**SYLLABUS**

1. **Information about the program**

|  |  |
| --- | --- |
| **1.1** Higher education institution |  UNIVERSITATEA POLITEHNICA TIMISOARA  |
| **1.2** Faculty[[1]](#footnote-2) / Department[[2]](#footnote-3) |  CONSTRUCTII/ CMMC+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**

|  |  |
| --- | --- |
| **2.1** Name of discipline/The educational classe[[4]](#footnote-5) | Introduction in Building Information Modelling and Digitalization / DCAV  |
| **2.2** Coordinator (holder) of course activities | Lect. dr. ing. Crisan Andrei / Assoc. Prof. Dr. ing. Codrut FLORUT  |
| **2.3** Coordinator (holder) of applied activities[[5]](#footnote-6) | Lect. dr. ing. Crisan Andrei / Assoc. Prof. Dr. ing. Codrut FLORUT |
| **2.4** Year of study[[6]](#footnote-7) |  2  | **2.5** Semester |  3  | **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))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 |  ,of which:  | course |   | seminar/laboratory/project |   |
| **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 |  4.93 ,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 | 1.5  |
| Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays | 1.43  |
| **3.4\*** Total number of hours of unasssited asctivities/ semester |  69 ,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 | 21  |
| Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays | 20  |
| **3.5 Total hrs./week**[[9]](#footnote-10) |  8.93  |
| **3.5\* Total hrs./semester** | 125 |
| **3.6 No. of credits** |  5  |

**4. Prerequisites** (where applicable)

|  |  |
| --- | --- |
| **4.1** Curriculum | * Reinforced concrete and steel structures; Concrete Structures; Steel Structures, Timber Structures
 |
| **4.2** Competencies | * Students will:
* gain proficiency in working with BIM software tools commonly used in the industry (create, edit, and manage 3D models, generate drawings, perform clash detection, and extract data from BIM models);
* acquire competences in managing and integrating data within the BIM environment;
* learn how to collaborate effectively within multidisciplinary teams and coordinate information across different stakeholders in a BIM project;
* acquire competences in performing analysis and simulation using BIM tools;
* develop skills in creating comprehensive project documentation using BIM, including drawings, schedules, reports, and presentations
* gain advanced knowledge on digital methods for the computer-supported design. acquire understanding, the application and the limitations of the following concepts within the frame of Building Information Modeling: parametric modeling, details of data exchange formats IFC and BCF, Level of Development and BIM Execution Planning.
* learn how to utilise modern software systems and apply these within a project to design, analyse and visualise a selected building
 |

**5. Conditions** (where applicable)

|  |  |
| --- | --- |
| **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

|  |  |
| --- | --- |
| Specific competencies | * Collaboration and coordination skills within multidisciplinary teams.
* Understanding and applying BIM principles, data management, and integration.
* Competence in analysis, simulation, documentation, and effective communication in BIM projects.
* Ability to develop BIM execution plans and adhere to industry standards.
* Proficiency in using BIM software tools, including 3D modeling, clash detection, and data extraction
 |
| Professional competencies ascribed to the specific competencies | * provide instructions to staff; adhere to legal regulations; supervise construction projects; provide construction counseling; integrate measures into architectural projects; draw sketches; utilize CAD software; manage engineering projects; draft technical reports; apply numerical computing skills; supervise personnel; evaluates the integrated design of buildings; Integrates construction requirements into architectural design;
 |
| Transversal competencies ascribed to the specific competencies | * apply scientific, technological, and engineering knowledge; work in teams; train others;
 |

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

|  |  |
| --- | --- |
| **7.1** The general objective of the discipline | * Equip students with the knowledge and skills on digital methods for the computer-supported design and analysis of engineering structures
 |
| **7.2** Specific objectives | * Provide students with a comprehensive understanding of BIM principles, concepts, and methodologies for effective project management and collaboration;
* Develop proficiency in ~~BIM~~ software tools and technologies, enabling students to create BIM models to analyze and effectively communicate ~~using 3D models and~~ project information with project stakeholders;
* Foster critical thinking and problem-solving skills in BIM-related challenges, such as clash detection, coordination, and data management;
* Enhance students' ability to collaborate effectively in multidisciplinary teams, promoting communication, coordination, and information exchange within BIM workflows;
* Instill ethical and professional practices in students, emphasizing the importance of integrity, confidentiality, and responsible data handling in BIM projects.
 |

**8. Content**

|  |  |  |  |
| --- | --- | --- | --- |
| **8.1** Course | Number of hours | Of which online | Teaching methods |
|  Concepts of Building Information Modelling: Introduction, terminology, Reference standards, technical specifications and guildelines |  4 |  Max 50%  |  Presentation on the blackboard, with video projector, conversations, explanations, examples  |
|  BIM Roles for architects, engineers, construction and facility management  |  4  |   |
|  BIM use cases  |  4  |   |
| BIM Execution plan: workflows, information requirements, Integrated project delivery, Common Data Environment, Modelling and visualization, Management of incompatibilities  |  4  |   |
|  BIM tools and platforms: concepts of platform and tools, Interoperability, IFC format  |  4  |   |
|  BIM objects: Modelling by objects, Objects and classes, Objects creation and management, Templates  |  2  |   |
| Digitalization of AECO industry: IoT, AI, RPA, Big data, GDPR  |  2  |   |
|   |   |   |
|   |   |   |
|   |   |   |
|   |   |   |
|   |   |   |
|   |   |   |
|   |   |   |
|  | Bibliography[[10]](#footnote-11) [ 1] Material de curs disponibil la www.robim.ro[ 2] https://bimdictionary.com/[ 3] https://www.buildingsmart.org/ [ 4] https://bimexcellence.org/ [ 5] Borrmann, A., König, M., Koch, C., & Beetz, J. (2018). Building Information Modeling: Technology Foundations and Industry Practice, https://link.springer.com/book/10.1007/978-3-319-92862-3[ 6] Rafael Sacks, Charles Eastman, Ghang Lee, Paul Teicholz “A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers - Third Edition”, 2018, ISBN 9781119287544[ 7] CIC Bulding Information Modeling (BIM) Protocol second edition, Standard Protocol for use in projects using Building Information Models, https://www.cic.org.uk/uploads/files/old/bim-protocol-2nd-edition-1.pdf[ 8] M. Reza Hosseini, Farzad Khosrowshahi, Ajibade A. Aibinu, Sepehr Abrishami “BIM Teaching and Learning Handbook, Implementation for Students and Educators”, 2022, 978-0-367-42795-5[ 9] https://www.12dsynergy.com/common-data-environment-guide/[10] <https://www.12dsynergy.com/iso-19650-guide>[11] Information management according to BS EN ISO 19650, Guidance Part 2, Parties, teams and processes for the delivery phase of the assets, Edition 6 Published by UK BIM Framework, 2021[12] Eastman, Chuck, Paul Teicholz, Rafael Sacks, and Kathleen Liston. BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers. Hoboken, NJ: Wiley, 2018.[13] Jones, Steven A. The BIM Execution Plan: From Concept to Completion. Boca Raton, FL: CRC Press, 2020.  |
| **8.2** Applied activities[[11]](#footnote-12) | Number of hours | Of which online | Teaching methods |
|  Development of BIM Execution Plan specific Eurocodes, applied for the standard fire curve  |  4  |  Max 35% |  Presentation on the blackboard, with video projector, on the computer, conversations, explanations, examples  |
|  Training of the creation of discipline-specific (e.g. architecture, structural, MEP etc.) BIM models (parametric modelling approach |  10  |   |
| Training of the application of model compliance and checking rules |  4  |   |
|  4D (construction planning) and 5D modelling (cost estimation |  6  |   |
|  Step by step BIM implementation guide within AECO organizations |  4  |   |   |
|   |   |   |   |
|   |   |   |   |
|   |   |   |   |
|   |   |   |   |
|  | Bibliography[[12]](#footnote-13) Tutorials (provided within the course and applications) available onlihne at [www.robim.ro](http://www.robim.ro)Autodesk Revit Software, URL https://www.autodesk.eu/products/revit/overview https://archademia.com/lessons/revit <https://learningrevitonline.com>[www.plannerly.com](http://www.plannerly.com) |

**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**

|  |
| --- |
| * The graduate will be able to determine the fire resistance of structural elements in accordance with the specific Eurocodes
 |

**10. Evaluation**

|  |  |  |  |
| --- | --- | --- | --- |
| 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 theoretical topics  |  Written examination  | 40%  |
| **10.5** Applied activities  | **S:** one application using simplified methods from specific Eurocodes, and one application with the use of the SAFIR program  |  Written examination, Application on computer  | 60%  |
|  | **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
 |

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

|  |  |  |
| --- | --- | --- |
| **Head of Department** **(signature)**  | **Date of approval in the Faculty Council [[16]](#footnote-17)** | **Dean****(signature)** |
|   |   |   |

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)