**SYLLABUS**

1. **Information about the program**

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| **1.1** Higher education institution | UNIVERSITATEA POLITEHNICA TIMISOARA |
| **1.2** Faculty[[1]](#footnote-2) / Department[[2]](#footnote-3) | CONSTRUCTII/ CCI |
| **1.3** Field of study (name/code[[3]](#footnote-4)) | 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-5) | | | Energy efficiency of buildings – Eficiența energetică a clădirilor/ DA | | | | |
| **2.2** Coordinator (holder) of course activities | | | Prof. dr. eng. Daniel DAN, Assoc. Conf. dr. eng. Simon PESCARI | | | | |
| **2.3** Coordinator (holder) of applied activities[[5]](#footnote-6) | | | Lector dr. eng. Cristina Marincu, Conf. dr. eng. Simon PESCARI | | | | |
| **2.4** Year of study[[6]](#footnote-7) | 1 | **2.5** Semester | 1 | **2.6** Type of evaluation | E | **2.7** Regime of discipline[[7]](#footnote-8) | DI |

1. **Total estimated time** (direct activities (fully assisted), partially assisted activities and unassisted activities[[8]](#footnote-9))

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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 | 24 ,of which: | course | 16 | seminar/laboratory/project | | | 8 |
| **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 | | | | | 2 |
| Study using a manual, course materials, bibliography and lecture notes | | | | | 2 |
| Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays | | | | | 2.71 |
| **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 | | | | | 28 |
| Study using a manual, course materials, bibliography and lecture notes | | | | | 28 |
| Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays | | | | | 38 |
| **3.5 Total hrs./week**[[9]](#footnote-10) | 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 | * Algebra and Geometry, Physics, General Knowledge of Civil Engineering |
| **4.2** Competencies | * Acquisition of the fundamental elements corresponding to the curriculum prerequisites |

**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 | * Assessment of the main parameters in the field of heating transfer in buildings * Inspection and identification of materials and solutions used for envelope in buildings * Passive house and NZEB concepts, sustainable solutions for new efficient buildings * Understanding the calculation and evaluation methods from the specific codes and European Directives regarding the energy efficiency for building * Energetic audit and certification of new and old buildings |
| Professional competencies ascribed to the specific competencies | * ensure compliance with security legislation; provide instructions to staff; adhere to legal regulations; develop feasibility studies; supervise construction projects; provide construction counselling; integrate measures into architectural projects; apply health and safety standards; use measuring tools; draw sketches; manage engineering projects; evaluate environmental impact; draft technical reports; ensure compliance with environmental legislation; supervise personnel; adapts existing projects to new circumstances; Integrates construction requirements into architectural design; |
| Transversal competencies ascribed to the specific competencies | * manage financial and material resources; oversee quality control; apply scientific, technological, and engineering knowledge; work in teams; train others; use equipment, tools, or technological equipment accurately |

**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 | * The students must be able to make the energetic expertise of an existing building and propose performant thermal reabilitation solutions * For the new buildings the graduates have to be able to implement the efficient solutions that minimize energy consumption and maximizing the comfort for the occupants of the buildings * Complete the competences in energy efficiency of buildings field in order to be able to participate at the examination process for Energetic Auditor certification |
| **7.2** Specific objectives | * Students learn to examinate the envelope elements, asses the thermal resistance for envelope elements, the heat flow in buildings, the energy balance, energetic certification and solution for thermal rehabilitation according to Romanian Codes and European Directives. |

**8. Content**

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| **8.1** Course | | Number of hours | Of which online | Teaching methods |
| Introduction. Energy efficiency trends towards Zero Energy Buildings | | 2 | Max 60% | Presentation on the blackboard, with video projector, conversations, explanations, examples |
| Passive house and NZEB concepts, sustainable solutions for new efficient buildings | | 2 |  |
| Energy efficiency requirements for new and existing buildings. Thermal resistences, thermal bridges and heat flow evaluation | | 4 |  |
| New performing materials used for insulation of buildings. Solution for thermal rehabilitation according to Romanian Codes and European Directives | | 2 |  |
| Energetic certification of buildings and flats in Romania. Assessment of the energy performance of the building under normal conditions of use - General formulas and calculation parameters. | | 4 |  |
| Framework content of the energy audit – according to Romanian Methodology Mc001/2022 | | 2 |  |
| Identification of energetic rehabilitation renovation measures/packages for envelope and building services | | 4 |  |
| Heat pomps and solar panels efficient solutions for NZEB | | 2 |  |
| Heating energy demand principles and simplified heating load calculation for a building | | 2 |  |
| Infrared thermal scanning and data processing to obtain heat losses in buildings | | 2 |  |
| Global costs method, economic evaluation procedure for energy systems in buildings | | 2 |  |
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|  | Bibliography[[10]](#footnote-11) ISO 52016-1:2017; Energy Performance of Buildings—Energy Needs for Heating and Cooling, Internal Temperatures and Sensible and Latent Heat Loads—Part 1: Calculation Procedures. International Organization for Standardization: Geneva, Switzerland, 2017  ISO 9050:2003; Glass in Building—Determination of Light Transmittance, Solar Direct Transmittance, Total Solar Energy Transmittance, Ultraviolet Transmittance and Related Glazing Factors. International Organization for Standardization: Geneva, Switzerland, 2003.  ISO 9869-1:2014; Thermal Insulation—Building Elements—In-Situ Measurement of Thermal Resistance and Thermal Transmittance—Part 1: Heat Flow Meter Method. International Organization for Standardization: Geneva, Switzerland, 2014  Mc001-2022, Methodology calculation on energy performance of buildings.C 107/1- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea 1. Normativ privind calculul coeficienţilor globali de izolare termică la clădirile de locuit. Indicativ C107/1-2005.  C 107/2- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea a 2-a. Normativ privind calculul coeficienţilor globali de izolare termică la clădirile cu altă destinaţie decât cea de locuire. Indicativ C107/2-2005.  C 107/3- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea a 3-a. Normativ privind calculul performanţelor termotehnice ale elementelor de construcţie ale clădirilor. Indicativ C107/3-2005  C 107/4- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea a 4-a. Ghid privind calculul performanţelor terrmotehnice ale clădirilor de locuit. Indicativ C107/4-2005  C 107/5- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea a 5-a. Normativ privind calculul termotehnic al elementelor de construcţie în contact cu solul. Indicativ C107/5-2005 Indicativ C107/4-2005;  Dan D., Secula S. – Civil engineering. Procedures for experimental tests  Dan D. – Building Physics – Course manuscript and powerpoint presentations  Marincu C. - Energy audit of buildings and economic analysis and investment financing – Powerpoint presentations and lectures manuscripts  Dan D., Floruț S.C., Tănasă C.M., - Building Physics. Experimental works and analytical examples. Editura UPT 2016 | | | |
| **8.2** Applied activities[[11]](#footnote-12) | | Number of hours | Of which online | Teaching methods |
| Thermal evaluation for different solutions of building envelope | | 4 | Max 35% | Presentation on the blackboard, with video projector, on the computer, conversations, explanations, examples |
| Investigation of thermal bridges and air leakage parameters on the total energy consumtion evaluation | | 2 |  |
| Evaluation of energetic performances for a specific building using dedicated softwares | | 6 |  |
| Solutions for thermal rehabilitation of the envelope and building services | | 4 |  |
| Re-certification of the rehabilitated building using 3 packages/scenarious | | 4 |  |  |
| Global cost analysis of the proposed packages | | 4 |  |  |
| Energetic audit report for the investigated building | | 4 |  |  |
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|  | Bibliography[[12]](#footnote-13) ISO 52016-1:2017; Energy Performance of Buildings—Energy Needs for Heating and Cooling, Internal Temperatures and Sensible and Latent Heat Loads—Part 1: Calculation Procedures. International Organization for Standardization: Geneva, Switzerland, 2017  ISO 9050:2003; Glass in Building—Determination of Light Transmittance, Solar Direct Transmittance, Total Solar Energy Transmittance, Ultraviolet Transmittance and Related Glazing Factors. International Organization for Standardization: Geneva, Switzerland, 2003.  ISO 9869-1:2014; Thermal Insulation—Building Elements—In-Situ Measurement of Thermal Resistance and Thermal Transmittance—Part 1: Heat Flow Meter Method. International Organization for Standardization: Geneva, Switzerland, 2014  Mc001-2022, Methodology calculation on energy performance of buildings. C 107/1- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea 1. Normativ privind calculul coeficienţilor globali de izolare termică la clădirile de locuit. Indicativ C107/1-2005.  C 107/2- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea a 2-a. Normativ privind calculul coeficienţilor globali de izolare termică la clădirile cu altă destinaţie decât cea de locuire. Indicativ C107/2-2005.  C 107/3- 2005 - Normativ privind calculul termotehnic al elementelor de construcție ale clădirilor. Partea a 3-a. Normativ privind calculul performanțelor termotehnice ale elementelor de construcție ale clădirilor. Indicativ C107/3-2005  C 107/4- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea a 4-a. Ghid privind calculul performanțelor termotehnice ale clădirilor de locuit. Indicativ C107/4-2005  C 107/5- 2005 - Normativ privind calculul termotehnic al elementelor de construcţie ale clădirilor. Partea a 5-a. Normativ privind calculul termotehnic al elementelor de construcţie în contact cu solul. Indicativ C107/5-2005 Indicativ C107/4-2005;  Dan D., Secula S. – Civil engineering. Procedures for experimental tests- Draft Manuscript  Dan D. – Building Physics – Course manuscript and powerpoint | | | |

**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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| * The content of the discipline is in accordance with the most important standards in Romania and cover all the requirements to understand the phenomenon of heat transfer, insulation calculation and energetic certification of the buildings. The knowledge accumulated during the program offer to the graduates the possibility to apply without additional preparation the principles and calculation procedures for buildings from design phase to the reception of the works on site. |

**10. Evaluation**

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| Type of activity | **10.1** Evaluation criteria[[13]](#footnote-14) | **10.2** Evaluation methods | **10.3** Share of the final grade |
| **10.4** Course | 2-4 theoretical topics | Written examination | 60% |
| **10.5** Applied activities | **S:** one or two applications using simplified methods or advanced software | Written report, Applications on computer using dedicated softwares for energetic evaluation performances and certification | 40% |
|  | **L:** |  |  |
|  | **P:** |  |  |
|  | **Pr:** |  |  |
|  | **Tc-R[[14]](#footnote-15):** |  |  |
| **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-16) | | | |
| * The final mark must accumulate a minimum score of 5 points out of 10 possible | | | |

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| **Date of completion** | **Course coordinator**  **(signature)** | **Coordinator of applied activities**  **(signature)** |
| 25.11.2024 |  |  |

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| **Head of Department**  **(signature)** | **Date of approval in the Faculty Council [[16]](#footnote-17)** | **Dean**  **(signature)** |
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1. The name of the faculty which manages the educational curriculum to which the discipline belongs [↑](#footnote-ref-2)
2. The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs. [↑](#footnote-ref-3)
3. The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated. [↑](#footnote-ref-4)
4. The educational classes of disciplines are: thoroughgoing study discipline (DA), advanced knowledge discipline (DCAV), synthesis discipline (DS) or complementary discipline (DC). [↑](#footnote-ref-5)
5. The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr). [↑](#footnote-ref-6)
6. The year of study to which the discipline is provided in the curriculum . [↑](#footnote-ref-7)
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-8)
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-9)
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-10)
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-11)
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-12)
12. At least one title must belong to the staff teaching the discipline. [↑](#footnote-ref-13)
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-14)
14. Tc-R= Homework-Reports [↑](#footnote-ref-15)
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-16)
16. The approval is preceeded by discussing the study program’s board’s point of view with redgards to the syllabus. [↑](#footnote-ref-17)