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
1.8	Subject code	19.20

2. Data about the subject

2.1	Subject name	Control Systems for Smart Homes and Cities						
2.2	Course responsible/lecturer	Assoc. Prof. PhD Eng. Calin Ciugudeanu,						
2.3	Teachers in charge of seminars	Assoc. Prof. PhD Eng. Calin Ciugudeanu, Calin.ciugudeanu@insta.utcluj.ro						
2.4 Year of study		II	2.5 Semester	1	2.6 Assessment	Colloquy		
2.8 Subject category		Formative category						DA
		Optional						DO

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) Manual, lecture material and notes, bibliography										15
(b) Supplementary study in the library, online and in the field										15
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										12
(d) Tutoring										2
(e) Exams and tests										3
(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	Electronic 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.

5.2	For the laboratory	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 108, 109.

6. Specific competences

Professional competences		Smart home control systems: • identify the market available control systems solutions. • propose the most appropriate control gears • calculate a control system IRR internal rate of return After graduating this subject, students will be able to: • comparing different control system diagrams for smart houses • to analyze and propose the best technical and economical control system solutions for smart homes • to make an SRI - Smart Readiness Indicator assessment for a building
Cross competences		1. Use of efficient and responsible work strategies, on-time, honest and personal engagement, based on principles, norms, and ethical professional values. 2. Knowledge of team efficient work, on different hierarchy stages. 3. Use of references in a foreign language, for professional and personal development, through continuous formation and efficient adaptation to new technical specifications.

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

7.1	General objective	Acquiring competences in smart control systems
7.2	Specific objectives	• Overview of energy control systems in various infrastructures like street lighting or built environments • Knowledge of EU Directive 2018/844 of the Energy Performance of Buildings, Directive (2010/31/EU) - measures to establish an optional scheme for rating the smart readiness of buildings. • Finding the optimal control systems for smart homes and cities • The course also includes a project in which students must study an energy system of their own interest, from a systems and controls perspective.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction: Concept and classification of control system	2	Video-Projector Teaching style based on the interactive teacher-student partnership; Presentation of case studies.	
2. Conventional Control Systems and Home Automation Control Systems	2		
3. Smart Control Centre	2		
4. Home Security Control Systems	2		
5. Smart lighting Management	2		
6. Room Climate Control Systems	2		
7. Shading Control Systems	2		

Bibliography
1. N C Jagan, "Control Systems", BS Publications, 1st Edition, 2007.
2. A Anand Kumar, "Control Systems", PHI Learning, 1st Edition, 2007.
3. Schneider Electric, Manualul instalaţiilor electrice, 2007;
4. https://www.se.com/ro/ro/work/products/building-automation-and-control/
5. https://www.researchgate.net/
6. https://www.electrical4u.com/

8.2. **Laboratory**	Number of hours	Teaching methods	Notes
1. Understanding the Control Systems for Smart Homes	2	Modeling execution, computer exercises, group project	
2. Proposing a Smart Home Control System Concept - groups of four students	2		
3. Detailed Design and Utilisation Instructions	4		
4. Smart Readiness Indicator – SRI calculation	2		
5. Concept Presentation	4		

Bibliography
1. G. M. Masters, Renewable and Efficient Electric Power Systems, John Wiley & Sons, 2013.
2. D. Callaway and I. Hiskens, "Achieving controllability of electric loads," Proceedings of the IEEE, vol. 99, no. 1, pp. 184 –199, jan. 2011.
3. Schneider Electric, Manualul instalaţiilor electrice, 2007;
4. https://www.se.com/ro/ro/work/products/building-automation-and-control/
5. DialuxEvo software free dowmnload at www.dial.de

9. **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.

10. **Evaluation**

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Technical content, word count, structure and critical analysis;	Final report grade	60%
10.5 Laboratory	Technical content, presentation and communication skills;	class activity, assignments, presentation grade	40%
10.6 Minimum standard of performance			
5 points out of 10 total points (5 min/10 max)			

Date of filling in: 12.06.2025		Title Surname Name	Signature
	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 19.06.2025	Head of department Assoc.Prof.PhD.Eng. Ciprian BACOŢIU
Date of approval in the Council of the Faculty of Building Services Engineering 19.06.2025	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA