

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				Urban Electric Infrastructure	Subject code	19.10
2.2	Course responsible/lecturer				Assoc. Prof. PhD Eng. Calin CIUGUDEANU, <i>calin.ciugudeanu@insta.utcluj.ro</i>		
2.3	Teachers in charge of laboratory				Assoc. Prof. PhD Eng. Calin CIUGUDEANU, <i>calin.ciugudeanu@insta.utcluj.ro</i>		
2.4	Year of study	2	2.5	Semester	1	2.6 Assessment	Colloquy
2.8 Subject		Formative category					DS
category		Optional					DOP

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										3
(b) Manual, lecture material and notes, bibliography										15
(c) Supplementary study in the library, online and in the field										15
(d) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										12
(e) Tutoring										2
(f) Other activities										-
3.8 Total hours of individual study (sum (3.7(a)...3.7(f)))					47					
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	Physics and Electrotechnical elements
4.2	Competence	Electrical engineering, Use of computer (MS-Office; Autocad)

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 205
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5.2	For the laboratory	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 108, 109
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6. Specific competences

Professional competences	CP13 – consider the impact of material characteristics on pipeline flows; CP15 – create designs for pipeline engineering; CP29 – develop energy saving concepts; CP28 – promote sustainable energy.
Cross competences	CT1 – collaborating in teams and networks; CT3 – dealing with problems.

7. Expected Learning Outcomes

Knowledge	Has in-depth knowledge of material properties used in urban pipelines (PVC, HDPE, ductile iron, steel, composites), interaction with transported fluids, durability in aggressive environments, and regulations for pressure pipes in urban spaces. 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. 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	Selects appropriate materials based on transported fluid (drinking water, wastewater, thermal agents), operating conditions (pressure, temperature, aggressive environment), design life, and environmental impact, evaluates material-associated risks (corrosion, wear, leaks), and proposes protection and monitoring solutions. 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. 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	Decides on the selection of materials for critical urban pipeline systems, assuming responsibility for durability, operational safety, and regulatory compliance, in the context of sustainable urban development and water resource protection. 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. 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	Acquiring competences in urban electrical infrastructure design
8.2	Specific objectives	- Finding the most appropriate power supply architecture diagrams. - Finding the best available techniques to decrease of the electro technological consumption. - Knowledge of National and European norms: I7/2011, PE132/2003, NTE 007/08/00, EN 13201. - Use of software for low voltage electrical design Ecodial.

9. Contents

9.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Electrical design fundamentals	2	Video-Projector Teaching style based on the interactive teacher-student partnership; Presentation of case studies.	
2. The Romanian and European electro-energetic system	2		
3. Low voltage power distribution installations	2		
4. Medium voltage power distribution installations	2		
5. Urban infrastructure electrical architecture design	2		
6. Basic electrical calculation – Ecodial software	2		
7. Decrease of the electro technological consumption in power distribution installations	2		
Bibliography			
1. Ciugudeanu C. Instalatii Electrice Industriale – Indrumator proiect, U.T. Press, 2015; 2. Schneider Electric, Manualul instalațiilor electrice, 2007; 3. Buzdugan Mircea, Compatibilitate electromagnetă; emisii conduse, Ed. Mediamira, 2008; 4. Buzdugan Mircea, Elemente de mașini electrice; funcționare și utilizare, U.T. Press, 2006; 5. Virgil Maier, s.a. Instalații electrice industriale, Lucrări practice U.T. Press, Cluj-Napoca, 2003; 6. Albert, H. ș.a., Pierderi de putere și energie în rețelele electrice, E.T. București 1997; 7. Centea O. Prize de pământ Editura Academiei, București, 2008.			
9.2. Laboratory	Number of hours	Teaching methods	Notes
1. Understanding the European electrical design norms	2	Site visits, role play during the projects, modeling execution, computer exercises, group project	
2. Choosing an urban power distribution grid example	2		
3. Energy efficiency street lighting assessment	2		
4. Using Ecodial electrical calculation software	4		
5. Decrease of the electro technological consumption in power distribution installations	2		
6. Final optimised and improved power distribution grid example	2		
Bibliography			
1. Norms EN 13201, NTE 007/08/00, PE 132/2003 2. International journal of Sustainable Lighting – open access at www.lightingjournal.org			

3. DialuxEvo software free download at www.dial.de
4. Ecodial advance electrical calculation software - <https://hto.power.schneider-electric.com/ecodialadvancecalculation/#/homepage>

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

The competences achieved are necessary in the field of electrical design of the future urban electrical infrastructures. The demands of the energetic employees are being satisfied.

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	Technical content, word count, structure and critical analysis;	Final report grade	60%
11.5 Laboratory	Technical content, presentation and communication skills;	class activity, assignments, presentation grade	40%
11.6 Minimum standard of performance			
5 points out of 10 total points (5 min/10 max)			

Date of filling in:		Title Surname Name	Signature
20.05.2026	Lecturer	Assoc. Prof. PhD Eng. Calin CIUGUDEANU	
	Teachers in charge of application	Assoc. Prof. PhD Eng. Calin CIUGUDEANU	

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