**SYLLABUS**

1. **Information about the program**

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| **1.1** Higher education institution | UNIVERSITATEA POLITEHNICA TIMISOARA |
| **1.2** Faculty[[1]](#footnote-1) / Department[[2]](#footnote-2) | CONSTRUCTII/ CMMC |
| **1.3** Field of study (name/code[[3]](#footnote-3)) | INGINERIE CIVILA/ 10 |
| **1.4** Study cycle | Master |
| **1.5** Study program (name/code/qualification) | ADVANCED DESIGN OF BUILDINGS – PROIECTAREA AVANSATA A CLADIRILOR/ 10/ Master |

1. **Information about discipline**

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| **2.1** Name of discipline/The educational classe[[4]](#footnote-4) | | | Shell and Plated Structures/ DCAV | | | | |
| **2.2** Coordinator (holder) of course activities | | | Conf.dr.ing. Dogariu Adrian | | | | |
| **2.3** Coordinator (holder) of applied activities[[5]](#footnote-5) | | | Conf.dr.ing. Dogariu Adrian | | | | |
| **2.4** Year of study[[6]](#footnote-6) | 2 | **2.5** Semester | 3 | **2.6** Type of evaluation | E | **2.7** Regime of discipline[[7]](#footnote-7) | DO |

1. **Total estimated time** (direct activities (fully assisted), partially assisted activities and unassisted activities[[8]](#footnote-8))

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| **3.1** Number of hours fully assisted/week | 4 ,of which: | course | 2 | seminar/laboratory/project | | | 2 |
| **3.1\*** Total number of hours fully assisted/sem. | 56 ,of which: | course | 28 | seminar/laboratory/project | | | 28 |
| **3.2** Number of on-line hours fully assisted/sem | 32 ,of which: | course | 16 | seminar/laboratory/project | | | 16 |
| **3.3** Number of hours partially assisted/week | ,of which: | project, research |  | training |  | hours designing M.A. dissertation |  |
| **3.3\*** Number of hours partially assisted/ semester | ,of which: | project of research |  | training |  | hours designing M.A. dissertation |  |
| **3.4** Number of hours of unassisted activities/ week | 6.71 ,of which: | Additional documentation in the library, on specialized electronic platforms, and on the field | | | | | 1.71 |
| Study using a manual, course materials, bibliography and lecture notes | | | | | 2.5 |
| Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays | | | | | 2.5 |
| **3.4\*** Total number of hours of unasssited asctivities/ semester | 94 ,of which: | Additional documentation in the library, on specialized electronic platforms, and on the field | | | | | 24 |
| Study using a manual, course materials, bibliography and lecture notes | | | | | 35 |
| Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays | | | | | 35 |
| **3.5 Total hrs./week**[[9]](#footnote-9) | 10.71 | | | | | | |
| **3.5\* Total hrs./semester** | 150 | | | | | | |
| **3.6 No. of credits** | 6 | | | | | | |

**4. Prerequisites** (where applicable)

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| **4.1** Curriculum |  |
| **4.2** Competencies |  |

**5. Conditions** (where applicable)

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| **5.1** of the course | * Medium capacity room, video projector |
| **5.2** to conduct practical activities | * Medium capacity room, video projector, computers |

**6. Specific competencies** acquired through this discipline

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| Specific competencies | * Design of metallic shell structures using methods of evaluating the strength of a shell structure according with SREN 1993-1-6 * Design of structures using complex numerical analysis, using MNA and LBA, respectively GMNIA |
| Professional competencies ascribed to the specific competencies | * ensure compliance with security legislation; provide construction counseling; apply health and safety standards; draw sketches; utilize CAD software; perform analytical mathematical calculations; draft technical reports; apply numerical computing skills; conduct sample analysis; manage data in the field of research; prepares scientific reports; |
| Transversal competencies ascribed to the specific competencies | * oversee quality control; apply scientific, technological, and engineering knowledge; work in teams; train others; |

**7. Objectives of the discipline** (based on the grid of specific competemcies acquired)

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| **7.1** The general objective of the discipline | * 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 |
| **7.2** Specific objectives | * During classwork hours will be review methods of evaluating the strength of a shell structure according with SREN 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 SREN 1993-1-6 regulations |

**8. Content**

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| **8.1** Course | | Number of hours | Of which online | Teaching methods |
| Introduction. Objective and scope of course.  General consideration; Shell structural forms used in constructions; Architectural considerations. Examples of shell structures | | 8 | Max 60% | 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 |  |
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|  | Bibliography[[10]](#footnote-10)  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  <https://shellbuckling.com/index.php> | | | |
| **8.2** Applied activities[[11]](#footnote-11) | | Number of hours | Of which online | Teaching methods |
| Stress design – Hand calculations | | 2 | Max 35% | Presentation on the blackboard, with video projector, on the computer, conversations, explanations, examples |
| Cylindrical shells of constant wall thickness | | 4 |  |
| Cylindrical shells of stepwise variable wall thickness | | 4 |  |
| Shells under wind loading | | 4 |  |
| Conical shells and truncated shells | | 4 |  |  |
| Spherical shells under uniform external pressure | | 2 |  |  |
| Cylindrical shells with ring stiffeners | | 2 |  |  |
| Cylindrical shells with longitudinal stiffeners | | 2 |  |  |
| Finite element numerical analysis | | 4 |  |  |
|  | Bibliography[[12]](#footnote-12)  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**

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

**10. Evaluation**

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| Type of activity | **10.1** Evaluation criteria[[13]](#footnote-13) | **10.2** Evaluation methods | **10.3** Share of the final grade |
| **10.4** Course | Theoretical subjects and applications from course content | Written examination | 50% |
| **10.5** Applied activities | **S:** Aplication solved according to EN | Presentation, attendance | 50% |
|  | **L:** |  |  |
|  | **P:** |  |  |
|  | **Pr:** |  |  |
|  | **Tc-R[[14]](#footnote-14):** |  |  |
| **10.6** Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified[[15]](#footnote-15) | | | |
| * All subjects should obtain a passing grade mark | | | |

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| **Date of completion** | **Course coordinator**  **(signature)** | **Coordinator of applied activities**  **(signature)** |
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| **Head of Department**  **(signature)** | **Date of approval in the Faculty Council [[16]](#footnote-16)** | **Dean**  **(signature)** |
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1. The name of the faculty which manages the educational curriculum to which the discipline belongs [↑](#footnote-ref-1)
2. The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs. [↑](#footnote-ref-2)
3. The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated. [↑](#footnote-ref-3)
4. The educational classes of disciplines are: thoroughgoing study discipline (DA), advanced knowledge discipline (DCAV), synthesis discipline (DS) or complementary discipline (DC). [↑](#footnote-ref-4)
5. The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr). [↑](#footnote-ref-5)
6. The year of study to which the discipline is provided in the curriculum . [↑](#footnote-ref-6)
7. Discipline may have one of the following regimes: imposed discipline (DI) or compulsory discipline (DOb)-for the other fundamental fields of studies offered by UPT or optional discipline (DO). [↑](#footnote-ref-7)
8. Within UPT, the number of hours from 3.1\*, 3.2\*,…,3.9\* are obtained by multipling by 14 (weeks) the number of hours from 3.1, 3.2,…, 3.9. [↑](#footnote-ref-8)
9. The total number of hours/week is obtained by summing up the number of hours from 3.1, 3.4 şi 3.8. [↑](#footnote-ref-9)
10. 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. [↑](#footnote-ref-10)
11. The types of applied activities are those mentioned in 5. If the discipline containes 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:”. [↑](#footnote-ref-11)
12. At least one title must belong to the staff teaching the discipline. [↑](#footnote-ref-12)
13. The Syllabus must contain the evaluation method of the discipline, specifying the criteria, the metods 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.) [↑](#footnote-ref-13)
14. Tc-R= Homework-Reports [↑](#footnote-ref-14)
15. For this point turn to “Ghid de completare a Fișei disciplinei” found at: <http://www.upt.ro/img/files/2018-2019/calitate/Ghid_de_completare_fisa_disciplinei.pdf> [↑](#footnote-ref-15)
16. The approval is preceeded by discussing the study program’s board’s point of view with redgards to the syllabus. [↑](#footnote-ref-16)