SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Building Services Engineering
1.3	Department	Building Services Engineering
1.4	Field of study	Civil Engineering and Building Services
1.5	Cycle of study	Master
1.6	Program of study/Qualification	Building Services for Regenerative Cities / MS Engineer
1.7	Form of education	Full time

2. Data about the subject

2.1	Subject name			Digital Design and Fabrication	Subject code	3.00
2.2	Course responsible/lecturer			Lecturer Phd.Eng. Rusu Daniel Sorin		
2.3	Teachers in charge of laboratory			Lecturer Phd.Eng. Rusu Daniel Sorin		
2.4 Year of study	1	2.5 Semester	1	2.6 Assessment		colloquy
2.7Subject category	Formative category					DC
	Optionality					DOB

3. Estimated total time

3.1 Number of hours per week	2	of which	3.2 Course	1	3.3 Seminar		3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	28	of which	3.5 Course	14	3.6 Seminar		3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Exams and tests	2
(b) Manual, lecture material and notes, bibliography	14
(c) Supplementary study in the library, online and in the field	14
(d) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(e) Tutoring	0
(f) Other activities	2
3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	3
3.9 Total hours per semester (3.4+3.8)	75
3.10 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	Basic Knowledge of AutoCAD

5. Requirements (where appropriate)

5.1	For the course	AutoCAD REVIT MEP
5.2	For the applications Seminar / laboratory / project	I206, I207, I208, I209 Bd. 21 December Nr. 128-130, Cluj-Napoca

6. Specific competences

Professional competences	**CP3 - Promote innovative infrastructure design** **CP14 - Integrate measures in architectural designs** **CP15 - Create designs for pipeline engineering** **CP24 - Use CAD software** **CP29 - Develop energy saving concepts**
Cross competences	**CT1 - collaborating in teams and networks** **CT2 - thinks holistically** **CT3 - dealing with problems**

7. Expected Learning Outcomes

Knowledge	*CP3 - Knows current trends in sustainable urban design (nZEB, green infrastructure), innovative technologies (IoT sensors, smart grids, advanced materials), and concepts of urban resilience and circular economy.* *CP14 - Has in-depth knowledge of specific fire protection, acoustic protection, building physics measures, and methods for integrating installations into complex architectural projects, including requirements for green and regenerative buildings.* *CP15 - Knows advanced hydraulic principles, materials used for urban pipelines, design and routing norms in the urban context, design standards, and specific requirements for water, sewage, district heating, and gas networks.* *CP24 - Has in-depth knowledge of CAD and BIM software used in urban infrastructure design (Revit), advanced functionalities (3D modeling), and representation standards.* *CP29 - Has in-depth knowledge of energy management systems (BMS), monitoring and control technologies, energy performance indicators (EnPI), consumption reduction strategies (demand response, load shifting, energy efficiency), and building energy certification principles.*
Skills	*CP3 - Identifies and evaluates innovation opportunities in urban infrastructure projects, integrates new technologies and unconventional solutions (rainwater harvesting systems, smart pipes, multifunctional infrastructure), develops innovative project proposals, and actively promotes sustainable approaches in professional settings and before authorities.* *CP14 - Incorporates fire safety, acoustic protection, energy efficiency, and water management measures into architectural projects, respecting specific requirements and coordinating with architects for harmonious and functional integration, using BIM tools and integrated methodologies.* *CP15 - Sizes pipes for urban networks (drinking water, sewage, district heating, gas), routes circuits on plans integrated with existing infrastructure, selects materials suitable for soil and urban traffic conditions, develops layout plans and longitudinal profiles.* *CP24 - Uses CAD/BIM software for designing urban pipeline networks, creates integrated 3D models, develops layout plans, longitudinal profiles, and cross-sections, coordinates projects with other utilities, extracts material and quantity lists, collaborates in common data environments (CDE).* *CP29 - Develops integrated concepts for saving energy resources in smart buildings, designs consumption optimization strategies (lighting, HVAC, appliances), integrates renewable sources and storage systems, evaluates energy performance through simulations and monitoring.*

Responsibilities and autonomy	*CP3 - Initiates and promotes innovative solutions for urban infrastructure, assuming calculated risks in the context of sustainable development, convincingly argues benefits before decision-makers, and contributes to paradigm shifts in regenerative urban planning.* *CP14 - Coordinates the integration of special measures into architectural projects, ensuring regulatory compliance and technical performance, assuming responsibility for user safety, comfort, and indoor environmental quality, in line with regenerative urban development principles.* *CP15 - Performs partial and complete design projects for urban pipeline networks, respecting norms and coordinating with other utilities (electricity, telecommunications, transport), assuming responsibility for technical viability and integration into urban space.* *CP24 - Executes complex urban infrastructure projects using advanced CAD/BIM tools, assuming responsibility for model accuracy, coordination with other specialties, and compliance with standards and beneficiary requirements.* *CP29 - Leads the development of energy resource saving concepts for smart buildings, assuming responsibility for energy performance, for integrating innovative solutions, and for compliance with sustainability standards.*

8. Discipline objectives (as results from the *key competences gained*)

8.1	General objective	Constructive and functional identification of building systems elements; Sizing calculation and representation
8.2	Specific objectives	Graphic representation of Building systems Data analysis output after using CAD and CAE software in building systems area.

9. Contents

9.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction in REVIT MEP	2	interactive teaching	Computes and required software
2. Basic Editing Tools	2		
3. Building Energy Performance Analysis	2		
4. HVAC Module	2		
5. Hydronic Piping and Plumbing Module	2		
6. Electrical Systems Module	2		
7. Scheduling, Detailing, Documentation, Work-sharing, Printing and Presentation	2		
Bibliography Autodesk Revit 2021: Fundamentals for MEP (Metric Units): Autodesk Authorized Publisher, Editor Ascent, Centre for Technical Knowledge, ISBN: 1952866111 Exploring Autodesk Revit 2018 for MEP, Sham Tickoo, Cadcim Technologies, ISBN: 1942689918			
9.2. Seminar /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Starting a New Project, Views, Interface, Keyboard Shortcuts, Families, Basic Creation Tools	2	Exposition and applications	Computes and required software,
2. Spaces and Zones Editing	2		
3. Perform Building Energy Analyses	2		

4. Draw HVAC	2		video projector
5. Draw Piping and Plumbing	2		
6. Draw Electrical Systems	2		
7. Finalize and Printing the Project	2		
Bibliography Virtual didactical models Virtual examples; PDF applications PowerPoint presentations.			

10. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Once you have completed this training course, you will have developed the knowledge and skills necessary to be able to create your own projects in Revit MEP Learn how to use Autodesk Revit MEP

11. Evaluation

Activity type	11.1 Assessment criteria	11.2 Assessment methods (and evaluation form: continuous/summative)	11.3 Weight in the final grade
11.4 Course	Testing of acquired knowledge	Presentation	50%
11.5 Seminars /Laboratory/Project	Develop a project in REVIT MEP	Project evaluation	50%
11.6 Minimum standard of performance			
Completion of at least one module (HVAC, Plumbing, Electrical) Seminar attendance is mandatory for examination Final grade components: Testing acquired knowledge (E), project evaluation (P). Final grade formula N=0.5xE+0.5xP Credits obtained only if N>5, E>5, P>5.			

Date of filling in:		**Title Surname Name**	**Signature**
16.05.2026	Lecturer	Lect.Phd.Eng. Rusu Daniel Sorin	
	Teachers in charge of application	Lect.Phd.Eng. Rusu Daniel Sorin	

Date of approval in the Department of Building Services Engineering 09.07.2026	Head of department Assoc.Prof.PhD.Eng. Ciprian BACOŢIU
Date of approval in the Council of the Faculty of Building Services Engineering 09.07.2026	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA