# Course/studio syllabi

**1. Data on the study programme**

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| 1.1 Institution | Technical University of Cluj-Napoca |
| 1.2 Faculty | of Architecture and Urban Planning |
| 1.3 Department | **Urban Planning and Technical Sciences** |
| 1.4 Domain | **Architecture** |
| 1.5 University level | Licence and master's degree |
| 1.6 Study programme/Qualification | Architecture |
| 1.7 Form of studies | IF – on-site full-time studies |
| 1.8 Course / studio code | **60.00** |

**2. Data on the course**

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|---|---|---|---|---|---|
| 2.1 Name of the course | **STRUCTURAL ENGINEERING THEORY 3** | | | | |
| 2.2 Course/ Studio Head | **Lecturer Imola KIRIZSAN** | | | | |
| 2.3 Head of seminary/ laboratory/ studio | - | | | | |
| 2.4 Study year | **4** | 2.5 Semester | **2** | 2.6 Type of evaluation | **Exam** |
| 2.7 Course /studio regime | Formative category: fundamental (DF)/ linked to the domain (DD)/ specific (DS)/ complementary (DC) | | | | **DD** |
| | Compulsory (DI)/ Optional/ (DOp)/ Voluntary (DFac) | | | | **DI** |

**3. Total estimated time**

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|---|---|---|---|---|---|---|---|---|---|---|
| 3.1 Number of hours/week | **4** | out of which: | 3.2 Course | **2** | 3.3 Seminary | **2** | 3.3 Laboratory | 0 | 3.3 Project | 0 |
| 3.4 Number of hours/semester | 56 | out of which: | 3.5 Course | 28 | 3.6 Seminary | 28 | 3.6 Laboratory | 0 | 3.6 Project | 0 |
| 3.7 Distribution of time (hours)/ semester for: | | | | | | | | | | |
| (a) Individual study supported by course textbook, course text, bibliography, and notes | | | | | | | | | | 12 |
| (b) Supplementary study in the library, online, and on site | | | | | | | | | | 14 |
| (c) Preparation for seminaries/ laboratories/ assignments, reports, portfolios, and essays | | | | | | | | | | 14 |
| (d) Tutoring | | | | | | | | | | 4 |
| (e) Examination | | | | | | | | | | - |
| (f) Other activities | | | | | | | | | | - |

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| 3.8 Total hours of individual study (sum (3.7(a)…3.7(f))) | **44** |
| 3.9 Total semestrial hours (3.4+3.8) | **100** |
| 3.10 Number of credits | **4** |

**4. Preconditions** (where applicable)

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| 4.1 curriculum preconditions | - |
| 4.2 competence preconditions | Competences and knowledge acquired in fundamental courses such as: *Structural Engineering Theory 1,2 Structural Mechanics, Construction elements and materials,* may constitute a basis for a good understanding of notions and information discussed in the present course. |

**5. Conditions** (where applicable)

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| 5.1. for the course | On site, in the allocated classroom (according to the faculty schedule). Attendance is a condition for examination. See also „10. Assessment method". |
| 5.2. for the seminary | On site, in the allocated classroom (according to the faculty schedule). Attendance is a condition for examination. See also „10. Assessment method". |

**6. Specific competencies**

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| | • Technical knowledge of structure, materials, and construction.<br>• Awareness of the impact of geotechnical conditions on construction<br>• Understanding of the impact of climate on urban and architectural design and construction.<br>• Ability to act with innovative technical competence in the use of building techniques and the understanding of their evolution.<br>• Understanding of the processes of technical design and the integration of structure, construction technologies and services systems into a functionally effective whole.<br>• Understanding of services systems as well as systems of transportation, communication, maintenance, and safety.<br>• Awareness of the role of technical documentation and specifications in design realisation, and of the processes of construction, cost, planning and control. |

**7. Objectives of the discipline**

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| 7.1 General objective of the discipline | • Ability to demonstrate a creative competence in building techniques, founded on a comprehensive understanding of the disciplines and construction methods related to architecture. |
| 7.2 Specific objectives | • Understanding of the structural design, construction and engineering problems associated with building design.<br>• Adequate knowledge of physical problems and technologies and of the function of buildings so as to provide them with internal conditions of comfort and protection against the climate.<br>• Understanding of research and pedagogical methodologies, including those of transdisciplinary knowledge action and knowledge transferability as inherent parts of architectural learning, for both students and teachers. |

**Commented [ST1]:** A se consulta si completa din carta UIA UNESCO, punctul 3 https://www.uia-architectes.org/wp-content/uploads/2023/08/FINAL_UNESCO-UIA_CHARTER2023.pdf

**8. Content/Syllabi**

| 8.1 Course | No. of hours | Teaching methods | Notes |
|---|---|---|---|
| **C1** Introductory course. Understanding the load bearing structure and its place in construction. Definition of the structure and its importance in the building. Designing the structure. Sequence of phases in the creative process. Structural analysis. Structural assemblies and common elements based on type of structural assemblies (limitations of this approach). Structural synthesis.<br>Stages of load-bearing structure analysis. | 6 | Lectures supported by projections,<br>Discussions on the reader of the course and presentations. | Students are encouraged to engage in talks throughout the course and to present the stage of their individual study. |

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| General principles of verification of load-bearing structures. Materials in the composition of load-bearing structures. | | | |
| **C2** Roof structures. Roofing subassemblies Definitions, classification, structural role, behaviour, static schemes, connections, loads. Statics of roof structures. Preliminary design, sizing, verification. Composition, prefabrication, execution technologies. | 4 | | |
| **C3** Slab subassemblies. Planar slabs. Definitions, classification, structural role. Solid Slabs. Behaviour of slabs as rigid horizontal subassemblies; methods to ensure diaphragm characteristics. Curved slabs, vaults, Slabs with Thrusts – Arches and Vaults. Thin Shells. Grid Shells. | 4 | | |
| **C4** Supporting sub-assemblies in load-bearing structure. Definitions, classification, structural role. Frames. Diaphragms. Dual structures. | 2 | | |
| **C5** Foundation subassemblies. Foundations, elevations - infrastructure. Definitions, classification, structural role. Characteristics of the foundation soil. Surface and deep foundations. Foundation construction in the vicinity of other constructions. | 2 | | |
| **C6** Stages of load-bearing structure synthesis. Joints and bracing. | 4 | | |
| **C7** One level assemblies of current load-bearing structure and with large spans<br>– Vaults, arches<br>– Structures with thrust<br>– Suspended structures. | 2 | | |
| **C8** Multi-story assemblies of load-bearing structures Frame-based multi-story structures. Diaphragm-based multi-story structures tube-in-tube multi-story structures | 2 | | |
| **C9** Recapitulation and Conclusions | 2 | | |
| NOTE: the permanent actualization of the course matter might lead to minor changes in its structure | | | |

**Bibliography :**

F. Ching, C. Adams: Building construction illustrated, Van Nostrand Reinhold New York, 1991;
H. A. Andreica, A. D. Berindean, R. M. Dârmon: Structuri din lemn, Cluj-Napoca, 2013,
MOGA, Cătălin Elemente compuse oţel-beton : bazele proiectării, Cluj-Napoca : U.T.Press, 2017
Malcolm Millais: Building Structures. Understanding the Basics. Ed Routledge, NewYork, 2017.
M. Crisan: Statica formelor construite. Note de curs 2009-2010, ed. UAIM, Bucureşti, 2010
A selection of texts can be found in the annex of the course, on the course TEAMS channel.

| 8.2 Seminary / laboratory / project | No. of hours | Teaching methods | Notes |
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| Recapitulation – Assessment of Loads, Elements, Structural Subassemblies. Analysis of | 4 | | |

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| Emblematic Buildings. Interpretation of the Structure. | | | |
| Starting from the given layout of a simple construction, the proposal involves designing an appropriate load-bearing structure using various construction materials (masonry, wood, and/or concrete, etc.), taking into consideration the site conditions. At least two variants are suggested – one with a functionally divisible space and one with an open space. | 4 | Seminary supported by projections, Common discussions on theoretical aspects, examples, individual or group studies with 3-4 students. | Students are encouraged to actively contribute with concrete examples in compiling their portfolios. |
| Preliminary sizing of the floor slabs in both variants, applying the principle of sustainability. Unconventional solutions. | 4 | | |
| Preliminary sizing of the supporting structure - pillars, diaphragms, etc. | 4 | | |
| Roof design and pre-dimensioning - trusses, trusses, trusses with lattice girders. | 3 | | |
| Structure of a residential building, related to the seismicity of the area and the number of floors. | 3 | | |
| Structural interventions to existing buildings Issues related to attic conversions. | 2 | | |
| Organised site visit in Cluj. | 2 | | |
| Presentation of seminar portfolio | 2 | | |

**Bibliography**

VASILESCU, Andrei, Indrumator si aplicatii la mecanica. Partea I: Statica, Bucuresti : Conspress, 2004,
LĂDAR, Ioana, Mecanică - Statică: aplicaţii, Cluj-Napoca : U.T.Press, 2015,
PERICLEANU, Bucur Dan, Specificaţii privind calculul planşeelor din lemn la construcţii civile, Constanţa : Ovidius University Press, 2015,
MIRCEA, Andreea-Terezia Planşee dală pentru clădiri de locuit: cerinţe tehnologice şi de proiectare, Cluj-Napoca : U.T.Press, 2009

**9. Harmonizing the content of the discipline with the expectations of the epistemic community, the professional associations, and representative employers**

The competencies achieved across the course contribute to the consolidation of the professional culture necessary for the profession and to the integrated use of theory and practice.

**10. Assessment**

| Type pf activity | 10.1 Evaluation criteria | 10.2 Assessment method | 10.3 Calculation of final grade |
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| 10.4 Course | | | **1 point by default** |

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| | Relevance and quality of the answers at 3 topics from those discussed in class, or from the given bibliography | **Wrtitten assessment** The answers consist of sketches and written part. | max. **2 points/topic** |
| | Relevance and quality of answers | **Oral exam** based on the course textbook. This exam will assess the knowledge assimilated, the capacity to make connections and interpret the structure | max. **3 points** |
| | Calculus of the final grade: as a sum of the points obtained through the evaluation methods described above. | | |
| | According to the ECTS/UTCN Regulations, art. 6.4, the Faculty Council has decided that attending courses is compulsory in a percentage of at least 50%. The situation of attendance will be updated weekly on the Teams channel dedicated to the course.<br>Students who have not attended 50% of the courses will not be able to participate in the final exam and will need to recontract the course. | | |
| 10.5 Seminary/Laboratory | Relevance and quality of portfolio | Portfolios of seminar exercises and individual study work are prepared, developed throughout the semester and handed in digitally and defended at the last seminar. | max. **6 points**<br>4 points for content and 2 points for drafting (quality of writing, graphic quality, critical apparatus) |
| | Implication | Critical discussions of individual studies based on the topics and theoretical examples presented; feedback gives the opportunity to improve the individual study | max. **3 points** |
| 10.6 Minimal standard for passing | | | |
| • a grade of minimum 5 for each part – course 60% and seminary 40% | | | |

| **Date :** | **Head of course** | **Title, Name, Surname** | **Signature** |
|---|---|---|---|
| 14.07.2023 | Course | Lecturer. PhD. eng. Imoa KIRIZSAN | |
| | Seminary/Lab | - | - |

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| Date of validation by the Department Council:<br><br>_____ | Chief of Department<br>Associate professor. PhD. arch. Vlad Sebastian RUSU |
| Data of approval in the Faculty Council:<br><br>_____ | Dean<br>Associate professor. PhD. arch. Dragoș Șerban Ion ȚIGĂNAȘ |