (where applicable)

5.1 of the course	•
5.2 to conduct practical activities	•

## 6. Specific competencies acquired through this discipline

Specific competencies	•
Professional competencies ascribed to the specific competencies	<ul style="list-style-type: none"> <li>• Proiectare în construcții cu posibilitatea asumării responsabilității de conducător</li> <li>• Activități de execuție și mentenanță în domeniul construcțiilor</li> <li>• Activitate de cercetare, dezvoltare în domeniul structurilor pentru construcții</li> <li>• Consultanța, asistența tehnică și verificări de proiecte</li> </ul>
Transversal competencies ascribed to the specific competencies	•

## 7. Objectives of the discipline (based on the grid of specific competencies acquired)

7.1 The general objective of the discipline	<ul style="list-style-type: none"> <li>• This course presents an overview of design philosophy as used in civil engineering shell structures, the forms of different kinds of structure, the relationship between the form and the functions, material behaviour, imperfections and their impact on structural behaviour, and different methods of evaluating the strength of a shell structure according with European Norms..</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• During classwork hours will be review methods of evaluating the strength of a shell structure according with EN 1993-1-6. Hand calculations and computer applications will be done. At the end of this course it is expected that students will be able to recognize typical shell structures and their behaviour under different loading conditions and to design them applying the appropriate EN 1993-1-6 regulations.</li> </ul>

## 8. Content

8.1 Course	Number of hours	Teaching methods
Introduction. Objective and scope of course. General consideration; Shell structural forms used in constructions; Architectural considerations. Examples of shell structures.	8	lecturing, conversation, explication, demonstration
Behaviour of shell structures under loads Loads on shell structures; Elasticity and Plasticity of shell structures; Buckling of shell structures; Curved latticed structures – general aspects.	4	
Design of steel structures - Strength and Stability of Shell Structures according with EN. Modeling of shell; Material assumptions; Geometric tolerances and imperfections; Limits states for shell structures: Plastic limit state (LS1); Cyclic plasticity limit state (LS2); Buckling limit state (LS3); Fatigue limit state (LS4).	14	
Shell structures solved with FEM	2	

Bibliography <sup>11</sup> ECCS Technical Committee 8 Structural Stability – Buckling of Shells European Recommendation 5th Edition; Eurocode 3, Part 1-6; N. 125, 2008; ESDEP (1994) European Steel Design Educational Programme; Lecture 8.6; 8.7; 8.8; 8.9; The ESDEP Society – The Steel Construction Institute; Silwood Park – Ascot – Bekshire; U.K		
<b>8.2 Applied activities<sup>12</sup></b>	<b>Number of hours</b>	<b>Teaching methods</b>
Stress design – Hand calculations	1	Explication, example
Cylindrical shells of constant wall thickness	2	
Cylindrical shells of stepwise variable wall thickness	2	
Shells under wind loading	2	
Conical shells and truncated shells	2	
Spherical shells under uniform external pressure	1	
Cylindrical shells with ring stiffeners	1	
Cylindrical shells with longitudinal stiffeners	1	
Finite element numerical analysis	2	
Bibliography <sup>13</sup> ECCS Technical Committee 8 Structural Stability – Buckling of Shells European Recommendation 5th Edition; Eurocode 3, Part 1-6; N. 125, 2008; ESDEP (1994) European Steel Design Educational Programme; Lecture 8.6; 8.7; 8.8; 8.9; The ESDEP Society – The Steel Construction Institute; Silwood Park – Ascot – Bekshire; U.K		

**9. Coroboration 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**

- Preparing and evaluating students in the specific field of advanced analysis of complex metallic structures

**10. Evaluation**

Type of activity	10.1 Evaluation criteria <sup>14</sup>	10.2 Evaluation methods	10.3 Share of the final grade
<b>10.4 Course</b>	Theoretical subjects and applications from course content	Written exam	50 %
<b>10.5 Applied activities</b>	<b>S:</b>		

<sup>11</sup> At least one title must belong to the department staff teaching the discipline, and at least one title must refer to a relevant work for the discipline, a national and international work that can be found in the UPT Library.

<sup>12</sup> The types of applied activities are those mentioned in 5. If the discipline contains more types of applied activities then they are marked, consecutively, in the table below. The type of activity will be marked distinctively under the form: „Seminar:“, „Laboratory:“, „Project:“ and/or „Practice/Training:“.

<sup>13</sup> At least one title must belong to the staff teaching the discipline.

<sup>14</sup> The Syllabus must contain the evaluation method of the discipline, specifying the criteria, the methods and the forms of evaluation, as well as mentioning the share attached to these within the final mark. The evaluation criteria must correspond to all activities stipulated in the curriculum (course, seminar, laboratory, project), as well as to the methods of continuous assessment (homework, essays etc.)

	<b>L:</b> Application solved according to EN	Presentation, attendance	50 %
	<b>P:</b>		
	<b>Pr:</b>		
	<b>Tc-R<sup>15</sup>:</b>		
<b>10.6</b> Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified <sup>16</sup> )			
<ul style="list-style-type: none"> <li>All subjects should obtain a passing grade mark</li> </ul>			

**Date of completion**

06.03.2019

**Course coordinator  
(signature)**

.....

**Coordinator of applied activities  
(signature)**

.....

**Head of Department  
(signature)**

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**Date of approval in the Faculty  
Council <sup>17</sup>**

**Dean  
(signature)**

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<sup>15</sup> Tc-R= Homework-Reports

<sup>16</sup> For this point turn to "Ghid de completare a Fișei disciplinei" found at: [http://univagora.ro/m/filer\\_public/2012/10/21/ghid\\_de\\_completare\\_fisa\\_disciplinei.pdf](http://univagora.ro/m/filer_public/2012/10/21/ghid_de_completare_fisa_disciplinei.pdf)

<sup>17</sup> The approval is preceded by discussing the study program's board's point of view with redgards to the syllabus.