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	1.00

2. Data about the subject

2.1	Subject name				Advanced Building Services - HVAC and Water Supply		
2.2	Course responsible/lecturer				Assoc. Prof. Eng. Florin DOMNIŢA, PhD florin.domnita@insta.utcluj.ro Lecturer Eng. Dan Mureșan, PhD Muresan.dan@insta.utcluj.ro		
2.3	Teachers in charge of seminars				Lecturer Eng. Octavian POP, PhD octavian.pop@insta.utcluj.ro Lecturer Eng. Anagabriela Deac, PhD anagabriela.deac@insta.utcluj.ro		
2.4 Year of study	1	2.5 Semester	1	2.6 Assessment	Exam		
2.7 Subject category	Formative category					DA	
	Optionality					DI	

3. Estimated total time

3.1 Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	-	3.3 Laboratory	-	3.3 Project	2
3.4 Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar	-	3.6 Laboratory	-	3.6 Project	28

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	21
(b) Supplementary study in the library, online and in the field	21
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	7
(e) Exams and tests	3
(f) Other activities	3

3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	69
3.9 Total hours per semester (3.4+3.8)	125
3.10 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	- Bachelor’s degree
4.2	Competence	- Technical competences

5. Requirements (where appropriate)

5.1	For the course	Building Services – HVAC and Water Supply
5.2	For the applications - project	Building Services – HVAC and Water Supply

6. Specific competences

Professional competences	After completing the discipline, students will be able to know: - Different parts constituting heating, air conditioning and refrigeration systems for energy efficient buildings; - Types of mechanical ventilation systems that permits the regenerative exchange and circulation of air; - Draft ventilation network. Prepare and plan the ventilation layout using specialist software. Design heating or cooling systems as required. Improve efficiency of ventilation network to lower energy consumption. Know the operation modes of heating, ventilation, air conditioning and refrigeration, installations and systems; - to conceive, design, technically, functionally and economically optimize and evaluate the efficiency of sanitary installations for buildings and assembles of buildings with various destinations and functions. - to coordinate and to control execution activities, operation and maintenance of sanitary installations for buildings and assembles of buildings and various functions.
Cross competences	After completing the discipline, students will be able to demonstrate creative spirit and initiative in solving complex problems in the field of HVAC and water supply.

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

7.1	General objective	- To design, build and make technical and economic optimization of the HVAC and Water Supply systems for energy efficient buildings. - To make technical and economic coordination and control of HVAC and Water Supply systems for energy efficient buildings. - To synthesize, interpret and transmit the information on the composition and operation of advanced building services- HVAC and water supply systems. - To develop programs and applications for evaluation of operational and functional performance of different types of advanced building services - HVAC and water supply systems.
7.2	Specific objectives	- To identify the technical and functional requirements of different categories of advanced building services - HVAC and water supply systems - in relation with the requirements imposed by the building functioning and destination.

		- To evaluate the tasks for dimensioning advanced building services - HVAC and water supply systems - under specific functional and placement conditions. - To analyse by comparison the alternative solutions for advanced building services - HVAC and water supply systems - composition and equipping. - To analyse, evaluate and take action in specific activities of advanced building services - HVAC and water supply systems - designing, execution and operation. - To know the latest scientific and technical achievements and the national and international trends for developing the field of building services - HVAC and water supply systems -. - To know in detail the role and the action of building services components and systems corresponding to functional requisite. - To use methods and specialized computer programs for modelling advanced building services - HVAC and water supply systems - and for simulation of their behaviour in various functional situations.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction. Types of HVAC systems. HVAC project development and system design	2	Standard and interactive teaching, supplemented by exposure through video-projector	
2. Solutions for energy efficiency design of HVAC systems	2		
3. Improving the efficiency of air distribution systems	2		
4. HVAC variable refrigerant flow systems	2		
5. Choosing high-efficiency HVAC equipment. Designing high-efficiency chilled water-systems.	2		
6. HVAC systems with recuperative heat recovery	2		
7. HVAC system with ground-air heat exchanger	2		
8. Performance criteria of quality requirements for sanitary installations in buildings	2		
9. Efficiency of sanitary installations by using dynamic balancing and temperature control	2		
10. Smart sanitary installations	2		
11. Silent and fireproof sanitary installations	2		
12. Vacuumatic sewerage installations for evacuation of meteoric waters	2		
13. Management of meteoric waters	2		
14. Decentralized supply with hot water of consumers from buildings	2		

Bibliography

1. Roger W. Haines and Michael E. Meyers HVAC Systems Design Handbook, Fifth Edition (2009);
2. Javad Khazaii - Energy-Efficient HVAC Design: An Essential Guide for Sustainable Building (2014);
3. *** ASHRAE Handbook *HVAC Applications.* ASHRAE.org, Atlanta, Georgia, United States, 2019;
4. *** ASHRAE Handbook—HVAC Systems and Equipment, 2020.

To be completed

8.2. Project	Number of hours	Teaching methods	Notes
1. Design topic: HVAC system and components design for a living house.	2	Presentation of calculation methods, guidance making the drawn parts	
2. Simplified heat load calculation	2		
3. Selection HVAC system - VRV	2		
4. Minimal renewal (fresh air) airflow rate calculation	2		
5. Simulation of earth-to-air heat exchanger (Canadian well)	2		
6. Selection of air handling unit with heat recovery	2		
7. Drawings of HVAC system	2		
8.Design calculations of installations for supply with hot and cold water in buildings	2		
9.Design calculations of sewerage installations for household and meteoric waters in buildings	2		
10. Hydraulic balancing methods of sanitary installations	2		
11.Design of smart sanitary installations	2		
12.Sizing of vacuumatic installation for sewerage of meteoric waters for buildings	2		
13.Sizing of infiltration tanks of meteoric waters	2		
14.Sizing of thermal modules for decentralized supply with hot household water of consumers in buildings	2		

Bibliography

1. Roger W. Haines and Michael E. Meyers HVAC Systems Design Handbook, Fifth Edition (2009);
2. Javad Khazaii - Energy-Efficient HVAC Design: An Essential Guide for Sustainable Building (2014);
3. *** ASHRAE Handbook *HVAC Applications.* ASHRAE.org, Atlanta, Georgia, United States, 2019;
4. *** ASHRAE Handbook—HVAC Systems and Equipment, 2020.
5. Henri Charlent and Patrick Agostini – Traité des installations sanitaires, 16 edition 2105

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

Acquired competencies will be necessary to the employees working in the field of advanced building services - HVAC and water supply systems: design, execution, energy audit, exploitation and maintenance.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The exam consists of checking knowledge, written and oral	Written and oral evaluation – 2 hours	66%
10.5 Project	Project presentation	Oral support of the project	34%
10.6 Minimum standard of performance			
Completion of the project conditions the entrance to the exam. Observance of the framework content of the applications according to the presentation during the semester and correct execution of the calculations The final Mark is obtained from the following formula: N=0,66E+0.34P; applicable if: T ≥ 5 and P ≥ 5. Mark components: Theory (T); Project (P).			

Date of filling in:		**Title Surname Name**	**Signature**
11.11.2021	Lecturer	Assoc. Prof. Eng. Florin DOMNIŢA, PhD	
		Lecturer Eng. Dan MUREȘAN, PhD	
	Teachers in charge of application	Lecturer Eng. Octavian POP, PhD	
		Lecturer Eng. Anagabriela DEAC, PhD	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	2.00

2. Data about the subject

2.1	Subject name			Human Centric Lighting			
2.2	Course responsible/lecturer			Assoc.prof.Phd.Eng. Dorin Beu - *dorin.beu@insta.utcluj.ro*			
2.3	Teachers in charge of seminars			Assoc.prof.Phd.Eng. Dorin Beu - *dorin.beu@insta.utcluj.ro*			
2.4 Year of study	I	2.5 Semester	1	2.6 Assessment	Exam		
2.7 Subject category	Formative category						DA
	Optional						DI

3. Estimated total time

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

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 Architecture elements
4.2	Competence	Use of computer (MS-Office)

5. Requirements (where appropriate)

5.1	For the course	Video-projector
5.2	For the project	Lux-meter, spectral-photometer, luminance meter,

6. Specific competences

Professional competences	Lighting basics • photometric and colorimetric quantities • lighting equipment - lamps, luminaires and control systems • interior, public and architectural lighting • knowledge of European standards in the field of lighting After graduating this subject, students will be able to: • to evaluate the current state of a lighting installation • to compare lighting solutions • to propose lighting solutions for human wellbeing, with sustainable and energy efficient solutions • to use lighting measurement equipment • to use the European lighting software DialuxEvo
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 competence in human centric lighting, with a holistic view on the regenerative impact of this topic
7.2	Specific objectives	• Human Centric Lighting – impact of daylight and electric lighting on human wellbeing • Impact of night lighting on environment and solutions to reduce it • Finding regenerative lighting solutions for buildings and cities • Kknowledge of European norms: EN 12464, EN 13201, EN17037, EN 1838 and SR EN 15193 • Use of software for lighting design and control

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1.Lighting fundamentals	2	Video-Projector Teaching style based on the interactive teacher-student partnership; Presentation of case studies.	
2.LEDs and luminaires	2		
3.Wellbeing and health issues related to lighting	2		
4.Natural lighting. Luminaire design	2		
5.Lighting control systems	2		
6.Regenerative approach	2		
7.Lighting waste treatment: circular economy	2		

Bibliography

1. Van Bommel, W., Interior Lighting - Fundamentals, Technology and Application, Springer, ISBN 978-3-030-17195-7, 2019
2. Van Bommel, W., Road Lighting - Fundamentals, Technology and Application, Springer, ISBN 978-3-319-11466-8, 2015
3. Steffy,G, Architectural Lighting Design, John Wiley & Sons, 2012, ISBN 0-471-38638-3

4. Moran, N, Performance Lighting Design, A&C Black Publishers LTD 2007, ISBN 978-0-7136-7757-7
1. ***, 1000 Lights, Taschen, 2004, ISBN 978-3-8228-5287-3
2. Descottes,H, Ultimate Lighting Design, teNeues, 2008, ISBN 978-3-8327-9016-5

8.2. Project	Number of hours	Teaching methods	Notes
1.Measuring illuminance, colour rendering and colour temperature	2	Site visits, role play during the projects, modeling execution, computer exercises, group project	
2.Using DialuxEvo	4		
3.Understanding the European lighting norms	2		
4.Interior lighting (from concept to site)	2		
5.Public lighting (from concept to site)	2		
6.Lighting future	2		

Bibliography

1. Norms EN 12464, 1838, 13201 and 15193
2. International journal of Sustainable Lighting – open access at www.lightingjournal.org
3. DialuxEvo software free dowmnload at www.dial.de
4. Lighting sustainable criteria's at www.usgbc.org

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

The course is supervised by ELEA – European Lighting Experts Association and Romanian Lighting Association ARI. A steering is realised by Signify Romania, Zumtobel Group Romania and Schreder Romania.

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;	Mid-term exam final report grade	20% 40%
10.5 Project	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:		**Title Surname Name**	**Signature**
01.11.2021	Lecturer	Assoc.prof.PhD. Dorin Beu	
	Teachers in charge of application	Assoc.prof.PhD. Dorin Beu	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	3.00

2. Data about the subject

2.1	Subject name			Digital Design and Fabrication			
2.2	Course responsible/lecturer			Lecturer Phd.Eng. Rusu Daniel Sorin			
2.3	Teachers in charge of seminars			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					DA	
	Optional					DI	

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	14
(b) Supplementary study in the library, online and in the field	14
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	0
(e) Exams and tests	2
(f) Other activities	3

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	
4.2	Competence	Basic Knowledge of AutoCAD

5. Requirements (where appropriate)

5.1	For the course	Microsoft Teams, 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	Understanding and knowing the basic notions of working with a BIM CAD software; Learning the basic of REVIT MEP: Interface, keyboard shortcuts, views, families, basic creation tools, HVAC, Plumbing and Electrical modules; Basic commands for construction elements; Creation of selection sets and basic editing tools; Work with different views of the project; Spaces and zones editing; Building Energy Performance Analysis; Using the HVAC module; Using the Hydronic Piping and Plumbing module; Using the Electrical Systems module; Scheduling, Detailing, Documentation, Work-sharing Printing and presentation of project
Cross competences	Efficient using of information sources and communication resources, assisted professional training.

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

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

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction in REVIT MEP	2	On-line 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

8.2. 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, video projector
2. Spaces and Zones Editing	2		
3. Perform Building Energy Analyses	2		
4. Draw HVAC	2		
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.			

9. 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

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Testing of acquired knowledge	On-line presentation	50%
10.5 Seminars /Laboratory/Project	Develop a project in REVIT MEP	Project evaluation	50%
10.6 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**
20.10.2021	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 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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
1.7	Form of education	Full time
1.8	Subject code	4.00

2. Data about the subject

2.1	Subject name			Advanced Architecture			
2.2	Subject area			Architecture and Civil Engineering			
2.3	Course responsible/lecturer			Associate Professor Arch. Șerban Țigănaș PhD			
2.4	Teachers in charge of seminars			Lecturer Arch. Paul Mihai Moldovan PhD			
2.5 Year of study	1	2.6 Semester	1	2.7 Assessment	E	2.8 Subject category	DC/DS

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	24
(b) Supplementary study in the library, online and in the field	7
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	-
(e) Exams and tests	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	Bachelor's in civil engineering, or Building Services Engineering, or Architecture, or Urbanism
4.2	Competence	Technical and Humanistic competences

5. Requirements (where appropriate)

5.1	For the course	Microsoft Teams / Amphitheatre B-dul 21 December Nr.128-130, Cluj-Napoca
5.2	For the applications	Microsoft Teams / Amphitheatre B-dul 21 December Nr.128-130, Cluj-Napoca

6. Specific competences

Professional Competences	- Involvement of the building services engineer in conceiving the design brief - Development of the humanistic component of engineering - Development of collaborative skills based on the role of the engineer in digital integrated design processes
Cross competences	- Interdisciplinary perspective implementation in building design - Strategic planning skills for advanced investment objectives - Integration capacity of advanced technologies in building design

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

7.1	General objective	A comprehensive perspective on the new paradigm in construction
7.2	Specific objectives	- A contemporary understanding of architecture as a holistic integrating discipline - An alignment of different construction professions into an advanced interdisciplinary process - Building a foundation for interdisciplinary advanced design - Integration of building services engineering in the conception and development of construction projects - Understanding of the future role of building services engineering

8. Contents

8.1. Lecture (syllabus)		Number of hours	Teaching methods	Notes
1.	Architecture Today – An Introduction	1	On line, Microsoft Teams Platform or Oral presentation and debate	Video-projector
2.	Form and Function, the Essential Binome	1		
3.	Design Thinking – Design Process	1		
4.	RE-Inventing construction – A Change of Paradigm	1		
5.	Hi-Tech, Low-Tech or a Smart combination?	1		
6.	Advanced Architecture – A Dictionary of Terms	1		
7.	Elements of Architecture – Floor, Ceiling, Wall	1		
8.	Elements of Architecture – Roof, Window, Facade	1		
9.	Elements of Architecture – Stair, Ramp, Escalator, Elevator	1		
10.	Elements of Architecture – Fireplace, Toilet	1		
11.	Permanence, Ephemerity and Life Cycle	1		
12.	Advanced Architectural Programs	1		
13.	The 17 Sustainable Development Goals in Architecture	1		

14.	Case Studies, Recent Experiences	1		
Total:		14		

Bibliography:

- Designing the Profile of the Future Architect – Șerban Țigănaș. Andreea Robu-Movilă, Eusebia Mindirigiu, 2019
- Re-Inventing Construction – Ilka and Andreas Ruby, 2010
- Ephemeral Urbanism. Does permanence matter? – Rahul Mehrotra and Felipe Vera with Jose Mayoral, 2017
- Smart Cities: Big Data, Civic Hakers, and the Quest for a New Utopia – Anthony Townsend, 2014

8.2. Applications/Laboratory		Number of hours	Teaching methods	Notes
1.	Architecture and Engineering in the History of Construction part 1	1	On line, Microsoft Teams Platform or Oral presentation and debate	Video-projector
2.	Architecture and Engineering in the History of Construction part 2	1		
3.	Design Process in examples	1		
4.	Digital Shift in Design – Software for Building Design and Architecture	1		
5.	Low – Tech Case studies	1		
6.	Low – Tech Case studies	1		
7.	Elemente of Architecture – Case Studies part 1	1		
8.	Elemente of Architecture – Case Studies part 2	1		
9.	Elemente of Architecture – Case Studies part 3	1		
10.	Advanced Architecture Worldwide part 1	1		
11.	Advanced Architecture Worldwide part 2	1		
12.	Advanced Architecture in Romania part 1	1		
13.	Advanced Architecture in Romania part 2	1		
14.	Evaluation	1		
Total:		14		

Bibliography:

- The Metapolis Dictionary of Advanced Architecture: city, technology and society i the information age – Manuel Gausa, Vicente Guallart, Willy Muller, Federico Soriano, Fernando Porrsa, Jose Morales
- An Architectural Guide to the UN 17 Sustainable Development Goals – Natalie Mossin (chief editor), 2019
- Elements of Architecture, Rem Koolhaas, 2014

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

The competences accumulated are necessary to activate the graduates in design activities, realization of buildings, consultancy and sales to meet the employers' requirements.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
Course	Knowledge testing from course and bibliography	Oral examination	50%
Applications	Knowledge testing and skills accumulated by applications	Written test	50%
10.4 Minimum standard of performance Students need to pass the application test to be accepted at the examination. The components of the final grade are Examination (E) and Application lab (L). Therefore, the formula for the final grade calculation is G=0.5xE + 0.5xL. The 3 credits are obtained if both E and L are rewarded with minimum 5			

Date of filling in:		**Title Surname Name**	**Signature**
20.10.2021	Lecturer	Assoc.prof.PhD.arch. Dragos Șerban ȚIGĂNAȘ	
	Teachers in charge of application	Lec.PhD.arch. Paul Mihai MOLDOVAN	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIȚA

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
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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	5.00

2. Data about the subject

2.1	Subject name	nZEB Buildings
2.2	Course responsible/lecturer	Assoc.Prof.PhD.Eng. Moga Ligia Mihaela: ligia.moga@ccm.utcluj.ro Assoc.Prof.PhD.Eng.Ancuţa Coca Abrudan: ancuta.abrudan@insta.utcluj.ro
2.3	Teachers in charge of seminars	Assoc.Prof.PhD.Eng.Moga Ligia: ligia.moga@ccm.utcluj.ro Assoc.Prof.PhD.Eng.Ancuţa Abrudan: ancuta.abrudan@insta.utcluj.ro

2.4 Year of study	I	2.5 Semester	I	2.6 Assessment	Exam	
2.7 Subject category	Formative category					DA
	Optional					DI

3. Estimated total time

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

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	10
(b) Supplementary study in the library, online and in the field	10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
(d) Tutoring	7
(e) Exams and tests	4
(f) Other activities	6

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	Knowledge regarding building and HVAC design, Thermotechnics of Constructions, construction materials, bachelor's degree
4.2	Competence	Thermotechnics and HVAC calculation

5. Requirements (where appropriate)

5.1	For the course	Class attendance is not mandatory, but it will be a plus for the final grade. Photography and filming are prohibited during the course
5.2	For the applications Project	Class attendance is mandatory. Photography and filming are prohibited during tutorials.

6. Specific competences

Professional competences	Knowledge regarding energy performance of buildings legislation. Knowledge regarding general criteria for nZEB design. Knowledge for the identification of constructive details for building envelope components Knowledge regarding thermal performance design Knowledge regarding different parts constituting HVAC systems for energy efficient buildings; Knowledge for the identification of building services components
Cross competences	The accumulated knowledge can be used for developing technical reports for the thermal design of nZEBs. The students will be able to get the required technical knowledge to communicate with other stakeholders in the field of nZEBs. The students will be able to demonstrate a creative and enterprising spirit in solving complex problems

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

7.1	General objective	Developing skills for designing high nearly Zero Energy Buildings Synthesizing, explaining and transmitting information for nearly Zero Energy Buildings
7.2	Specific objectives	Acquiring knowledge regarding legislation and design norms nZEBs Skills development in designing nZEBs To know in detail the role of building services components and systems in designing nZEBs. Using the latest scientific and technical achievements (national and international) trends for developing design nZEBs

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Overview, objectives, history. Energy efficiency at buildings. Legislation and norms regarding thermal performance of new buildings and thermal rehabilitation process at existing buildings	2	Exposure, applications	Video-projector
2. nZEBs definition. Principles and design criteria.	2		
3. Constructive solutions for nZEBs. Types of energy efficient windows.	2		
4. Evaluation methodologies for the energy performance of a building and building services.	2		

5. Use of cogeneration for nZEBs	2		
6. Use of renewable energy for buildings: wind power and geothermal energy	2		
7. Use of renewable energy for buildings: solar energy and heat pumps	2		

Bibliography

1. Selected examples of Nearly Zero Energy Buildings Detailed Report September 2014 www.epbd ca.eu
2. Theoni Karlessi et al. The Concept of Smart and NZEB Buildings and the Integrated Design Approach, Procedia Engineering 180 (2017) 1316 – 1325
3. Horia-A. Andreica, Munteanu C., Moga L. Et al, Buildings, UTPRESS, 2009
4. Moga L., Thermo-energetic optimisation of glasing surfaces, U.T.Press, 2013, ISBN 978-973-662-793-4
5. Moga L., Şoimoşan T., Environmental and Human Impact of Buildings: An Energetics Perspective, Springer Tracts in Civil Engineering, 2021, eBook ISBN978-3-030-57418-5, https://doi.org/10.1007/978-3-030-57418-5
6. *** Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings
7. *** Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency.
8. Hendriks L.; Hens H. Building Envelopes in a Holistic Perspective, ISBN-10-9075741057, 2010.
9. *** http://www.passivhaus.de/
10. *** www.usgbc.org/leed
11. *** http://www.breeam.com/

8.2. Project	Number of hours	Teaching methods	Notes
1. Presentation of the project theme. Identification of required building layouts.	2	Exposure, applications	Standards and Norms, AutoCad, AllPlan, MathCad, energy modelling and design tools
2. Identification of building's envelope components. Constructive detailing design specific for nZEBs.	2		
3. Evaluation of the thermal performance of the building envelope components	2		
4.Evaluation of the global insulation coefficient of the building envelope.	1		
5. Presentation of the project theme. Description of all possible renewable energy types to be used in nZEBs.	3		
6. Calculation method using heat pumps	2		
7. Calculation method using wind power	2		

Bibliography

1. ISO/DIS 13789 - Thermal performance of buildings - Transmission and ventilation heat transfer coefficients - Calculation method
2. ISO/DIS 13370 - Thermal performance of buildings - Heat transfer via the ground - Calculation methods
3. Moga Ligia, Moga Ioan Specific thermal bridges at load bearing masonry buildings - Design Atlases Ed. U.T. Press, Cluj-Napoca, 2013, pp. 138, ISBN 978-973-662-799-6.

4. Moga Ligia, Moga Ioan, Specific thermal bridges for terrace roofs, attic floors, floors over the basement and slabs on the ground at load bearing masonry buildings - Design Atlases, Ed. U.T. Press, Cluj-Napoca, 2017, pp. 164, ISBN 978-606-737-245-8.
5. Moga L., Rusu A., Thermal performance of large prefabricated panels - Design Approach, U.T.Press, 2013
6. *** Thermotechnics design norms C107/0...7-2005
7. *** Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on
8. Hendriks L.; Hens H. Building Envelopes in a Holistic Perspective, ISBN-10-9075741057, 2010.
9. *** http://www.passivhaus.de/
10. *** www.usgbc.org/leed
Software:
1. AutoCAD, Student Version
2. Allplan Engineering, Student Version
3. Mathcad

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

The gained knowledge will be necessary for employees that will work in building design field and building services systems. This satisfies employers' requirements.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	20 theoretic questions	Written test of 2.0 h - on-site or 30 min online	30%
10.5 Project	Evaluation of written part, calculations and drawings	Project presentation for 40 min	70%
10.6 Minimum standard of performance			
Exam grade E≥5; Project/paper grade A≥5 **E= [0.3 (T) +0.7 (P)]** The final grade will take into consideration the student's involvement during the semester			

Date of filling in:		Title Surname Name	Signature
01.11.2021	Lecturer	Assoc.Prof.PhD.Eng. Moga Ligia Mihaela Assoc.Prof.PhD.Eng. Ancuţa Abrudan	
	Teachers in charge of application	Assoc.Prof.PhD.Eng. Moga Ligia Mihaela	
		Assoc.Prof.PhD.Eng.Ancuţa Abrudan	

Date of approval in the Department of Building Services Engineering

18.11.2021

Head of department
Assoc.Prof.PhD.Eng. Carmen MÂRZA

Date of approval in the Council of the Faculty of Building Services Engineering

19.11.2021

Dean
Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	6.00

2. Data about the subject

2.1	Subject name			Circular economy			
2.2	Course responsible/lecturer			Lect.PhD.Eng. Tania RUS - tania.rus@insta.utcluj.ro			
2.3	Teachers in charge of seminars			Lect.PhD.Eng. Tania RUS - tania.rus@insta.utcluj.ro			
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment	Colloquy		
2.7 Subject category	Formative category						DS
	Optional						DI

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	14
(b) Supplementary study in the library, online and in the field	14
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	3
(e) Exams and tests	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	Bachelor’s degree
4.2	Competence	Technical competences in the field of civil engineering and building services

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

5.2	For the applications Laboratory	Classroom - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

6. Specific competences

Professional competences	Theoretical knowledge: - Of building services dimensioning and working principles; - Of building services materials and equipment used; Acquired skills: - To understand the need of moving from linear economy towards circular; - Implementation of strategies to reduce energy consumption of building services; - To propose solution for the building services materials and equipment reuse; - To identify the building services materials and equipment for upcycle or recycle. Skills acquired: - Reducing the consumption footprint and increasing the circular material use rate; - Conservation of nature reserves.
Cross competences	To demonstrate a creative and enterprising spirit in complex problem solving; 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	Development of skills in the field of circularity: moving from linear, highly resource depleting systems with high emissions, waste generation, and high impacts on ecosystems, towards circular, less wasteful systems that use resources more efficiently and sustainably, while providing work opportunities and a high quality of life
7.2	Specific objectives	Develop a solid understanding and integrative knowledge of circular economy; The ability to effectively use circularity principle in designing processes; To use methods and programs to transmit information.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. What is circular economy and why create circularity?	2	Video-Projector Teaching style based on the interactive teacher-student partnership; Alternatively	
2. Circular economy principles for buildings	2		
3. Designing-out waste. Design for adaptability	2		
4. Design for disassembly and reuse	2		
5. Selecting materials and products	2		
6. Turning waste into a resource	2		
7. Virtuous circles. Coming full circle	2		

		ONLINE on UTCN's TEAMS platform	
Bibliography 1. European Circular Economy Stakeholder Platform - https://circulareconomy.europa.eu/platform/; 2. European Commission (2020) - Leading the way to a global circular economy: state of play and outlook - https://ec.europa.eu/environment/circular-economy/pdf/leading_way_global_circular_economy.pdf; 3. Knowledge map – circular economy (2020) - https://kenniskaarten.hetgroenebrein.nl/en/knowledge-map-circular-economy/ce-environmental-benefits/.			
8.2. Laboratory	Number of hours	Teaching methods	Notes
1. Identification of existing constructions, systems and components regarding their possibility for inclusion in circularity	2	Teaching style based on the interactive teacher-student partnership;	
2. Investigations of existing constructions, systems and components regarding its possibility to disassemble and re-use	2		
3. Solutions, debates and critical view on construction materials for reuse, upcycle or recycle	4		
4. Solutions, debates and critical view on building services materials and equipment for reuse, upcycle or recycle	4		
5. Presentation of laboratory works	2		
Bibliography 1. The Circularity Gap Reporting Initiative a global score for circularity (2020) - https://assets.website-files.com/5e185aa4d27bcf348400ed82/5e4d0a24eb0887b1ddfa59b9_Measuring%20and%20Mapping%20Circularity%20-%20technical%20methodology%20document.pdf; 2. European Commission (2020) - Leading the way to a global circular economy: state of play and outlook - https://ec.europa.eu/environment/circular-economy/pdf/leading_way_global_circular_economy.pdf; 3. Sustainability guide - https://sustainabilityguide.eu/.			

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

The acquired competencies will be necessary for the employees who carry out their activity in complex interdisciplinary context for understanding the impact of their own specialty on the ecosystem and natural environment.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The colloquium consists in verifying the theoretical and practical knowledge acquired	Written exam	75%
10.5 Laboratory	Completion and submission of laboratory papers conditions the entrance to the exam.	Submission of laboratory papers	25%
10.6 Minimum standard of performance			

Participation in the laboratory conditions the entrance to the exam.

Exam grade components (E); Laboratory (L); Calculation formula of the grade $G = 0.75 \times E + 0.25 \times L$

Condition for obtaining credits: $G > 5.0$; where $E > 5.0$, $L > 5.0$

Date of filling in:		**Title Surname Name**	**Signature**
01.11.2021	Lecturer	Lect.PhD.Eng. Tania RUS	
	Teachers in charge of application	Lect.PhD.Eng. Tania RUS	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	7.00

2. Data about the subject

2.1	Subject name			Professional practice 1		
2.2	Course responsible/lecturer			-		
2.3	Teachers in charge with professional practice 1			Lect.Eng.PhD. Octavian POP – octavian.pop@insta.utcluj.ro		
2.4 Year of study	I	2.5 Semester	I	2.6 Assessment		Verification
2.7 Subject category	Formative category					DS
	Optional					DI

3. Estimated total time

3.1 Number of hours per week	14	of which	3.2 Course		3.3 Seminar		3.3 Laboratory		3.3 Project	14
3.4 Total hours in the curriculum	196	of which	3.5 Course		3.6 Seminar		3.6 Laboratory		3.6 Project	196
3.7 Individual study:										
(a) Manual, lecture material and notes, bibliography										24
(b) Supplementary study in the library, online and in the field										24
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										16
(d) Tutoring										-
(e) Exams and tests										2
(f) Other activities										-
3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))										54
3.9 Total hours per semester (3.4+3.8)										250
3.10 Number of credit points										10

4. Pre-requisites (where appropriate)

4.1	Curriculum	Bachelor's degree in one of the following fields: - building services engineering; - civil engineering; - architecture; - other related specializations.
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the development of professional practice	

6. Specific competences

Professional competences	Theoretical knowledge: • Disciplines taught in the first semester within the master's program. Acquired skills: • To deepen the knowledge taught through design topics specific to the course disciplines. Skills acquired: • Development of skills in the field of design and execution. • Development of skills regarding the preparation of reports specific to the field.
Cross competences	The students will be able to: • make decisions and take responsibility for their own decisions and actions by adapting to new situations; • have leadership skills on complex projects; • demonstrate a creative and enterprising spirit in solving complex problems.

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

7.1	General objective	✓ To evaluate the functional and energy efficiency of the installation systems and to design solutions for their rehabilitation and technological modernization; ✓ To synthesize, explain and transmit information on the composition and operation of installation systems
7.2	Specific objectives	• To compile programs for investigating the operating conditions and evaluating the efficiency of different categories of installations • To analyze and evaluate the functional parameters and performance indicators of equipment and installation systems in the given operating conditions • To identify the technical non-conformities and the needs of functional and energetic rehabilitation / modernization • To select and propose intervention measures for the energy efficiency of the different categories of installations • To draw up the technical-economic documentation specific to the functional and energetic evaluation • Analyze and synthesize existing information on installation systems; • To elaborate documentary and formative materials regarding the composition and calculation of the installation systems; • To know the recent technical-scientific achievements and the national and international tendencies for the development of the field.

8. Contents

8.1. Theme area	Number of hours	Teaching methods	Notes

Advanced Building Services – HVAC and Water Distribution			
Human Centric Lighting			
Digital Design and Fabrication			
nZeb Buildings			
Circular economy			
Obs: Students will be divided into groups and will address a topic of their choice from those proposed by teachers or companies with which there are internship agreements. The themes will be focused on the realization of projects and on the analysis of the chosen solutions.			
8.2. Applications	Number of hours	Teaching methods	Notes
Presentation of the design / practice theme for each student	42	Exposure, applications	
Calculation method used at national level	42		
Implementation of the calculation methodology	42		
Case study based on calculation methods used at national level	68		
Deliver and present the elaborated project	2		
Bibliography 1. Course notes related to the disciplines studied in the first semesters of the master's cycle. 2. Bibliographic sources specific to the project / practice topic. 3. Legislation specific to each topic.			

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

The gained knowledge will be necessary for employees that will work in building services engineering design and execution.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	-		
10.5 Applications	Verification (grade C); Knowledge in the calculation methodology when carrying out the project (grade A).	The verification consists in evaluating the knowledge resulting from the design (2 hours).	80% project 20% verification
10.6 Minimum standard of performance			
Grade components: Verification (C); Knowledge in the calculation methodology (A). G= 0.2 C +0.8 A Condition for obtaining the credits: G≥ 5; C≥ 5; A≥ 5			

Date of filling in:		Title Surname Name	Signature
15.11.2021	Lecturer		
	Teachers in charge of application	Lect.PhD.Eng Octavian Pop	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	8.00

2. Data about the subject

2.1	Subject name			Building and City Assessment			
2.2	Course responsible/lecturer			Prof. PhD.eng. Cristina Câmpian - *cristina.campian@dst.utcluj.ro*			
2.4	Teachers in charge of seminars			Assoc.prof.Phd.Eng. Dorin Beu - *dorin.beu@insta.utcluj.ro*			
2.5 Year of study	I	2.6 Semester	2	2.7 Assessment	Exam		
2.8 Subject category	Formative category					DS	
	Optional					DI	

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	1	3.3 Seminar		3.3 Laboratory		3.3 Project	2
3.4 Total hours in the curriculum	42	of which	3.5 Course	14	3.6 Seminar		3.6 Laboratory		3.6 Project	28

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	18
(b) Supplementary study in the library, online and in the field	18
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	18
(d) Tutoring	2
(e) Exams and tests	2
(f) Other activities	

3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	nZeB Buildings, Circular Economy
4.2	Competence	Use of computer (MS-Office)

5. Requirements (where appropriate)

5.1	For the course	Video-projector
5.2	For the project	N/A

6. Specific competences

Professional competences	● carry out a pre-assessment for voluntary green building certification schemes such as LEED, BREEAM, GREEN HOMES and for cities - European Energy Award; ● understand the process and implications of the green building and cities certifications systems; ● prepare the documentation needed in order to obtain a green building certification or city EEA; ● gain experience working in a green building or city ● certification project;
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. 4. Social competences by becoming aware of his/her current knowledge and understanding the necessity of studying through the whole life of a system/product, building or a city.

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

7.1	General objective	● Learn to complete a green building certification system for a building or a community;
7.2	Specific objectives	● develop a solid understanding of the process, data requirements for completion of a green building or city certification; ● understand the criteria intent and technical applicable solutions and documentation requirements; ● critically evaluate sustainability tools used; ● use different methodologies for impact assessment; ● learn possible applications and limitations of the green building or city certification systems; • comparison of the main green building or city certification systems used at national and European level and analyze indicators through case studies;

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1.Introduction to voluntary green building/city certification systems: History, definition, types, benefits, structure;	2	Video-Projector Teaching style based on the interactive teacher-student partnership;	
2.Goal and intent of the criteria for BREEAM, LEED, GREEN HOMES and European Energy Award;	2		
3.Data collection and validation. Data interpretation, limitation of green building/city certification systems.	2		
4.Identification of significant issues, evaluation, reporting, critical review.	2		

5.Pre-certification and certification process for a variety of projects.	2	Presentation of case studies.	
6.Integrated design charrettes with a project team and rol play in order to understand the process and the responsibilities of the green building/city consultant;	2		
7.Specialty reports and dynamic modelling specifications using approved software;	2		
Bibliography 1. Reeder, L. , Guide to Green Building Rating System, John Wiley &Sons, ISBN 978-0470401941, 2010 2. LEED V4 Reference Manual; www.usgbc.org 3. BREEAM New Construction 2019 Manual; www.breeam.com 4. BREEAM Refurbishment and Fit Out 2019 Manual; www.breeam.com 5. GREEN HOMES v3 Manual; www.rogbc.org 6. EEA manual: https://www.european-energy-award.org			
8.2. Seminar /Laboratory/Project	Number of hours	Teaching methods	Notes
Computing programs and databases dedicated to green buildings	4	Site visits, role play during the projects, modeling execution, computer exercises, group project	
Preparation of reports based on the visit to the construction site;	4		
Real experience in each project;	2		
Preparation of an interim or final report for BREEAM, LEED and GREEN HOMES.	2		
Critical view and limitations of the main green building certification systems;	2		
European Energy Award concept - EEA	4		
Evaluating a city with the EEA system using the EMT calculation program	4		
Covenant of Mayor - CoM reporting system	2		
Data transfer between EEA and CoM	2		
Presentation of case studies	2		
Bibliography 1. National and international case studies; 2. Most specialized magazines with articles about the certification of green buildings / cities; 3. Journal of Industrial Ecology, 4. Environmental Science and Technology, 5. Journal of Cleaner Production, 6. Journal of Environmental Management, Ecological Economics, Energy.			

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

The course is supervised by EEA – European Energy Award Association and Green Building Council International, with the help of Romania Green Building Council.

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;	mid-term exam final report grade	20% 40%
10.5 Seminars /Laboratory/Project	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:		**Title Surname Name**	**Signature**
25.10.2021	Lecturer	Prof.PhD.Eng. Cristina Câmpian	
	Teachers in charge of application	Assoc.prof.PhD.Eng. Dorin Beu	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	9.00

2. Data about the subject

2.1	Subject name			Indoor environmental quality and well-being			
2.2	Course responsible/lecturer			Lect.PhD.Eng. Tania RUS - tania.rus@insta.utcluj.ro			
2.3	Teachers in charge of seminars			Lect.PhD.Eng. Tania RUS - tania.rus@insta.utcluj.ro			
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment	Exam		
2.7 Subject category	Formative category						DS
	Optional						DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar		3.3 Laboratory	1	3.3 Project	
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar		3.6 Laboratory	14	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	21
(b) Supplementary study in the library, online and in the field	15
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	6
(e) Exams and tests	2
(f) Other activities	

3.8 Total hours of individual study (sum (3.7(a)...3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	Bachelor's degree
4.2	Competence	Principles of heating installations; Principles of ventilation and air conditioning installations; Principles of lighting installations.

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

5.2	For the applications Laboratory	Laboratory room I01 - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

6. Specific competences

Professional competences	Theoretical knowledge: - Specific notions of heating installations; - Specific notions of ventilation and air conditioning installations; - Specific notions of lighting installations. Acquired skills: - To evaluate the quality of the indoor environment depending on the destination of the building and the typology of the occupants; - To evaluate the thermal comfort of a building; - To evaluate the quality of the indoor air of a building; - To evaluate the quality of lighting. Skills acquired: - To use equipment and tools for monitoring the quality of the indoor environment; - To propose solutions of improvement of the indoor environment quality.
Cross competences	To demonstrate a creative and enterprising spirit in complex problem solving. 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	Development of skills in the field of indoor environment quality evaluation of a building and to propose solutions of improvement with an emphasis on the needs of the occupants.
7.2	Specific objectives	To establish the parameters and calculation assumptions of imposed requirements; To identify the technical non-conformities and the needs of functional and energetic rehabilitation / modernization; To use the basic concepts and engineering calculation methods to solve the practical problems imposed using installations in constructions; To use methods and programs to transmit information.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction in indoor environmental quality (IEQ)	2	Video-Projector Teaching style based on the interactive	
2. Standards for IEQ evaluation	2		
3. Hygro-thermal environment – temperature, humidity and air velocity	2		
4. Thermal comfort assessment	2		

5. Occupant responses to thermal comfort/discomfort	2	teacher-student partnership; Presentation of case studies. Alternatively ONLINE on UTCN's TEAMS platform	
6. Interaction between outdoor climate and thermal comfort	2		
7. Indoor air quality – indoor ventilation	2		
8. Indoor air quality – contaminants	2		
9. Indoor air quality – occupant satisfaction	2		
10. Visual environment – natural/artificial lighting	2		
11. Acoustic environment	2		
12. Biophilia	2		
13. Well-being and human values	2		
14. Regenerative objectives for IEQ	2		

Bibliography

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), (2013). ANSI/ASHRAE Standard 55. Thermal Environmental Conditions for Human Occupancy. Atlanta;
2. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), (2016). ANSI/ASHRAE Standard 62-1. Ventilation for Acceptable Indoor Air Quality. Atlanta;
3. CEN, (2019). UNI EN 16798-1: Energy performance of buildings – Ventilation for buildings – Part 1: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics. Brussels, European Committee for Standardization;
4. World Health Organization – Air quality guidelines for Europe, 2000;
5. CEN, (2004). UNI EN 12464-1: Light and lighting. Lighting of workplaces. Part 1: Indoor workplaces. Brussels, European Committee for Standardization.
6. U.S. Environmental Protection Agency (1990). (EPA) (b), Facts About Formaldehyde [Online]. Retrieved from https://www.epa.gov/formaldehyde/facts-about-formaldehyde#whatisformaldehyde
7. U.S. Environmental Protection Agency. (1990). (EPA) Particulate Matter (PM) Basics. Retrieved from https://www.epa.gov/pm-pollution/particulate-matter-pm-basics#PM
8. U.S. Environmental Protection Agency. (1990). (EPA) (d), Indoor Particulate Matter. Retrieved from https://www.epa.gov/indoor-air-quality-iaq/indoor-particulate-matter
9. U.S. National Institute for Occupational Safety and Health. (2018). (NIOSH), Pocket Guide to Chemical Hazards. Retrieved from https://www.cdc.gov/niosh/npg/default.html
10. U.S. Occupational Safety and Health Administration (OSHA) (2020), Code of Federal Regulations. Retrieved from https://www.graphicproducts.com/articles/osha-29-cfr-1910/
11. Naboni, E., & Havinga, L. C. (2019). Regenerative Design in Digital Practice: A Handbook for the Built Environment. EURAC Research. Retrieved from https://www.buildup.eu/en/practices/publications/regenerative-design-digital-practice-handbook-built-environment

8.2. Laboratory	Number of hours	Teaching methods	Notes
1. Assessment of the hygro-thermal environment – temperature, humidity and air velocity	2	Teaching style based on the interactive teacher-student partnership;	
2. Objective and subjective thermal comfort computation	2		
3. Indoor air-quality: measurements of the chemical and natural contaminants	2		
4. Evaluation of the visual environment	2		
5. Evaluation of the acoustic environment	2		
6. Assessment of the indoor environmental quality	2		
7. Recovery of laboratory	2		

Bibliography

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), (2013). *ANSI/ASHRAE Standard 55. Thermal Environmental Conditions for Human Occupancy*. Atlanta;
2. CEN, (2005). EN ISO 7730: *Ergonomics of the thermal environment – Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort*
criteria. Brussels, European Committee for Standardization;
3. CEN, (2019). UNI EN 16798-1: *Energy performance of buildings – Ventilation for buildings – Part 1: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics*. Brussels, European Committee for Standardization;
4. World Health Organization (WHO) (2000). *Air Quality Guidelines for Europe*. Second Edition
5. World Health Organization – Air quality guidelines for Europe, 2000;
6. International Well Building Institute (IWBI), (2019). *The Well Building Standard*

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

The acquired competencies will be necessary for the employees who carry out their activity in design, execution and maintenance.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The exam consists in verifying the theoretical and practical knowledge acquired	Written exam	75%
10.5 Laboratory	Completion and submission of laboratory papers conditions the entrance to the exam.	Submission of laboratory papers	25%
10.6 Minimum standard of performance			
Participation in the laboratory conditions the entrance to the exam. Exam grade components (E); Laboratory (L); Calculation formula of the grade G = 0.75 × E + 0.25 × L Condition for obtaining credits: G> 5.0; where E> 5.0, L> 5.0			

Date of filling in:		**Title Surname Name**	**Signature**
01.10.2021	Lecturer	Lect.PhD.Eng. Tania RUS	
	Teachers in charge of application	Lect.PhD.Eng. Tania RUS	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	10.00

2. Data about the subject

2.1	Subject name			Building Services Retrofit Solutions			
2.2	Course responsible/lecturer			*Lect.phd.eng. Octavian Pop – octavian.pop@insta.utcluj.ro* *Lect.phd.eng Roxana Mare – roxana.mare@insta.utcluj.ro*			
2.3	Teachers in charge of seminars			*Lect.phd.eng Roxana Mare – roxana.mare@insta.utcluj.ro* *Lect.phd.eng. Octavian Pop – octavian.pop@insta.utcluj.ro*			
2.4 Year of study	I	2.5 Semester	II	2.6 Assessment			E
2.7 Subject category							DA
							DO

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	1	3.3 Seminar		3.3 Laboratory		3.3 Project	2
3.4 Total hours in the curriculum	42	of which	3.5 Course	14	3.6 Seminar		3.6 Laboratory		3.6 Project	28

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	23
(b) Supplementary study in the library, online and in the field	9
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
(d) Tutoring	2
(e) Exams and tests	4
(f) Other activities	-

3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	Microsoft Teams platform/ amphitheatre, B-dul 21 Decembrie Nr.128-130, Cluj-Napoca
5.2	For the applications Laboratory	Microsoft Teams platform/ laboratory room, B-dul 21 Decembrie Nr.128-130, Cluj-Napoca

6. Specific competences

Professional competences	✓ Implementation of new design strategies in order to minimise the energy costs and to extend the life of the systems from an aging facility ✓ Conceptual framework determination in order to be able to apply the optimal retrofit and sustainable solutions for the present-day building services ✓ Dimensioning of each type of building services for establishing the optimum retrofit and sustainable solution for the existing building services ✓ Economic analysis before and after the implementation of the building services retrofit solution
Cross competences	✓ Teamwork – the ability to synthetise and clearly define every team worker's job, ensuring an efficient exchange of information, knowledge and proofing good interpersonal and networking skills. ✓ Use of the IT&C technology. ✓ Adjustment to new technologies, personal and professional development by using specialized documents and software, and electronic resources written in an international language.

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

7.1	General objective	Implementation of new design strategies in order to minimise the energy costs and to extend the life of the systems from an aging facility
7.2	Specific objectives	Conceptual framework determination in order to be able to apply the optimal retrofit and sustainable solutions for the present-day building services. Dimensioning and economic analysis for establishing the optimum retrofit and sustainable solution for the existing building services.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Essentials aspects regarding the performance evaluation of the building services.	2 hours	On line or Presentation and discussions	Video system
Aspects regarding the building occupants' needs according to the building old or new destination.	2 hours		
New technologies for buildings water distribution systems.	2 hours		
New technologies for buildings HVAC systems.	2 hours		
New technologies for buildings electrical systems.	2 hours		

Optimal retrofit and sustainable solutions for building services.	2 hours		
Deployment of the BMS system in buildings.	2 hours		
Total	14 hours		

Bibliography

1. ASHRAE Handbook: HVAC Basics and HVAC System Efficiency Improvement, 2016
2. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality;
3. J. F. Kreider, P. Curtiss and A. Rabl, Heating and Cooling of Buildings: Design for Efficiency, McGraw-Hill, 2nd Ed., 2002;
4. McQuiston & Parker, Heating, Ventilating, and Air Conditioning Analysis and Design, Wiley, 6th Ed., 2005;
5. R. W. Haines and D. C. Hittle, Control Systems for Heating, Ventilating and Air Conditioning, Boston: Kluwer Academic Publishers, 6th Ed., 2003;
6. Producers' catalogues
7. ANSI Standard ACCA 5 QI-2010. HVAC Quality Installation Specification
8. I 13 Normative for design, execution and exploitation of the heating systems
9. I 9 Normative for design, execution and exploitation of the sanitary installation
10. I 5 Normative for design, execution and exploitation of the ventilation and air conditioning systems
11. I 7 Normative for design, execution and exploitation of the electrical systems for buildings.
12. CEN EN 12464-1:2011. Light and lighting - Lighting of work places - Part 1: Indoor work places

8.2. Seminar / laboratory / **project**	Number of hours	Teaching methods	Notes
Project design topic presentation and assimilation. General debate on the building blueprints.	2 hours	On line or Discussions, case study, team work.	
Performance evaluation of the effective building services: HVAC systems.	2 hours		
Performance evaluation of the effective building services: water distribution.	2 hours		
Performance evaluation of the effective building services: electrical systems.	2 hours		
Evaluation of the maintenance and operation costs for the existing building services.	2 hours		
Comfort demand of the building occupants according to the building old or new destination: HVAC systems.	2 hours		
Comfort demand of the building occupants according to the building old or new destination: water distribution and lighting.	2 hours		
Design the optimal retrofit and sustainable solution for building services: HVAC systems.	2 hours		
Design the optimal retrofit and sustainable solution for building services: water distribution.	2 hours		
Design the optimal retrofit and sustainable solution for building services: electrical systems.	2 hours		
Financial estimate after the implementation of the optimum retrofit and sustainable solutions of the building services.	2 hours		
Tutoring.	2 hours		

Oral presentation of the project.	4 hours		
Total	28 hours		

Bibliography

1. ASHRAE Handbook: HVAC Basics and HVAC System Efficiency Improvement, 2016
2. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality;
3. J. F. Kreider, P. Curtiss and A. Rabl, Heating and Cooling of Buildings: Design for Efficiency, McGraw-Hill, 2nd Ed., 2002;
4. McQuiston & Parker, Heating, Ventilating, and Air Conditioning Analysis and Design, Wiley, 6th Ed., 2005;
5. R. W. Haines and D. C. Hittle, Control Systems for Heating, Ventilating and Air Conditioning, Boston: Kluwer Academic Publishers, 6th Ed., 2003;
6. Producers' catalogues
7. ANSI Standard ACCA 5 QI-2010. HVAC Quality Installation Specification
8. I 13 Normative for design, execution and exploitation of the heating systems
9. I 9 Normative for design, execution and exploitation of the sanitary installation
10. I 5 Normative for design, execution and exploitation of the ventilation and air conditioning systems
11. I 7 Normative for design, execution and exploitation of the electrical systems for buildings.
12. CEN EN 12464-1:2011. Light and lighting - Lighting of work places - Part 1: Indoor work places

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

The competences achieved by the alumni are necessary in the field of design, production, consulting and marketing. Thus, the demands of the 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	Written exam	Test – 2 hours	50%
10.5 Seminar / laboratory / **project**	Oral presentation of the project	Oral examination	50%
10.6 Minimum standard of performance			
Students must pass the Laboratory test for the final exam. The components of the final grade are Exam (E) and Project (P). Thus, the formula for the final grade of this subject is N = 0.5xE + 0.5xP. The 4 credits are obtained only if N≥5, where both E≥5 and P≥5.			

Date of filling in:		**Title Surname Name**	**Signature**
11.11.2021	Lecturer	Lect.phd.eng. Octavian Pop	
		Lect.phd.eng. Roxana MARE	
	Teachers in charge of application	Lect.phd.eng. Roxana MARE	
		Lect.phd.eng. Octavian Pop	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.prof.phd.eng. Carmen MÂRZA
Date of approval in the Council of Faculty of Building Services Engineering 19.11.2021	Dean Assoc.prof. phd. eng. Florin DOMNIȚA

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	11.00

2. Data about the subject

2.1	Subject name			Energy Analysis of a Building / City			
2.2	Course responsible/lecturer			Lecturer Dr. Eng. Andrei CECLAN			
2.3	Teachers in charge of seminars			Lecturer Dr. Eng. Andrei CECLAN			
2.4 Year of study	II	2.5 Semester	I	2.6 Assessment		Exam	
2.7 Subject category	Formative category					DS	
	Optionality					DI	

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	10
(b) Supplementary study in the library, online and in the field	10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	18
(d) Tutoring	6
(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	General knowledge related to energy, electrotechnics, thermo-technics, civil engineering and renewable energy sources.
4.2	Competence	Electrical, gas, thermal, water and water sewage installations.

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with blackboard and Video Projector - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

5.2	For the applications project	Classroom equipped with blackboard and Video Projector - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform. On site visits within the city.

6. Specific competences

Professional competences	The ability to use specific energy analytics instrumentation and to manage on both energy use and generation at buildings level and local regenerative communities level, on different energy users and energy carriers. The ability to elaborate energy efficiency action plans and programs, energy management actions to be put in practice at buildings, utilities infrastructure and local communities level. The ability to calculate energy consumptions in buildings for different facilities and energy productions for renewable sources.
Cross competences	The ability to have an enhanced understanding of the energy impact on the local public utility services, buildings and their interaction in the regenerative cities. The ability to identify and foster opportunities and detail energy efficiency and energy management solutions. Competences of synthesis and integration of contents from various engineering disciplines, through a holistic approach to the energy of buildings, from an energy perspective.

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

7.1	General objective	Evidenced based knowledge transfer and case study-based experiences regarding the energy management in both (non) regenerative cities, to empower the participants to act as local Energy Auditors. Prepare participants with skills similar to those of certified Energy Auditors and certified Energy Managers.
7.2	Specific objectives	Integrative knowledge of the local energy generation and use in the regenerative cities. Knowledge of the legislation and authorities involved in the energy management in local communities, respectively of the role of energy audit and of energy management for local communities. The ability to effectively use energy management tools and implement energy efficiency solutions. Financing, energy performance contracting.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Course 1. Analysis of energy need and real consumption in buildings for heating and for domestic hot water	2	Debates on available for the student's materials and contents. Sessions of	
Course 2. Analysis of energy need and real consumption in buildings for cooling and for mechanical ventilation	2		
Course 3. Analysis of energy production / consumption in buildings provided by solar collectors – thermal and	2		

electricity – heat pumps, combined heat and power units, wind-mills		questions and answers. Case studies presentations. Use of online interactive instruments – mentimeter – use of power point presentations and board writing Practical examples of energy analytics tools.	
Course 4. Site surveys in energy evaluation of buildings for deep renovation purposes – procedures, steps, instrumentation, case studies and examples	2		
Course 5. Preparation of an energy efficiency action plan for the deep renovation of a building – life cycle cost-benefit assessment, energy savings, cost savings, emissions reduction	2		
Course 6. Technical (energy) and financial due diligence evaluation for buildings for financing purposes, buildings acquisition and energy performance implementation projects	2		
Course 7. Digitalized and distributed energy services for buildings and their interaction with the utilities and mobility – research and innovation demo pilots presentation from several implemented Horizon 2020 projects.	2		
Bibliography • Guide to Energy Management, Eighth Edition 8th Edition, Barney L. Capehart, Wayne C. Turner, William J. Kennedy, The Fairmont Press, USA, 2016. • Energy Management Handbook, Wayne C. Turner and Steve Doty (Editors), The Fairmont Press, USA 2006. • Total Energy Management Handbook, Kazuhiko Yoshida (Editor), Energy Conservation Center Japan, 2005. • Energy Management in Buildings, Keith Moss, Taylor & Francis, 2006. • Building Energy Management Systems, Geoff Levermore, Taylor and Francis 2000. • Managing Indoor Environments and Energy in Buildings with Integrated, Triantafyllia Nikolaou, Dionysia Kolokotsa, George Stavrakakis, Apostolos Apostolou, Corneliu Munteanu, Springer, 2015. Managementul energiei electrice. Aplicații, Andrei C. Cziker, Mircea Chindriș, Casa Cărții de Știință, Cluj-Napoca, 2004.			
8.2. Project	Number of hours	Teaching methods	Notes
Lab 1 Calculation of energy consumption for heating and for domestic hot water in a residential building	2	Debates on available for the student's materials and contents. Sessions of questions and answers. Case studies presentations. Use of online interactive instruments – mentimeter – use of power point	
Lab 2 Calculation of energy consumption for cooling and for mechanical ventilation in an office building	2		
Lab 3 Calculation of energy production for domestic hot water consumption using solar collectors	2		
Lab 4 Instrumentation for site surveys and energy measurements and indoor comfort parameters evaluation in buildings	2		
Lab 5 Description, design and calculation of different energy efficiency and renewable energy sources solutions in buildings	2		

Lab 6 Energy analytics for life cycle cost-benefit assessments for energy savings, cost savings, emissions reduction	2	presentations and board writing Practical examples of energy analytics tools.	
Lab 7 Results integration in the project, using all the previous tools and programs	2		

Bibliography

- Guide to Energy Management, Eighth Edition 8th Edition, Barney L. Capehart, Wayne C. Turner, William J. Kennedy, The Fairmont Press, USA, 2016.
- Energy Management Handbook, Wayne C. Turner and Steve Doty (Editors), The Fairmont Press, USA 2006.
- Total Energy Management Handbook, Kazuhiko Yoshida (Editor), Energy Conservation Center Japan, 2005.
- Energy Management in Buildings, Keith Moss, Taylor & Francis, 2006.
- Building Energy Management Systems, Geoff Levermore, Taylor and Francis 2000.
- Managing Indoor Environments and Energy in Buildings with Integrated, Triantafyllia Nikolaou, Dionysia Kolokotsa, George Stavrakakis, Apostolos Apostolou, Corneliu Munteanu, Springer, 2015.

Managementul energiei electrice. Aplicații, Andrei C. Cziker, Mircea Chindriș, Casa Cărții de Știință, Cluj-Napoca, 2004.

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

The preparation and periodical update of the course will take into account the existent curricula at international level, the consultation of relevant professional associations and authorities, the legal frame evolution and national and international implemented projects in energy, energy efficiency and energy audit and management in local communities.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Oral and written evaluation	Individual interviews and quiz	40%
10.5 Seminars /Laboratory/Project	Laboratory evaluation	Written test	60%
10.6 Minimum standard of performance			
Participation at the courses – minimum 80% of the available time and full presence in the laboratory meetings as conditions to enter to the exam. Evaluation grade (G); Course (C); Laboratory (L); Calculation formula of the grade $G = 0.4 \times C + 0.6 \times L$ Condition for obtaining credits: $G > 5.0$; where $C > 5.0$, $L > 5.0$.			

Date of filling in:		**Title Surname Name**	**Signature**
14.10.2021	Lecturer	Lecturer Dr. Eng. Andrei CECLAN	
	Teachers in charge of application	Lecturer Dr. Eng. Andrei CECLAN	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	12.00

2. Data about the subject

2.1	Subject name			Life Cycle Analysis		
2.2	Course responsible/lecturer			Assoc. Prof. PhD. Eng. Dana - Adriana ILUŢIU - VARVARA Adresa de email: *dana.adriana.varvara@insta.utcluj.ro*		
2.3	Teachers in charge of projects			Assoc. Prof. PhD. Eng. Dana - Adriana ILUŢIU - VARVARA Adresa de email: *dana.adriana.varvara@insta.utcluj.ro*		
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment		Colloquy
2.7 Subject category	Formative category					DS
	Optionality					DI

3. Estimated total time

3.1 Number of hours per week	3	of which	3.2 Course	2	3.3 Seminar	0	3.3 Laboratory	0	3.3 Project	1
3.4 Total hours in the curriculum	42	of which	3.5 Course	28	3.6 Seminar	0	3.6 Laboratory	0	3.6 Project	14

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	30
(b) Supplementary study in the library, online and in the field	8
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	18
(d) Tutoring	-
(e) Exams and tests	2
(f) Other activities	-

3.8 Total hours of individual study (sum (3.7(a)...3.7(f)))	58
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	-
4.2	Competence	Defining the fundamental concepts necessary for the application of environmental scientific theories and methodology.

5. Requirements (where appropriate)

5.1	For the course	21 December Boulevard, No.128-130, Cluj-Napoca (onsite) /

		Microsoft Teams (online)
5.2	For the applications Seminar / laboratory / project	21 December Boulevard, No.128-130, Cluj-Napoca (onsite) / Microsoft Teams (online)

6. Specific competences

Professional competences	Knowledge of environmental legislation on life cycle analysis. Knowledge of the provisions of the standards: ISO 14040 - Principles and framework; ISO 14041 - Definition of purpose, scope and inventory analysis; 14042 - Life cycle impact assessment; 14043 - Interpretation of the life cycle. Knowledge and interpretation of stages in life cycle analysis. Knowledge of methods analysis for product life cycle analysis. Knowledge of methods and tools for assessing the environmental impact of the life cycle of products. Knowledge and selection of impact categories (depletion of natural resources, greenhouse effect, ozone layer degradation, acidification, eutrophication, toxicological potential, land cover with wastes etc.) Analysis of the product from an environmental perspective using impact categories and category indicators related to the interpretation and quantification of input and output data for a system, product, in assessing the impact of the life cycle. Interpretation and application of information resulting from life cycle assessment in real situations. Identifying and specifying information related to the best available technologies in the field. Analysis of technological processes and projects in order to reduce the negative impact on the environment. Carrying out an individual study on the life cycle analysis of a product.
Cross competences	Ability to support, with scientific arguments, a point of view by assuming responsibilities for decisions made and related risks. Participation in one's own professional and scientific development. Improving one's own scientific and technical potential. Updating professional knowledge for continuous development.

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

7.1	General objective	Knowledge and deepening of the fundamental principles regarding the analysis of the life cycle of the products, in order to minimize the negative impact on the environment.
7.2	Specific objectives	Developing of skills regarding the elaboration of an individual study, regarding the analysis of the life cycle of a product. Applying the methods of environmental impact assessment of the set of activities associated with a product / process / technological flow, starting from the generation of raw materials and auxiliary materials until its final disappearance. Developing practical skills and creating the necessary skills for making decisions on the development of new products and technologies with minimal impact on the environment.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Presentation of the lecture content. Lecture objectives. Introductory notions. Standards in the field of life cycle analysis.	2	Microsoft Teams platform (online)/ onsite. Exposure; Lecture; Explanation; Exemplification; Conversation; Problematization; Observation; Video projector (.ppt presentations).	
2. Environmental pollution and protection. The impact of anthropogenic activities on the environment. The material and energy balances.	2		
3. Environmental balance. Defining the notion of environmental balance. Types of environmental balances.	2		
4. The concept of sustainable development. The importance of product life cycle analysis to ensure the sustainable development of society.	2		
5. Life cycle analysis. Defining. Components of life cycle analysis. The importance of life cycle analysis to reduce the negative impact on the environment. The importance of life cycle analysis in the context of sustainable development.	4		
6. Product life cycle analysis. Methods of product life cycle analysis. Methods for assessing the environmental impact of the life cycle of products. Stages of product life cycle impact assessment - detailed approach.	4		
7. The end-of-life cycle stage. The pyramid of the end of the life cycle. Waste storage. Energy recovery. Recycling. Restoration / repair. Reuse. Valorization.	4		
8. Life cycle analysis as a method of waste minimization. Industrial waste management. Reuse, recycling and valorization of the wastes.	4		
9. Carbon footprint. Calculation of carbon emissions, specific to the product life cycle stages. Strategies to reduce greenhouse gas emissions.	2		
10. The BAT (Best Available Technology) concept.	2		

Bibliography

1. Curran, M. A. - “Life Cycle Assessment Student Handbook”. Wiley, 2015.
2. Curran, M. A. – “Life Cycle Assessment Handbook: A Guide for Environmentally Sustainable Products”. Wiley-Scrivener, 2012.
3. Guinée, J. B. – “Handbook on life cycle assessment operational guide to the ISO standards. The international journal of life cycle assessment”. 7(5), 2002, 311-313.
4. Hester, E., Harrison, M. “Environmental impact of solid waste management”. RSC, UK, 2002.
5. Horne, R., Grant, T., Verghese, K. - “Life cycle assessment: Principles, practice, and prospects”. Csiro Publishing, 2009.

6. Klöpffer, W. – "Life cycle assessment". Environmental Science and Pollution Research, 4(4), 223-228, 1997.
7. Salvato, J., Nemerow, N. L. , Agardy, F.J. - "Environmental Engineering". J. Wiley & Sons 2003.
8. Tchnobanoglous G., Theisen, H., Eliassen, R. – "Solid Wastes - Engineering principles and management issues". McGraw – Hill Book Company, 1977, USA .
9. Handbook of Clean Energy Systems, Jinyue Yan (Editor), Publisher: Wiley, 2015.
10. Life Cycle Assessment: Principles and Practice, EPA/600/R-06/060, 2006.
11. Life Cycle Engineering Guidelines, EPA Guidelines, 2001.
12. Environmetal Engineers Handbook, CRC Press, 1999.
13. ***ISO 14040:2007 -A standard on principles and framework.
14. ***ISO 14041-A standard on goal and scope definition and inventory analysis.
15. *** ISO 14042-A standard on life-cycle impact assessment.
16. ***ISO 14043-A standard on life-cycle interpretation.

Journals:

1. International Journal of Lifecycle Assessment;
2. Journal of Industrial Ecology;
3. Environmental Science and Technology;
4. Environmental Science and Pollution Research;
5. Journal of Cleaner Production;
6. Sustainability;
7. Journal of Environmental Management;
8. Environmental Engineering and Management Journal;
9. Polish Journal of Environmental Studies;
10. Ecological Economics;
11. Energy etc.

8.2. Project	Number of hours	Teaching methods	Notes
1. Presentation of the case study requirements. Data on the case study.	2	Microsoft Teams platform (online) / onsite. Exposure; Exemplification; Case Study; Problematization; Brainstorming; Interactive discussions.	
2. Carrying out an individual case study on the life cycle analysis of a product. The case study must contain: all stages related to the life cycle of the studied product (2.1; 2.2; 2.3; 2.4; 2.5; 2.6; 2.7). 2.1. Inventory of inputs and outputs of a system.	2		
3. 2.2. Analysis on the impact of the life cycle of the studied product on environmental factors.	2		
2.3. The effects generated on human health. 4. 2.4. Interpretation of the obtained results.	2		
2.5. Proposals to reduce the negative impact on environmental factors. 5. 2.6. Solutions for recycling, reuse and valorisation of wastes.	2		
6. 2.7. Proposals on the BAT concept.	2		
7. Oral presentation of the case study.	2		

Bibliography

1. Navajas, A., Uriarte, L., Gandía, L.M., 2017, Application of Eco-Design and Life Cycle Assessment Standards for Environmental Impact Reduction of an Industrial Product, Sustainability, 9, 1724, doi:10.3390/su9101724.

2. ***ISO 14040:2007 -A standard on principles and framework.
3. ***ISO 14041-A standard on goal and scope definition and inventory analysis.
4. *** ISO 14042-A standard on life-cycle impact assessment.
5. ***ISO 14043-A standard on life-cycle interpretation.

Journals:

1. International Journal of Lifecycle Assessment;
2. Journal of Industrial Ecology;
3. Environmental Science and Technology;
4. Environmental Science and Pollution Research;
5. Journal of Cleaner Production;
6. Sustainability;
7. Journal of Environmental Management;
8. Environmental Engineering and Management Journal;
9. Polish Journal of Environmental Studies;
10. Ecological Economics;
11. Energy etc.

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

The content of the discipline is in accordance with the expectations of the representatives of the epistemic community, professional associations and employers in the field of "Civil and Building Services Engineering", through the complexity of the treated issue, referring to the life cycle analysis. The content of the course is compatible with that of similar disciplines taught at prestigious universities in the country and abroad.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The colloquium consists in verifying the theoretical knowledge.	Oral valuation. Onsite / online (Microsoft Teams Platform).	60 %
10.5 Project	Oral presentation of the case study.	Oral presentation of the case study. Onsite / online (Microsoft Teams Platform).	40 %
10.6 Minimum standard of performance Individual development of a complex topic. Learning specialized terminology. The realization and oral presentation of the case study, conditions the participation in the colloquium. To promote the discipline are necessary: Project Note $\geq$ 5; Colloquium Note $\geq$ 5.			

Date of filling in:		Title Surname Name	Signature
28.10.2021	Lecturer	Assoc. Prof. PhD. Eng. Dana - Adriana ILUŢIU - VARVARA	
	Teachers in charge of application	Assoc. Prof. PhD. Eng. Dana - Adriana ILUŢIU - VARVARA	

Date of approval in the Department of Building Services Engineering 18.11.2021	**Head of Department of Building Services Engineering,** Assoc. Prof. PhD. Eng. Carmen Maria MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	**Dean,** Assoc. Prof. PhD. Eng. Florin Vasile DOMNIŢA

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	6.00

2. Data about the subject

2.1	Subject name			Ethics and academic integrity			
2.2	Course responsible/lecturer			Assoc.Prof.PhD.Eng. Ligia MOGA - ligia.moga@ccm.utcluj.ro			
2.3	Teachers in charge of seminars						
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment	Colloquy		
2.7 Subject category	Formative category						DC
	Optional						DI

3. Estimated total time

3.1 Number of hours per week	1	of which	3.2 Course	1	3.3 Seminar		3.3 Laboratory		3.3 Project		
3.4 Total hours in the curriculum	14	of which	3.5 Course	14	3.6 Seminar		3.6 Laboratory		3.6 Project		
3.7 Individual study:											
(a) Manual, lecture material and notes, bibliography											-
(b) Supplementary study in the library, online and in the field											14
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays											6
(d) Tutoring											10
(e) Exams and tests											6
(f) Other activities											-

3.8 Total hours of individual study (sum (3.7(a)...3.7(f)))	36
3.9 Total hours per semester (3.4+3.8)	50
3.10 Number of credit points	2

4. Pre-requisites (where appropriate)

4.1	Curriculum	Not necessary
4.2	Competence	Not necessary

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 128-130 Compulsory attendance at half plus one of the courses
5.2	For the applications	Not necessary

6. Specific competences

Professional competences	Identifying concepts: academic ethics, academic integrity. Identification of the concept of intellectual property: copyright, patent, trademark. Identifying and knowing the legislation in the field of ethics and academic integrity. Acquiring behaviours in close correlation with what is defined in the legislation of ethics and academic integrity. Use of research data according to standards of ethics and professional integrity. (e.g. correct citation of studied works,…) - Correct use of online document platforms (e.g. scribd platform), platforms that usually share content created by another author.
Cross competences	The ability to analyse interpersonal situations applying the principles of ethics and professional integrity. Adapting a correct professional conduct in terms of professional ethics and integrity. The ability to appreciate the originality of ideas or actions in the professional sphere. The ability to appreciate the personality of a colleague in terms of professional ethics and integrity.

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

7.1	General objective	Learning the concept of ethics and academic integrity and applying the notions received in the current activity.
7.2	Specific objectives	Understanding general issues: copyright, plagiarism, fabrication and falsification of data in academic research. Discussions about the different policies and results of the integrity issues of teachers and students Discussions and debates for different types of disciplines, at different levels. Understanding aspects related to the integrity of research at the graduate level for both teachers and students. Discussions and debates related to the ramifications of the research integrity issue in academic research. Acquiring the capacity to integrate in a team respecting the principles of ethics and academic integrity.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction to ethics and academic integrity. The importance of academic integrity in academia	2	Presentation, discussions, case studies, teamwork; Alternatively ONLINE on UTCN's TEAMS platform	Video-Project or
2. Academic rights and responsibilities of students. Student integrity. Case studies.	2		
3. Intellectual property: copyright, patent, trademark. Case studies	2		
4. Ethical conduct in research. Manufacture and falsification of research data. Case studies.	2		

5. Acquisition of the intellectual property rights of another author. (e.g. plagiarism). Case studies.	2		
6. The importance of original research in the elaboration of the dissertation. Case studies.	2		
7. Student grading. Analysis of the ethics and academic integrity of some texts (ie case studies) evaluated by students.	2		

Bibliography

Barrass, R., Students must write: A guide to better writing in coursework and examination., 2005.
Lipson, C. Doing honest work in college: How to prepare citations, avoid plagiarism, and achieve real academic success (2nd ed.). Chicago: University of Chicago Press, 2008.
Nelville, C. The complete guide to referencing and avoiding plagiarism. Maidenhead: Open University Press, 2007.
W Sutherland-Smith, Plagiarism, the Internet, and student learning: Improving academic integrity, Routledge New York, 2008.
PJ Boehm, M Justice, S Weeks, Promoting academic integrity in higher education, The Community College, 2009 available at http://schoolcraft.edu/pdfs/cce/15.1.45-61.pdf
https://owl.purdue.edu/owl/english_as_a_second_language/esl_students/plagiarism_and_esl_writers.html
https://www.insidehighered.com/digital-learning/views/2018/02/14/creative-cheating-online-learning-and-importance-academic
https://integrity.mit.edu/
Academic Integrity at the Massachusetts Institute of Technology: A Handbook for Students available at https://handbook.mit.edu/academic
Academic Misconduct available at https://studentlife.mit.edu/osc/faculty/academic-misconduct
Ethics and Integrity available at http://meche.mit.edu/ethics

8.2. Laboratory	Number of hours	Teaching methods	Notes

Bibliography

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

The content of the discipline is correlated with the need identified both academically and on the labor market, respectively for the training of adults who are able to apply and respect professional ethics and integrity in the current activity.
The student acquires skills of analysis and critical thinking necessary to appreciate the actions and activities with relevant value.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The colloquium will include the elaboration of some works during the semester	Works on the subject of the discipline	100%
10.5 Laboratory			
10.6 Minimum standard of performance			

Eligibility condition for the exam: attendance at least 3 courses.

Theory note (T): min. 5 (five)

C = [0.85 * (T) + 0.15 * (Course Interaction)]

Promotion / obtaining condition: C ≥ 5.

OBS: When establishing the final grade, the student's involvement during the semester will also be considered: participation in debates, frequency

Date of filling in:		**Title Surname Name**	**Signature**
01.11.2021	Lecturer	Assoc.prof.PhD.Eng. Ligia MOGA	
	Teachers in charge of application		

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	14.00

2. Data about the subject

2.1	Subject name			Professional practice 2		
2.2	Course responsible/lecturer			-		
2.3	Teachers in charge with professional practice			Lect.Eng.PhD. Octavian POP – octavian.pop@insta.utcluj.ro		
2.4 Year of study	I	2.5 Semester	II	2.6 Assessment		Verification
2.7 Subject category	Formative category					DS
	Optional					DI

3. Estimated total time

3.1 Number of hours per week	14	of which	3.2 Course		3.3 Seminar		3.3 Laboratory		3.3 Project	13
3.4 Total hours in the curriculum	196	of which	3.5 Course		3.6 Seminar		3.6 Laboratory		3.6 Project	182

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	11
(d) Tutoring	-
(e) Exams and tests	2
(f) Other activities	-

3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	43
3.9 Total hours per semester (3.4+3.8)	225
3.10 Number of credit points	9

4. Pre-requisites (where appropriate)

4.1	Curriculum	Bachelor's degree in one of the following fields: - building services engineering; - civil engineering; - architecture; - other related specializations.
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the development of professional practice	

6. Specific competences

Professional competences	Theoretical knowledge: • Disciplines taught in the second semester within the master's program. Acquired skills: • To deepen the knowledge taught through design topics specific to the course disciplines. Skills acquired: • Development of skills in the field of design and execution. • Development of skills regarding the preparation of reports specific to the field.
Cross competences	The students will be able to: • make decisions and take responsibility for their own decisions and actions by adapting to new situations; • have leadership skills on complex projects; • demonstrate a creative and enterprising spirit in solving complex problems.

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

7.1	General objective	✓ To evaluate the functional and energy efficiency of the installation systems and to design solutions for their rehabilitation and technological modernization; ✓ To synthesize, explain and transmit information on the composition and operation of installation systems
7.2	Specific objectives	• To compile programs for investigating the operating conditions and evaluating the efficiency of different categories of installations • To analyze and evaluate the functional parameters and performance indicators of equipment and installation systems in the given operating conditions • To identify the technical non-conformities and the needs of functional and energetic rehabilitation / modernization • To select and propose intervention measures for the energy efficiency of the different categories of installations • To draw up the technical-economic documentation specific to the functional and energetic evaluation • Analyze and synthesize existing information on installation systems; • To elaborate documentary and formative materials regarding the composition and calculation of the installation systems; • To know the recent technical-scientific achievements and the national and international tendencies for the development of the field.

8. Contents

8.1. Theme area	Number of hours	Teaching methods	Notes

Building and City Assessment			
Indoor Environment Quality and Well-being			
Building Services Retrofit Solutions			
Energy Analysis of a Building / City			
Lifecycle Analysis			
Obs: Students will be divided into groups and will address a topic of their choice from those proposed by teachers or companies with which there are internship agreements. The themes will be focused on the realization of projects and on the analysis of the chosen solutions.			
8.2. Applications	Number of hours	Teaching methods	Notes
Presentation of the design / practice theme for each student	38	Exposure, applications	
Calculation method used at national level	38		
Implementation of the calculation methodology	38		
Case study based on calculation methods used at national level	66		
Deliver and present the elaborated project	2		
Bibliography 1. Course notes related to the disciplines studied in the second semesters of the master's cycle. 2. Bibliographic sources specific to the project / practice topic. 3. Legislation specific to each topic.			

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

The gained knowledge will be necessary for employees that will work in building services engineering design and execution.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	-		
10.5 Applications	Verification (grade C); Knowledge in the calculation methodology when carrying out the project (grade A).	The verification consists in evaluating the knowledge resulting from the design (2 hours).	80% project 20% verification
10.6 Minimum standard of performance			
Grade components: Verification (C); Knowledge in the calculation methodology (A). G= 0.2 C +0.8 A Condition for obtaining the credits: G≥ 5; C≥ 5; A≥ 5			

Date of filling in:		Title Surname Name	Signature
15.11.2021	Lecturer		
	Teachers in charge of application	Lect.PhD.Eng Octavian Pop	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	15.00

2. Data about the subject

2.1	Subject name				Urban Network Management			
2.2	Course responsible/lecturer				*Assoc.Prof. PhD.Eng. Ciprian BACOŢIU - ciprian.bacotiu@insta.utcluj.ro* *Assoc.Prof. PhD.Eng. Ancuţa ABRUDAN- ancuta.abrudan@insta.utcluj.ro*			
2.3	Teachers in charge of seminars				*Senior Lecturer PhD.Eng. Cristina IACOB - cristina.iacob@insta.utcluj.ro*			
2.4 Year of study		2	2.5 Semester	1	2.6 Assessment	Exam		
2.7 Subject category	Formative category							DA
	Optionality status							DI

3. Estimated total time

3.1 Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar		3.3 Laboratory	2	3.3 Project	
3.4 Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar		3.6 Laboratory	28	3.6 Project	
3.7 Individual study:										
(a) Manual, lecture material and notes, bibliography										28
(b) Supplementary study in the library, online and in the field										19
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										20
(d) Tutoring										-
(e) Exams and tests										2
(f) Other activities										-
3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))										69
3.9 Total hours per semester (3.4+3.8)										125
3.10 Number of credit points										5

4. Pre-requisites (where appropriate)

4.1	Curriculum	B.Sc. Engineering Diploma
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	128-130, 21 Decembrie 1989 Blvd., Auditorium A1, Cluj-Napoca
5.2	For the applications Laboratory	128-130, 21 Decembrie 1989 Blvd., CAD Lab, Cluj-Napoca

6. Specific competences

Professional competences	Theoretical knowledge about: - GIS paradigm; - Urban water distribution networks; - Urban sewerage networks; - Urban district heating systems; - Multicriteria decision-making methods. Acquired skills: - To implement and use GIS tools for urban networks underground infrastructure; - To collect, store, monitorize and use information in a GIS environment; - To make decisions using multicriteria analysis; - To propose solutions of improvement of the district heating systems.
Cross competences	To demonstrate a creative and enterprising spirit in complex problem solving.

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

7.1	General objective	A comprehensive understanding of the urban underground infrastructure (water distribution systems, sewerage networks, district heating systems) using modern tools and paradigms (GIS, multicriteria analysis).
7.2	Specific objectives	Understanding the graphical representation of building services design layouts and schematics. Evaluating the results obtained by using specific CAD/GIS models/softwares for building services engineering domain. Selecting appropriate materials and technologies with respect to the particular conditions regarding the structure and positioning of different building services systems. Identifying specific technical regulations for district heating networks, water supply and sewerage systems. Adapting the calculation methods to the characteristics of building services systems and components: district heating networks, water supply and sewerage systems.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes

1. Overview of the course	2	Interactive teaching methods; Multimedia presentation	Video-projector
2. Urban Water Distribution Networks	2		
3. Urban Sewerage Networks	2		
4. Overview of GIS: Definitions, components	2		
5. GIS Applications for Urban Management and Development	2		
6. Data Analysis, Spatial Queries and Basic Spatial Analysis	2		
7. Multicriteria Decision-Making Basics	2		
8. Management of urban thermal networks - generalities	2		
9. Thermal network systems: classification, pipes, connecting elements, mobile and fixed supports, expansion compensators	2		
10. External structure of central heating systems	2		
11. Hydraulic calculation of thermal networks: hydraulic calculation of hot water networks, piezometric graph of hot water networks	2		
12. Thermal calculation of district heating networks: heat loss calculation	2		
13. Calculation of temperature drop: checking the temperature at the outer surface of the thermal insulation, calculation of the optimal thickness of the thermal insulation layer	2		
14. Mechanical calculation of thermal networks: general considerations, calculation of pipe wall thickness, calculation of the distance between mobile and fixed supports, calculation of naturally elastic configurations. The case of pre-insulated pipes.	2		

Bibliography

1. Nyerges Timothy L., Jankowski P. - *Regional and Urban GIS: A Decision Support Approach*. New York: Guilford Press, 2010.
2. Maantay J., Ziegler J. - *GIS for the Urban Environment*, ESRI Press, Redlands (CA), USA, 2006.
3. Shamsi U.M. - *GIS applications for water, wastewater, and stormwater systems*. CRC Press, Boca Raton (FL), USA, 2005.
4. Grigg N.S. - *Water, Wastewater, and Stormwater Infrastructure Management*, CRC Press, Boca Raton (FL), USA, 2012.
5. Ishizaka A., Nemery P. - *Multi-criteria decision analysis: methods and software*. Wiley, Chichester, UK, 2013.
6. District heating application handbook - www.districtenergy.danfoss.com
7. INTERNATIONAL ENERGY AGENCY - IEA DISTRICT HEATING AND COOLING; Programme of Research, Development and Demonstration on District Heating and Cooling
8. Handbook on Planning of District Heating Networks - www.energieschweiz.ch

8.2. Laboratory	Number of hours	Teaching methods	Notes
1. QGIS Interface. Creating layers.	2		

2. Creating basic maps. Vectors. Symbology.	2	Interactive teaching methods	Video-projector
3. Attributes. Labels. Creating vectors and vector analysis. Raster data.	2		
4. Database concepts. SQL. Spatial databases in QGIS.	2		
5. Calculation of water losses according to IWA methodology and water loss management programs in urban networks.	2		
6. Analysis of urban water distribution networks using a hydraulic modeling program.	2		
7. Analysis of water quality in urban networks using a hydraulic modeling program.	2		
8. Multi-criteria analysis - methods and software.	2		
9. Multi-criteria analysis - methods and software.	2		
10. Applications to the hydraulic calculation of thermal networks: the hydraulic calculation of hot water networks.	2		
11. Applications to the thermal calculation of thermal networks: calculation of heat losses.	2		
12. Applications to the calculation of the temperature drop: checking the temperature at the outer surface of the thermal insulation, calculating the optimal thickness of the thermal insulation layer.	2		
13. Applications to the mechanical calculation of thermal networks: calculation of pipe wall thickness, calculation of distance between movable and fixed supports, calculation of naturally elastic configurations.	2		
14. Evaluation of practical work.	2		

Bibliography

1. QGIS Training Manual https://docs.qgis.org/2.14/en/docs/training_manual/
2. Green, D. Bossomaier, T. - *Online GIS and Spatial metadata*, Taylor and Francis, New York,London, 2000
3. Nyerges Timothy L., Jankowski P. - *Regional and Urban GIS: A Decision Support Approach*. New York: Guilford Press, 2010.
4. Maantay J., Ziegler J. - *GIS for the Urban Environment*, ESRI Press, Redlands (CA), USA, 2006.
5. Shamsi U.M. - *GIS applications for water, wastewater, and stormwater systems*. CRC Press, Boca Raton (FL), USA, 2005.
6. Ishizaka A., Nemery P. - *Multi-criteria decision analysis: methods and software*. Wiley, Chichester, UK, 2013.
7. Handbook on Planning of District Heating Networks - www.energieschweiz.ch

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

Acquired competences will be necessary to the employees working in the field of urban water and sewerage networks design and execution, district heating systems design and execution, and urban planning.

4. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Evaluation will be based on: - quizzes; - questions	Written exam (2 hours)	50%
10.5 Laboratory	In order to be accepted to the exam, students must properly finalize their laboratory activity (submitting in time their work and presenting it)	Evaluation along the semester	50%
10.6 Minimum standard of performance			
Getting grade 5 for both theory and applications. Final grade is obtained from the following formula: $N = 0.5 \bullet T + 0.5 \bullet A$ applicable only if: $T \geq 5$ and $A \geq 5$. Grade components: Theory (T); Applications (A)			

Date of filling in:		**Title Surname Name**	**Signature**
10.10.2021	Lecturer	Assoc.Prof. PhD.Eng. Ciprian BACOŢIU (7 weeks) Assoc.Prof. PhD.Eng. Ancuţa ABRUDAN (7 weeks)	
	Teachers in charge of application	Senior Lecturer PhD.Eng. Cristina IACOB	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	16.00

2. Data about the subject

2.1	Subject name			Energy Management Tools and Programs for Regenerative Cities			
2.2	Course responsible/lecturer			Prof. Dr. Eng. Math. Dan D. MICU			
2.3	Teachers in charge of seminars			Lecturer Dr. Eng. Andrei CECLAN			
2.4 Year of study	II	2.5 Semester	I	2.6 Assessment		C	
2.7 Subject category						DS	
						DI	

3. Estimated total time

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

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	10
(b) Supplementary study in the library, online and in the field	10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	18
(d) Tutoring	6
(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	General knowledge related to energy, electrotechnics, thermo-technics, buildings and renewable energy sources.
4.2	Competence	Electrical, gas, thermal, water and water sewage installations.

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with blackboard and Video Projector - 21 December 1989 Blvd., no. 128-130

		Alternatively, ONLINE on UTCN's TEAMS platform.
5.2	For the applications project	Classroom equipped with blackboard and Video Projector - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform. On site visits within the city.

6. Specific competences

Professional competences	The ability to use specific energy analytics instrumentation and to manage on both energy use and generation at buildings level and local regenerative communities level, on different energy users and energy carriers. The ability to elaborate energy efficiency action plans and programs, energy management actions to be put in practice at buildings, utilities infrastructure and local communities level.
Cross competences	The ability to have an enhanced understanding of the energy impact on the local public utility services, buildings and their interaction in the regenerative cities. The ability to identify and foster opportunities and detail energy efficiency and energy management solutions.

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

7.1	General objective	Evidenced based knowledge transfer and case study-based experiences regarding the energy management in both (non) regenerative cities, to empower the participants to act as local Energy Managers.
7.2	Specific objectives	Integrative knowledge of the local energy generation and use in the regenerative cities. Knowledge of the legislation and authorities involved in the energy management in local communities. The ability to effectively use energy management tools and implement energy efficiency solutions. Financing, energy performance contracting and ESCO mechanisms.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Course 1 **Introduction** **1. The actual local energy context of the cities** 1.1. Built environment – energy use 1.2. Local counties capitals – energy use 1.3. The other cities – energy use 1.4. Villages and counties – energy use 1.5. Public utility infrastructure companies 1.6. Mobility and the energy impact 1.7. Waste collection and energy valorization 1.8. Street lighting – energy impacts	2	Debates on available for the students materials and contents. Sessions of questions and answers. Case studies presentations.	

1.9. Services and industrial sites – energy use 1.10. Energy impact in the local budgets		Use of online interactive instruments – mentimeter – use of power point presentations and board writing Practical examples of energy analytics tools.	
Course 2 **2. Opportunities, responsibility, collaboration, vision** 2.1. Energy cooperation and energy islands 2.2. Paradigm shift in the public utility companies – energy, water and transportation 2.3. Financing schemes and how to access them on energy projects 2.4. Support and regulation authorities – paradigm shift: ANRE, ANRSC, Ministry of Development, State Construction Inspectorate, Sustainable Development Department – Romanian government, Ministry of Economy, Energy and Business Environment 2.5. The energy audit and the effective implementation of the proposed action plan 2.6. The local energy manager role 2.7. The ISO 50001 Energy Management system 2.8. Measurement and verification tools and protocol **3. Legal frame** 3.1. European and national legislation regarding energy 3.2. Strategies, action plans and energy programs 3.3. Design themes and procurement documentation 3.4. Energy performance contracting 3.5. Public-private partnership	2		
Course 3 **4. Instruction, education and behavioral change** 4.1. Guide for the local decision maker in the cities 4.2. Professional uplift of the administrative staff 4.3. Campaigns for instruction, education and behavioral change 4.4. Updates for the professionals 4.5. Maintenance and exploitation **5. Energy poverty approach** 5.1. Energy poverty at the users level 5.2. Energy poverty at the generation and district heating level 5.3. Proposed action plan	2		
Course 4 **6. Technologies for energy efficiency and distributed generation** 6.1. Reduce the energy need first 6.2. Energy efficiency of the processes 6.3. Local distributed generation 6.4. Energy management in both generation and use 6.5. Buildings deep renovation 6.6. Preparation and launch of energy efficiency projects	2		
Course 5 **7. Added value through research, innovation and dissemination** 7.1. Energy infrastructure development 7.2. High energy performance and increased interactive buildings	2		

7.3. Digital distributed energy services			
Course 6 **8. Added value through energy efficiency investments** 8.1. Budgets, budgeting and cost-analysis applied in energy efficiency 8.2. Free money financing schemes in energy efficiency projects 8.3. ESCO investments 8.4. Energy efficiency funds and loans 8.5. Energy coaching in local communities 8.6. Marketing and sale of energy efficiency	2		
Course 7 **9. Transforming through energy the local communities** 9.1. Proposed vision and challenges 9.2. Sustainable local communities 9.3. Multiple core cities and rapid mobility 9.4. Energy cooperation and energy islands – revisited 9.5. Intelligent and high indoor comfort buildings 9.6. Local energy policies and programs	2		

Bibliography

- Guide to Energy Management, Eighth Edition 8th Edition, Barney L. Capehart, Wayne C. Turner, William J. Kennedy, The Fairmont Press, USA, 2016.
- Energy Management Handbook, Wayne C. Turner and Steve Doty (Editors), The Fairmont Press, USA 2006.
- Total Energy Management Handbook, Kazuhiko Yoshida (Editor), Energy Conservation Center Japan, 2005.
- Energy Management in Buildings, Keith Moss, Taylor & Francis, 2006.
- Building Energy Management Systems, Geoff Levermore, Taylor and Francis 2000.
- Managing Indoor Environments and Energy in Buildings with Integrated, Triantafyllia Nikolaou, Dionysia Kolokotsa,George Stavrakakis,Apostolos Apostolou,Corneliu Munteanu, Springer, 2015.

Managementul energiei electrice. Aplicații, Andrei C. Cziker, Mircea Chindriș, Casa Cărții de Știință, Cluj-Napoca, 2004.

8.2. Project	Number of hours	Teaching methods	Notes
Project meeting 1 List of proposed project titles and collection of student proposals Definition of the design themes Local communities energy balance calculation Status on the project preparation.	2	Debates on available for the students materials and contents. Sessions of questions and answers. Case studies presentations. Use of online interactive instruments – mentimeter – use of power point	
Project meeting 2 Apply monitoring and targeting (M&T) tools Status on the project preparation.	2		
Project meeting 3 Apply energy analytics tools Status on the project preparation.	2		
Project meeting 4 Apply measurement and verification (M&V) tools for energy savings Status on the project preparation.	2		

Project meeting 5 Elaboration of an energy efficiency program Status on the project preparation.	2	presentations and board writing Practical examples of energy analytics tools.	
Project meeting 6 Preparation and implementation of an energy management plan Status on the project preparation.			
Project meeting 7 Results integration in the project, using all the previous tools and programs Status on the project preparation.	2		
Bibliography • Guide to Energy Management, Eighth Edition 8th Edition, Barney L. Capehart, Wayne C. Turner, William J. Kennedy, The Fairmont Press, USA, 2016. • Energy Management Handbook, Wayne C. Turner and Steve Doty (Editors), The Fairmont Press, USA 2006. • Total Energy Management Handbook, Kazuhiko Yoshida (Editor), Energy Conservation Center Japan, 2005. • Energy Management in Buildings, Keith Moss, Taylor & Francis, 2006. • Building Energy Management Systems, Geoff Levermore, Taylor and Francis 2000. • Managing Indoor Environments and Energy in Buildings with Integrated, Triantafyllia Nikolaou, Dionysia Kolokotsa,George Stavrakakis,Apostolos Apostolou,Corneliu Munteanu, Springer, 2015. Managementul energiei electrice. Aplicații, Andrei C. Cziker, Mircea Chindriș, Casa Cărții de Știință, Cluj-Napoca, 2004.			

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

The preparation and periodical update of the course will consider the existent curricula at international level, the consultation of relevant professional associations and authorities, the legal frame evolution and national and international implemented projects in energy, energy efficiency and energy management in local communities.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Oral and written evaluation	Individual interviews and quiz	40%
10.5 Seminars /Laboratory/Project	Project evaluation	Team presentation of the achieved projects	60%
10.6 Minimum standard of performance			
Participation at the courses – minimum 80% of the available time and full presence in the project meeting as conditions to enter to the exam. Evaluation grade (G); Course (C); Project (P); Calculation formula of the grade $G = 0.4 \times C + 0.6 \times P$ Condition for obtaining credits: $G > 5.0$; where $C > 5.0$, $P > 5.0$.			

Date of filling in: 01.11.2021		Title Surname Name	Signature
	Lecturer	Prof. Dr. Eng. Math. Dan D. MICU	
	Teachers in charge of application	Lecturer Dr. Eng. Andrei CECLAN	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	of Building Services Engineering
1.3	Department	of Building Services Engineering
1.4	Field of study	Civil and Building Services Engineering
1.5	Cycle of study	Master
1.6	Program of study/Qualification	Building Services for Regenerative Cities
1.7	Form of education	Full time
1.8	Subject code	17.00

2. Data about the subject

2.1	Subject name			Communication Skills			
2.2	Course responsible/lecturer			Assoc.prof.PhD.arch. Șerban ȚIGĂNAȘ dragos.tiganas@arch.utcluj.ro			
2.3	Teachers in charge of seminars			Lect.PhD.Eng Daniel Sorin RUSU daniel.rusu@insta.utcluj.ro			
2.4 Year of study	II	2.5 Semester	I	2.6 Assessment	E	2.7 Subject category	DC/DI

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	24
(b) Supplementary study in the library, online and in the field	7
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	-
(e) Exams and tests	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	Bachelor's in civil engineering, Building Services Engineering, or Architecture and Urbanism
4.2	Competence	Technical and Humanistic Competences

5. Requirements (where appropriate)

5.1	For the course	Microsoft Teams Platform / amphitheatre B-dul 21 December Nr.128-130, Cluj-Napoca
5.2	For the applications	Microsoft Teams Platform / amphitheatre B-dul 21 December Nr.128-130, Cluj-Napoca

6. Specific competences

Professional Competences	- Communication skills for leadership - Communication skills within the team and between - Communication for reporting and management
Cross competence	- Interdisciplinary communication for briefing - Interdisciplinary communication for project development - Adequating the communication to the interlocutor and the phase of the process

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

7.1	General objective	- Understanding the importance of the communication in investment processes, understanding of different types of communication and the adaptation to the context and achieving basic skills for professional communication
7.2	Specific objectives	- Understanding the specific of interdisciplinary - Positioning the building services engineer trough communication - Achieving relevant experiences of communication

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Observations
1. Why is communication important? – an introduction	1	Online Microsoft Teams Platform or Oral presentations and debates	Video-projector
2. Communication types and to whom do we address?	1		
3. Verbal, visual and combined communication – means of communication	1		
4. The content and the support of a communication; technical communication	1		
5. Communication of the essential; adapting the message to the time gap and to the means	1		
6. Verbal, nonverbal and paraverbal communication	1		
7. How to prepare a communication and how to improvise	1		
8. Communicating as a team	1		
9. Templates and innovations; open communication; interaction with the audience	1		
10. Case studies: pro-active communication, discourse, offer, technical proposal, and negotiations	1		
11. Case studies: concluding, retroactive communication, feed-back	1		
12. Didactic communication	1		
13. On-line communication	1		
14. Conclusions and feed-back	1		

Total	14		
bibliography 1. D'Iribarne, P., Chevrier, S., Segal, A. H. J-P and Tréguer-Felten, G. "Interpersonal Communication" in Cross-Cultural Management Revisited. A Qualitative Approach, Oxford University Press, 2020 2. Hopkins, Claude C., Scientific Advertising, Fq Classics, 2007 3. Ju, I. "Marketing Communication,". in R. L. Heath and W. Johansen (Eds.), The International Encyclopedia of Strategic Communication, 2018 4. McKinsey, D., Strategic Storytelling: How to Create Persuasive Business Presentations, Kindle Edition, 2014			
8.2. Applications/Seminars	Number of hours	Teaching methods	Observations
1. Definition, components and communication types. Applications and Examples.	2	Online Microsoft Teams Platform or Oral presentations and debates	Video-Projector, didactic materials
2. Communication in professional areas, distinctions, principals and rules. Applications.	2		
3. Modes and mediums of communication. Applications.	2		
4. Principles of non-violent, assertive communication. Positive and negative feedback offering techniques. Applications.	2		
5. Open communication, speech and presentation. Applications.	2		
6. Digital communication (e-mail, sms, voice and video). Phone call communication. Applications.	2		
7. Overview and practical applications.	2		
Total	14 ore		
Bibliography 1. Ian Tuhovsky, Communication Skills: A Practical Guide to Improving Your Social Intelligence, Presentation, Persuasion and Public Speaking (Master Your Communication and Social Skills), Publisher : CreateSpace Independent Publishing Platform, ISBN-13 : 978-1515031918 2. DK, Effective Communication, Dorling Kindersley Ltd, ISBN 978-024-11-8616-9, 2015 3. Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler Crucial Conversations Tools for Talking When Stakes Are High, ISBN: 978-0-07-177132-0, 2012			

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

The competences accumulated are necessary to activate the graduates in design activities, realization of buildings, consultancy and sales to meet the employers' requirements.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Verification of the knowledge learned as a result of completing the course activities and bibliography	Oral exam	50%
10.5Applications	Knowledge assessment of practical applications	Portfolio	50%
10.6 Minimum standard of performance			

Students must pass the laboratory test to be accepted in the final exam.
Final grade components: Exam (E) and portfolio evaluation (L).
Final grade formula N=0.5xE+0.5xL
Credits obtained only if N≥5 where E≥5 and L≥5.

Date of filling in:		**Title Surname Name**	**Signature**
10.11.2021	Lecturer	Assoc.prof.PhD.Arch. Dragoş Şerban ŢIGĂNAŞ	
	Teachers in charge of application	Lect.PhD.Eng. Daniel RUSU	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	18.00

2. Data about the subject

2.1	Subject name			Renewable Energy Sources		
2.2	Course responsible/lecturer			*Lect.phd.eng. Roxana Mare – roxana.mare@insta.utcluj.ro*		
2.3	Teachers in charge of seminars			*Lect.phd.eng. Georgiana CORSIUC – georgiana.corsiuc@insta.utcluj.ro*		
2.4 Year of study	II	2.5 Semester	I	2.6 Assessment		E
2.7 Subject category						DA
						DI

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	24
(b) Supplementary study in the library, online and in the field	7
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	-
(e) Exams and tests	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	
4.2	Competence	Technical drawings, electrical, thermal, and mechanical engineering

5. Requirements (where appropriate)

5.1	For the course	Microsoft Teams platform/ amphitheater, 21 December 1989 Blvd. Nr.128-130, Cluj-Napoca

5.2	For the applications Laboratory	Microsoft Teams platform/ laboratory room, 21 December 1989 Blvd. Nr.128-130, Cluj-Napoca

6. Specific competences

Professional competences	✓ Identify the types and amount of energy supply necessary in a regenerative building or city, in order to provide the most beneficial, sustainable and cost-effective energy services as regards the renewable energies. ✓ To design renewable energy plants and systems integrated in nZeB buildings and regenerative cities, that match the latest findings regarding the renewable energy sources and leads to improvement, optimisation and modernisation of the building services; all focused on energy sustainability and efficiency. ✓ Designing, analysing and choosing the best solution for building services and systems focused on renewable energy sources with the help of special data programmes and software.
Cross competences	✓ Teamwork – the ability to synthesise and clearly define every team worker's job, ensuring an efficient exchange of information, knowledge and proofing good interpersonal and networking skills. ✓ Use of the IT&C technology. ✓ Adjustment to new technologies, personal and professional development by using specialized documents and software, and electronic resources written in an international language.

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

7.1	General objective	Developing competences in the field of renewable energy sources for nZeB buildings and regenerative cities.
7.2	Specific objectives	✓ Identify the renewable energy sources from the area of interest. ✓ The use of the latest technologies of the renewable energies in building services from regenerative cities after determining the energy demand of buildings and/or city. ✓ Design new building services, optimise and upgrade the existing building services and systems based on renewable energies. ✓ The integration of the building services and systems that use the renewable energies in the architecture of the nZeB buildings and regenerative cities. ✓ The use of theoretical knowledge in practice: dimensioning, analysis and choice of the optimum solution through specific software.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Overview. Renewable energy policy and statistics	1 hour	On line or	Video system
Solar energy – thermal plants	2 hours		

Solar energy – photovoltaic systems	2 hours	Presentation and discussions	
Wind energy	2 hours		
Hydropower	1 hour		
Biomass and biofuels	2 hours		
Geothermal energy	1 hour		
Hydrogen and fuel cells	1 hour		
Hybrid renewable systems for thermal and electrical energies	2 hours		
Total	14 hours		

Bibliography

1. RES LEGAL Europe – Legal Sources on Renewable Energy - https://www.res-legal.eu/home/
2. ***, Renewable Energy Policies in a Time of Transition, April 2018, IRENA
3. https://www.ecohz.com/facts/european-renewable-policy-framework/
4. ***, Renewable Energy Statistics Report, IRENA – International Renewable Energy Agency, 2020
5. ***, Eurostat, Renewable Energy Statistics https://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics
6. Mârza C., Hoțupan A., Moldovan R., Corsiuc G., Surse neconvenționale de energie (Renewable energy sources), Ed. U.T.PRESS Cluj-Napoca, 2013.
7. Boyle, G., Renewable Energy. Power for a Sustainable Future, Third Edition, Oxford University Press, 2012.
8. Shere J., Renewable., St. Martin's Press, 2013
9. Sorensen B., Renewable energy. Its physics, engineering, use, environmental impacts, economy and planning aspects, Third Ed., Elsevier Science, 2004.
10. Yergin D., The New Map. Energy, Climate, and the Clash of Nations, The Penguin Press, 2020

8.2. Laboratory	Number of hours	Teaching methods	Notes
Solar systems for heating and hot water. Domestic hot water and heating demand. Selecting and sizing components.	4	On line or Discussions, case study, team work.	
Determining electricity demand. Selecting components and sizing the solar-photovoltaic system.	4		
Wind power generation system.	2		
Heat pumps for heating and domestic hot water supply.	2		
Evaluation	2		

Bibliography

1. Mârza C., Hoțupan A., Moldovan R., Corsiuc G., Surse neconvenționale de energie (Renewable energy sources), Ed. U.T.PRESS Cluj-Napoca, 2013.
2. Bandoc, G., Degeratu M., Instalaţii şi echipamante pentru utilizarea energiei mecanice nepoluante,Utilizarea energiei vântului, Matrix Rom, Bucureşti, 2007.
3. Boyle, G., Renewable Energy. Power for a Sustainable Future, Third Edition, Oxford University Press, 2012.
4. Degeratu, M., Bandoc G., Instalaţii şi echipamante pentru utilizarea energiei mecanice nepoluante- Utilizarea energiei valurilor, Matrix Rom, Bucureşti, 2007.
5. Fanchi, J. R.: Energy: technology and directions for the future. 2004, Elsevier.

6. ***Gex 13-2015 Ghidul privind utilizarea surselor regenerabile de energie la cladirile noi si existente, Ed. Matrix Rom. Bucuresti, 2016.
7. Lucian Victor, Surse nepoluante de producere a energiei electrice, Editura AGIR, Bucureşti 2005.
8. Kemp, W., Renewable Energy Handbook, Aztext Press, Canada, 2009.
9. Popescu, M.,O, Popescu, C.,L, Surse regenerabile de energie, Vol.1: Principii şi aplicaţii, Ed. Electra, Bucuresti 2010.

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

The competences achieved by the alumni are necessary in the field of design, production, consulting and marketing. Thus, the demands of the 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	Written exam	Test – 2 hours	50%
10.5 Laboratory	Verification of knowledge and abilities acquired as a result of class activities.	Oral examination	50%
10.6 Minimum standard of performance			
Students must pass the Laboratory test for the final exam. The components of the final grade are Exam (E) and Laboratory (L). Thus, the formula for the final grade of this subject is N = 0.5xE + 0.5xL. The 3 credits are obtained only if N≥5, where both E≥5 and L≥5.			

Date of filling in: 01.11.2021		**Title Surname Name**	**Signature**
	Lecturer	Lect.phd.eng. Roxana MARE	
	Teachers in charge of application	Lect.phd.eng. Georgiana CORSIUC	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	19.1

2. Data about the subject

2.1	Subject name			Urban Electric Infrastructure			
2.2	Course responsible/lecturer			Prof.Phd.Eng. *Mircea BUZDUGAN* – *mircea.buzdugan@insta.utcluj.ro*			
2.3	Teachers in charge of seminars			Lect.Phd.Eng. Calin Ciugudeanu – *calin.ciugudeanu@insta.utcluj.ro*			
2.4 Year of study	2	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	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

		Alternatively, ONLINE on UTCN's TEAMS platform.
5.2	For the project	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 108, 109 Alternatively, ONLINE on UTCN's TEAMS platform.

6. Specific competences

Professional competences	Electrical design: • Identify the maximum absorbed active power for different buildings • electrical power distribution equipment – medium and low voltage gears • street lighting and power distribution • knowledge of European standards in the field of electrical design After graduating this subject, students will be able to: • to evaluate the current state of an electrical distribution installation • to compare different electrical architecture diagrams • to analyze and propose the best technical and economical solutions • to use electrical measurement equipment
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 urban electrical infrastructure design
7.2	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.

8. Contents

8.1. 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. Schneider Electric, Electrical Installation Guide 2018, https://www.se.com/ww/en/download/document/EIGED306001EN/			

2. INSTALLATION GUIDE FOR ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE), https://www.mass.gov/doc/electric-vehicle-charging-infrastructure-manual/download ;
3. Norms EN 13201
4. IEC 60364-1 Low-voltage electrical installations, https://webstore.iec.ch/preview/info_iec60364-1%7Bed5.0%7Den_d.pdf .

8.2. Project	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,
2. IEC 60364-1 Low-voltage electrical installations, https://webstore.iec.ch/preview/info_iec60364-1%7Bed5.0%7Den_d.pdf .
3. International journal of Sustainable Lighting – open access at www.lightingjournal.org
4. DialuxEvo software free dowmnload at www.dial.de
5. Ecodial advance electrical calculation software - https://hto.power.schneider-electric.com/ecodialadvancecalculation/#/homepage

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:		Title Surname Name	Signature
01.11.2021	Lecturer	Prof.Phd.Eng. Mircea BUZDUGAN	
	Teachers in charge of application	Lect.Phd.Eng. Calin Ciugudeanu	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	19.2

2. Data about the subject

2.1	Subject name			Control Systems for Smart Homes and Cities			
2.2	Course responsible/lecturer			Prof.Phd.Eng. *Mircea BUZDUGAN* – *mircea.buzdugan@insta.utcluj.ro*			
2.3	Teachers in charge of seminars			Lect.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.

		Alternatively, ONLINE on UTCN's TEAMS platform.
5.2	For the project	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 108, 109. Alternatively, ONLINE on UTCN's TEAMS platform.

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, Electrical Installation Guide 2018, https://www.se.com/ww/en/download/document/EIGED306001EN/ 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. Project	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, Electrical Installation Guide 2018, https://www.se.com/ww/en/download/document/EIGED306001EN/ 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:		Title Surname Name	Signature
01.11.2021	Lecturer	Prof.Phd.Eng. Mircea BUZDUGAN	
	Teachers in charge of application	Lect.Phd.Eng. Calin Ciugudeanu	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	20.1

2. Data about the subject

2.1	Subject name			Project Management			
2.2	Course responsible/lecturer			Eng. Geapana Izabella			
2.3	Teachers in charge of seminars			Eng. Geapana Izabella			
2.4 Year of study	2	2.5 Semester	1	2.6 Assessment	Exam		
2.7 Subject category	Formative category						DS
	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	14
(b) Supplementary study in the library, online and in the field	14
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(d) Tutoring	3
(e) Exams and tests	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	Bachelor’s degree
4.2	Competence	Project development principles; Risk assessment principles; Communication principles;

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

5.2	For the applications Seminar / laboratory / project	Room equipped with Video Projector and whiteboard/blackboard- 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

6. Specific competences

Professional competences	Theoretical knowledge: - Specific notions of project lifecycle; - Specific notions of management; - Specific notions of cost analysis. Acquired skills: - To score the projects based on the regenerative urban development framework criteria; - To evaluate the project quality; - To evaluate the project feasibility; - To evaluate the project cost efficiency; - To evaluate the project impact. Skills acquired: - To propose projects in line with circular economy and regenerative urban development framework.
Cross competences	To demonstrate the capacity for analysis and synthesis in a multi-stakeholder project context.

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

7.1	General objective	Development of skills in the field of project evaluation understand the impact of their specialty on complex interdisciplinary projects at every stage of the project lifecycle.
7.2	Specific objectives	To Establish the criteria and assumptions of regenerative project requirements; To identify the phases of the project management life cycle and the necessary steps, resources and documentations for supporting the project; To use the basic concepts to evaluate interdisciplinary projects based on regenerative principles; To use project management tools and methods to communicate relevant information during all phases of a project with various stakeholders.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction in Project Lifecycle processes and how they apply to regenerative design	2	Video-Projector	

2. Feasibility and Pre-FEED analysis based on regenerative principles	2	Teaching style based on the interactive teacher-student partnership; Alternatively ONLINE on UTCN's TEAMS platform	
3. FEED phase of complex projects and mapping out all stakeholders	2		
4. Design phase in a closed loop approach and quality management plan	2		
5. Execute phase and prerequisites for implementation in the regenerative urban development framework	2		
6. Operating complex projects and change management	2		
7. Decommission and maximize reuse at end of life of the projects	2		

Bibliography:

1.A guide to the project management body of knowledge, Ed. Newton Square: Project Management Institute, 2013;

2.Project management: a systems approach to planning, scheduling, and controlling; Harold Kerzner, Ed. John Wiley and Sons, 2013;

3.https://www.worldfuturecouncil.org/wp-content/uploads/2016/01/WFC_2010_Regenerative_Cities.pdf
https://www.worldfuturecouncil.org/wp-content/uploads/2016/01/WFC_2014_Regenerative_Urban_Development_A_Roadmap_to_the_City_We_Need.pdf

4.https://issuu.com/world.bank.publications/docs/9781464804731
https://issuu.com/msc.exhibition2019/docs/190902_thesis_final_single_pages
https://www.projectsmart.co.uk/white-papers.php

5.https://www.pmi.org/business-solutions/white-papers

8.2. Seminar /Laboratory/Project	Number of hours	Teaching methods	Notes
1. Project ideas and working groups designation, cost efficiency principles	2	Teaching style based on the interactive teacher-student partnership; Student presentation of evaluations on the selected projects.	
2. Project economic feasibility evaluation results and impact criteria selection	2		
3. Project stakeholder mapping and FEED evaluation	2		
4. Project quality plan and correspondence with design documents	2		
5. Project management tools and their application to a change management scenario	2		
6. Project end of life scenarios and reuse option for the involved materials	2		
7. Project conclusion presentations	2		

Bibliography

1.https://ec.europa.eu/environment/gpp/lcc.htm

2.https://ec.europa.eu/environment/gpp/pdf/Buying-Green-Handbook-3rd-Edition.pdf

3.https://sppregions.eu/fileadmin/user_upload/Life_Cycle_Costing_SoA_Report.pdf

4.https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/cba_guide.pdf

5.https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0098&from=EN
6.https://www.pmi.org/learning/library/practical-quality-management-project-managers-16

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

The acquired competencies will be necessary for the employees who carry out their activity in complex interdisciplinary context for understanding the impact of their own specialty on the project at every phase of the project management life cycle.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The exam consists in verifying the theoretical and practical knowledge acquired	Oral exam	20%
10.5 Seminars /Laboratory/Project	Completion and submission of project evaluation - conditions the entrance to the exam.	Submission of project evaluation	80%
10.6 Minimum standard of performance			
Participation in the laboratory conditions the entrance to the exam. Exam grade components (E); Laboratory (L); Calculation formula of the grade G = 0.2 × E + 0.8 × L Condition for obtaining credits: G> 5.0; where E> 5.0, L> 5.0			

Date of filling in:		**Title Surname Name**	**Signature**
01.11.2021	Lecturer	Eng. Izabella GEAPANA	
	Teachers in charge of application	Eng. Izabella GEAPANA	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.prof.phd.eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.prof.phd.eng. Florin DOMNIŢA

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	20.2

2. Data about the subject

2.1	Subject name			Local, National and European Policies			
2.2	Course responsible/lecturer			*Lect.PhD.Eng. Cristina IACOB – cristina.iacob@insta.utcluj.ro*			
2.3	Teachers in charge of seminars			*Lect.PhD.Eng. Cristina IACOB – cristina.iacob@insta.utcluj.ro*			
2.4 Year of study	II	2.5 Semester	1	2.6 Assessment	Exam		
2.7 Subject category	Formative category						DS
	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	21
(b) Supplementary study in the library, online and in the field	7
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
(d) Tutoring	7
(e) Exams and tests	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	Bachelor’s degree
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

5.2	For the applications Seminar / laboratory / project	Classroom equipped with Video Projector - 21 December 1989 Blvd., no. 128-130 Alternatively, ONLINE on UTCN's TEAMS platform.

6. Specific competences

Professional competences	Acquiring theoretical knowledge about: - local, national and EU institutions and legislation - policymaking in the EU - the EU budget, programmes and projects - the EU cohesion policy and structural and investment funds - national and EU regional and urban development strategies - policy and management of water resources, wastewater and energy with respect to sustainable development Acquired skills: - a solid understanding of current policies, strategies, institutions and regulations in the major areas of building services - the ability to monitor changes in rules, policies and legislation and to identify how they may affect the organization, existing operations or, in some cases, a specific situation. - the ability to promote the use of renewable sources, energy efficient and clean equipment and technologies - the ability to analyze and interpret data, to verify compliance with current regulations - preparing the documentation for financing applications for development / investment projects in different areas of building services
Cross competences	- Adapting to new technologies, professional and personal development, using printed documentation sources, specialized software and electronic resources in an international language. - Team development of a project - the ability to synthesize and clearly define the activities of each team member, ensuring the efficient exchange of information and knowledge and interpersonal communication. - Use of ICT technologies

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

7.1	General objective	A comprehensive understanding of current policies, strategies, institutions and regulations in the major areas of building services
7.2	Specific objectives	To be acquainted with the technical framework and the legislation in the field of building services in correlation with the specific international regulations To analyze and synthesize existing information on installation earthquakes To use methods and programs to transmit information To be familiar with the recent technical and scientific achievements and the national and international tendencies for the development of the field

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Local, National and EU Institutions and Legislation	2	Presentation, discussions and case studies	
2. Policymaking in the EU. Transposition and Implementation	2		
3. The EU Budget, Programmes and Projects. EU Cohesion Policy and Structural and Investment Funds	2		
4. National and EU Regional and Urban Development Strategies.	2		
5. Water Resources Policy and Management	2		
6. Wastewater Policy and Management.	2		
7. Energy Strategies. Energy Efficiency – Targets, Directives and Rules.	2		

Bibliography

Policies and Policy Processes of the European Union - Laurie Buonanno, Neill Nugent, Macmillan International Higher Education, 2013

Environmental Policy in the EU: Actors, Institutions and Processes- Andrew Jordan, Taylor & Francis 2nd Edition, 2012

https://europa.eu/european-union/law_en

https://www.europarl.europa.eu/factsheets/en/home

https://www.europarl.europa.eu/factsheets/en/section/193/environment-policy

https://ec.europa.eu/regional_policy/en/funding/

National Sustainable Development Strategy Romania 2013-2020-2030- Government of Romania Ministry of Environment and Sustainable Development, United Nations Development Program - National Centre for Sustainable Development, Bucharest 2008

Romania's 2021-2030 Integrated National Energy and Climate Plan

https://energy.ec.europa.eu/system/files/2020-06/ro_final_necp_main_en_0.pdf , April 2020

The Transposition of EC Directives: A Comparative Study of Instruments, Techniques and Processes in Six EU Member States - Steunenberg, B., Voermans, W. J., 2006.

The Lisbon Charter. Guiding the Public Policy and Regulation of Drinking Water Supply, Sanitation and Wastewater Management Services -International Water Association, 2015

8.2. Seminar /Laboratory/Project	Number of hours	Teaching methods	Notes
1. The main European and national regulations in the field of water and energy - applications and case studies.	2	Presentation, discussions and case studies	
2. Preparing the documentation for financing applications for development projects in the sectors of drinking water supply systems and collection and treatment of urban wastewater.	2		
3. Preparing the documentation for financing applications for development / investment projects in the electricity and gas transmission systems sector.	2		
4. Preparing the documentation for financing applications for development / investment projects in the renewable energy sector and increasing energy efficiency.	2		

5. Preparing the documentation for financing applications for development / investment projects in the sector of central heating systems.	2		
6. Presentation of an IT system for electronic data exchange between beneficiaries and authorities for coordination, management and control of the Structural and Investigation Funds (MySims)	2		
7. Evaluation of practical work.	2		

Bibliography

https://europa.eu/european-union/law_en
https://www.europarl.europa.eu/factsheets/en/home
https://www.europarl.europa.eu/factsheets/en/section/193/environment-policy
https://ec.europa.eu/regional_policy/en/funding/
Romania's 2021-2030 Integrated National Energy and Climate Plan
https://energy.ec.europa.eu/system/files/2020-06/ro_final_necp_main_en_0.pdf , April 2020
National Sustainable Development Strategy Romania 2013-2020-2030- Government of Romania Ministry of Environment and Sustainable Development, United Nations Development Program - National Centre for Sustainable Development, Bucharest 2008
The Lisbon Charter. Guiding the Public Policy and Regulation of Drinking Water Supply, Sanitation and Wastewater Management Services -International Water Association, 2015
https://www.anre.ro/ro/energie-termica/legislatie1580310091
https://www.anre.ro/en/electric-energy/legislation
https://www.anre.ro/en/natural-gas/legislation
https://www.anre.ro/en/energy-efficiency/legislation

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

The acquired competencies will be necessary for the employees who carry out their activity in design, execution and maintenance.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Evaluating the theoretical and practical knowledge acquired	Written test	80%
10.5 Seminars /Laboratory/Project	Evaluation of knowledge and abilities acquired during class practical activities.	Oral examination	20%
10.6 Minimum standard of performance			
Students must pass the laboratory test for the final exam. The components of the final grade are Exam (E) and Laboratory (L). Thus, the formula for the final grade of this subject is N = 0.8xE + 0.2xL. The 3 credits are obtained only if N≥5, where both E≥5 and L≥5.			

Date of filling in: 01.11.2021		Title Surname Name	Signature
	Lecturer	*Lect.PhD.Eng. Cristina IACOB*	
	Teachers in charge of application	*Lect.PhD.Eng. Cristina IACOB*	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of the Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	21.00

2. Data about the subject

2.1	Subject name			Professional practice 3		
2.2	Course responsible/lecturer			-		
2.3	Teachers in charge with professional practice			Lect.Eng.PhD. Octavian POP – octavian.pop@insta.utcluj.ro		
2.4 Year of study	II	2.5 Semester	II	2.6 Assessment		Verification
2.7 Subject category	Formative category					DS
	Optional					DI

3. Estimated total time

3.1 Number of hours per week	14	of which	3.2 Course		3.3 Seminar		3.3 Laboratory		3.3 Project	14
3.4 Total hours in the curriculum	196	of which	3.5 Course		3.6 Seminar		3.6 Laboratory		3.6 Project	196

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	24
(b) Supplementary study in the library, online and in the field	24
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	16
(d) Tutoring	-
(e) Exams and tests	2
(f) Other activities	-
3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	54
3.9 Total hours per semester (3.4+3.8)	250
3.10 Number of credit points	10

4. Pre-requisites (where appropriate)

4.1	Curriculum	Bachelor's degree in one of the following fields: - building services engineering; - civil engineering; - architecture; - other related specializations.
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the development of professional practice	

6. Specific competences

Professional competences	Theoretical knowledge: • Disciplines taught in the first semester of the second year within the master's program. Acquired skills: • To deepen the knowledge taught through design topics specific to the course disciplines. Skills acquired: • Development of skills in the field of design and execution. • Development of skills regarding the preparation of reports specific to the field.
Cross competences	The students will be able to: • make decisions and take responsibility for their own decisions and actions by adapting to new situations; • have leadership skills on complex projects; • demonstrate a creative and enterprising spirit in solving complex problems.

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

7.1	General objective	✓ To evaluate the functional and energy efficiency of the installation systems and to design solutions for their rehabilitation and technological modernization; ✓ To synthesize, explain and transmit information on the composition and operation of installation systems
7.2	Specific objectives	• To compile programs for investigating the operating conditions and evaluating the efficiency of different categories of installations • To analyze and evaluate the functional parameters and performance indicators of equipment and installation systems in the given operating conditions • To identify the technical non-conformities and the needs of functional and energetic rehabilitation / modernization • To select and propose intervention measures for the energy efficiency of the different categories of installations • To draw up the technical-economic documentation specific to the functional and energetic evaluation • Analyze and synthesize existing information on installation systems; • To elaborate documentary and formative materials regarding the composition and calculation of the installation systems; • To know the recent technical-scientific achievements and the national and international tendencies for the development of the field.

8. Contents

8.1. Theme area	Number of hours	Teaching methods	Notes
Urban Network Management			
Energy Management Tools and Programs for Regenerative Cities			
Renewable Energy Sources			
Urban Electric Infrastructure			
Control Systems for Smart Homes and Cities			
Project Management			
Local, National and European Policies			
Obs: Students will be divided into groups and will address a topic of their choice from those proposed by teachers or companies with which there are internship agreements. The themes will be focused on the realization of projects and on the analysis of the chosen solutions.			
8.2. Applications	Number of hours	Teaching methods	Notes
Presentation of the design / practice theme for each student	42	Exposure, applications	
Calculation method used at national level	42		
Implementation of the calculation methodology	42		
Case study based on calculation methods used at national level	68		
Deliver and present the elaborated project	2		
Bibliography 1. Course notes related to the disciplines studied in the first and second semesters of the master's cycle. 2. Bibliographic sources specific to the project / practice topic. 3. Legislation specific to each topic.			

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

The gained knowledge will be necessary for employees that will work in building services engineering design and execution.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	-		
10.5 Applications	Verification (grade C); Knowledge in the calculation methodology when carrying out the project (grade A).	The verification consists in evaluating the knowledge resulting from the design (2 hours).	80% project 20% verification
10.6 Minimum standard of performance			
Grade components: Verification (C); Knowledge in the calculation methodology (A).			

G= 0.2 C +0.8 A

Condition for obtaining the credits: G≥ 5; C≥ 5; A≥ 5

Date of filling in: 15.11.2021		**Title Surname Name**	**Signature**
	Lecturer		
	Teachers in charge of application	Lect.PhD.Eng Octavian Pop	

Date of approval in the Department of Building Services Engineering

18.11.2021

Head of department
Assoc.Prof.PhD.Eng. Carmen MÂRZA

Date of approval in the Council of the Faculty of Building Services Engineering

19.11.2021

Dean
Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	22.00

2. Data about the subject

2.1	Subject name			Professional practice 4		
2.2	Course responsible/lecturer			-		
2.3	Teachers in charge with professional practice			Assoc.prof.Phd.Eng. Dorin Beu - *dorin.beu@insta.utcluj.ro*		
2.4 Year of study	II	2.5 Semester	II	2.6 Assessment		Verification
2.7 Subject category	Formative category					DS
	Optional					DI

3. Estimated total time

3.1 Number of hours per week	14	of which	3.2 Course		3.3 Seminar		3.3 Laboratory		3.3 Project	14
3.4 Total hours in the curriculum	196	of which	3.5 Course		3.6 Seminar		3.6 Laboratory		3.6 Project	196

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	28
(b) Supplementary study in the library, online and in the field	20
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	16
(d) Tutoring	-
(e) Exams and tests	2
(f) Other activities	-

3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))	54
3.9 Total hours per semester (3.4+3.8)	250
3.10 Number of credit points	10

4. Pre-requisites (where appropriate)

4.1	Curriculum	Bachelor's degree in one of the following fields: - building services engineering; - civil engineering; - architecture; - other related specializations.
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the development of professional practice	

6. Specific competences

Professional competences	Theoretical knowledge: • Disciplines taught in the first, second and third semester within the master's program. Acquired skills: • To deepen the knowledge taught through design topics specific to the course disciplines. Skills acquired: • Development of skills in the field of design, execution and project management. • Development of skills regarding the preparation of reports specific to the field.
Cross competences	The students will be able to: • make decisions and take responsibility for their own decisions and actions by adapting to new situations; • have leadership skills on complex projects; • demonstrate a creative and enterprising spirit in solving complex problems.

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

7.1	General objective	✓ To evaluate the functional and energy efficiency of the installation systems and to design solutions for their rehabilitation and technological modernization; ✓ To synthesize, explain and transmit information on the composition and operation of installation systems; ✓ To design programs and perform application activities to evaluate the functional energy performance of different categories of installations.
7.2	Specific objectives	• To compile programs for investigating the operating conditions and evaluating the efficiency of different categories of installations • To analyze and evaluate the functional parameters and performance indicators of equipment and installation systems in the given operating conditions • To identify the technical non-conformities and the needs of functional and energetic rehabilitation / modernization • To select and propose intervention measures for the energy efficiency of the different categories of installations • To draw up the technical-economic documentation specific to the functional and energetic evaluation • Analyze and synthesize existing information on installation systems; • To elaborate documentary and formative materials regarding the composition and calculation of the installation systems; • To know the recent technical-scientific achievements and the national and international tendencies for the development of the field.

8. Contents

8.1. Theme area	Number of hours	Teaching methods	Notes
Advanced building services - HVAC and water distribution			
nZeB Buildings			
Buildings and cities assessment			
Energy analysis of a building / city			
Urban network management			
Life cycle analysis			
Building services retrofit solutions			
Use of renewable energy sources			
Urban electrical infrastructure			
8.2. Applications	Number of hours	Teaching methods	Notes
Presentation of the topic of professional practice	4	Exposure, applications	
The state of knowledge at national and international level	24		
Calculation methodology used nationally and internationally	24		
Carrying out measurements, evaluations, technical analyzes, etc. using field-specific equipment and devices	70		
Preparation of the professional practice report based on the results obtained and the calculation methodology used	72		
Deliver and present the elaborated project	2		
Bibliography 1. Course notes related to the disciplines studied in the first, second and third semesters of the master's cycle. 2. Bibliographic sources specific to the project / practice topic. 3. Online and electronic documentation sources; 4. Legislation specific to each topic.			

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

The gained knowledge will be necessary for employees that will work in building services engineering design, execution, project management and energy assessment of buildings / cities.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	-		
10.5 Applications	Knowledge of the current stage of the topic (note A);	Verification consists of assessing theoretical and practical knowledge (2 hours)	50% project 50% verification

	Evaluation of the practical results obtained (note B); Supporting the practice report (note C).		
10.6 Minimum standard of performance			
Grade components: $G = 0.3 \cdot A + 0.5 \cdot B + 0.2 \cdot C;$ Condition for obtaining credits: G> 5; A> 5; B> 5; C> 5.			

Date of filling in:		**Title Surname Name**	**Signature**
11.11.2021	Lecturer		
	Teachers in charge of application	Assoc.prof.Eng.PhD. Dorin Beu	

Date of approval in the Department of Building Services Engineering

18.11.2021

Head of department
Assoc.Prof.PhD.Eng. Carmen MÂRZA

Date of approval in the Council of the Faculty of Building Services Engineering

19.11.2021

Dean
Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	23.00

2. Data about the subject

2.1	Subject name			Dissertation Project Work		
2.2	Course responsible/lecturer			-		
2.3	Teachers in charge			Assoc.prof.Phd.Eng. Dorin Beu - *dorin.beu@insta.utcluj.ro*		
2.4 Year of study	II	2.5 Semester	II	2.6 Assessment		Verification
2.7 Subject category	Formative category					DS
	Optional					DI

3. Estimated total time

3.1 Number of hours per week	7	of which	3.2 Course		3.3 Seminar		3.3 Laboratory		3.3 Project	7
3.4 Total hours in the curriculum	98	of which	3.5 Course		3.6 Seminar		3.6 Laboratory		3.6 Project	98
3.7 Individual study:										
(a) Manual, lecture material and notes, bibliography										40
(b) Supplementary study in the library, online and in the field										40
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										70
(d) Tutoring										-
(e) Exams and tests										2
(f) Other activities										-
3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))										152
3.9 Total hours per semester (3.4+3.8)										250
3.10 Number of credit points										10

4. Pre-requisites (where appropriate)

4.1	Curriculum	Bachelor's degree in one of the following fields: - building services engineering; - civil engineering; - architecture; - other related specializations.
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the development of professional practice	

6. Specific competences

Professional competences	Theoretical knowledge: • Disciplines taught in the first, second and third semester within the master's program. Acquired skills: • To deepen the knowledge taught through design topics specific to the course disciplines. Skills acquired: • Development of skills in the field of design, execution and project management. • Development of skills regarding the preparation of reports specific to the field.
Cross competences	The students will be able to: • make decisions and take responsibility for their own decisions and actions by adapting to new situations; • have leadership skills on complex projects; • demonstrate a creative and enterprising spirit in solving complex problems.

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

7.1	General objective	✓ To design programs and perform practical activities to evaluate the functional energy performance of different categories of installations.
7.2	Specific objectives	• To know the recent technical and scientific achievements and the national and international trends for the development of the field; • To know in depth the role and behavior of equipment and installation systems corresponding to functional requirements; • To use specialized calculation methods and programs for modeling installation systems and simulating their behavior in different functional hypotheses; • To apply techniques for measuring functional parameters, to process and interpret the results of measurements for different categories of installations; • Prepare projects and reports for field-specific programs.

8. Contents

8.1. Theme area	Number of hours	Teaching methods	Notes
Advanced building services - HVAC and water distribution			
nZeB Buildings			
Buildings and cities assessment			
Energy analysis of a building / city			
Urban network management			
Life cycle analysis			
Building services retrofit solutions			
Use of renewable energy sources			
Urban electrical infrastructure			

8.2. Applications	Number of hours	Teaching methods	Notes
Presentation of the topic of professional practice	4	Exposure, applications	
The state of knowledge at national and international level	12		
Calculation methodology used nationally and internationally	12		
Case study based on the calculation methodology used	18		
Own contributions	10		
Final conclusions	10		
Elaboration of the dissertation paper in final form	30		
Deliver and present the elaborated project	2		
Bibliography 1. Course notes related to the disciplines studied in the first, second and third semesters of the master's cycle. 2. Bibliographic sources specific to the project / practice topic. 3. Online and electronic documentation sources; 4. Legislation specific to each topic.			

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

The gained knowledge will be necessary for employees that will work in building services engineering design, execution, project management and energy assessment of buildings / cities.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	-		
10.5 Applications	Knowledge of the current stage of the topic (note A); Evaluation of the practical results obtained (note B); Personal contributions to the dissertation (note B); Presentation of the practice report (note C); Supporting the practice report (note D).	Presentation of the dissertation thesis	50% dissertation thesis 50% presentation
10.6 Minimum standard of performance			
Grade components: $G = 0.2 \cdot A + 0.4 \cdot B + 0.2 \cdot C + 0.2 \cdot D;$ Condition for obtaining credits: G> 7; A> 5: B> 5; C> 5; D> 5.			

Date of filling in:		**Title Surname Name**	**Signature**
11.11.2021	Lecturer		
	Teachers in charge of application	Assoc.prof.Eng.PhD. Dorin Beu	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	24.00

2. Data about the subject

2.1	Subject name			Practice for Dissertation		
2.2	Course responsible/lecturer			-		
2.3	Teachers in charge with practice			Assoc.prof.Phd.Eng. Dorin Beu - *dorin.beu@insta.utcluj.ro*		
2.4 Year of study	II	2.5 Semester	II	2.6 Assessment		Verification
2.7 Subject category	Formative category					DS
	Optional					DI

3. Estimated total time

3.1 Number of hours per week	7	of which	3.2 Course		3.3 Seminar		3.3 Laboratory		3.3 Project	7
3.4 Total hours in the curriculum	98	of which	3.5 Course		3.6 Seminar		3.6 Laboratory		3.6 Project	98
3.7 Individual study:										
(a) Manual, lecture material and notes, bibliography										35
(b) Supplementary study in the library, online and in the field										35
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										80
(d) Tutoring										-
(e) Exams and tests										2
(f) Other activities										-
3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))										152
3.9 Total hours per semester (3.4+3.8)										250
3.10 Number of credit points										10

4. Pre-requisites (where appropriate)

4.1	Curriculum	Bachelor's degree in one of the following fields: - building services engineering; - civil engineering; - architecture; - other related specializations.
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the development of professional practice	

6. Specific competences

Professional competences	Theoretical knowledge: • Disciplines taught in the first, second and third semester within the master's program. Acquired skills: • To deepen the knowledge taught through design topics specific to the course disciplines. Skills acquired: • Development of skills in the field of design, execution and project management. • Development of skills regarding the preparation of reports specific to the field.
Cross competences	The students will be able to: • make decisions and take responsibility for their own decisions and actions by adapting to new situations; • have leadership skills on complex projects; • demonstrate a creative and enterprising spirit in solving complex problems.

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

7.1	General objective	✓ To evaluate the functional and energy efficiency of the installation systems and to design solutions for their rehabilitation and technological modernization; ✓ To synthesize, explain and transmit information on the composition and operation of installation systems; ✓ To design programs and perform application activities to evaluate the functional energy performance of different categories of installations.
7.2	Specific objectives	• To compile programs for investigating the operating conditions and evaluating the efficiency of different categories of installations • To analyze and evaluate the functional parameters and performance indicators of equipment and installation systems in the given operating conditions • To identify the technical non-conformities and the needs of functional and energetic rehabilitation / modernization • To select and propose intervention measures for the energy efficiency of the different categories of installations • To draw up the technical-economic documentation specific to the functional and energetic evaluation • Analyze and synthesize existing information on installation systems; • To elaborate documentary and formative materials regarding the composition and calculation of the installation systems; • To know the recent technical-scientific achievements and the national and international tendencies for the development of the field.

8. Contents

8.1. Theme area	Number of hours	Teaching methods	Notes
Advanced building services - HVAC and water distribution			
nZeB Buildings			
Buildings and cities assessment			
Energy analysis of a building / city			
Urban network management			
Life cycle analysis			
Building services retrofit solutions			
Use of renewable energy sources			
Urban electrical infrastructure			
8.2. Applications	Number of hours	Teaching methods	Notes
Presentation of the topic of professional practice	4	Exposure, applications	
The state of knowledge at national and international level	20		
Calculation methodology used nationally and internationally	20		
Carrying out measurements, evaluations, technical analyzes, etc. using field-specific equipment and devices	80		
Preparation of the professional practice report based on the results obtained and the calculation methodology used	70		
Deliver and present the elaborated project	2		
Bibliography 1. Course notes related to the disciplines studied in the first, second and third semesters of the master's cycle. 2. Bibliographic sources specific to the project / practice topic. 3. Online and electronic documentation sources; 4. Legislation specific to each topic.			

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

The gained knowledge will be necessary for employees that will work in building services engineering design, execution, project management and energy assessment of buildings / cities.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	-		
10.5 Applications	Knowledge of the current stage of the topic (note A); Evaluation of the practical results obtained (note B); Supporting the practice report (note C).	Verification consists of assessing theoretical and practical knowledge (2 hours)	80% project 20% verification
10.6 Minimum standard of performance			
Grade components: $G = 0.3 \cdot A + 0.5 \cdot B + 0.2 \cdot C;$			

Condition for obtaining credits: G> 5; A> 5; B> 5; C> 5.

Date of filling in: 11.11.2021		**Title Surname Name**	**Signature**
	Lecturer		
	Teachers in charge of application	Assoc.prof.Eng.PhD. Dorin Beu	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA

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	25.00

2. Data about the subject

2.1	Subject name			Presentation of Dissertation		
2.2	Course responsible/lecturer			-		
2.3	Teachers in charge			Assoc.prof.PhD. Dorin Beu		
2.4 Year of study	II	2.5 Semester	II	2.6 Assessment	Exam	
2.7 Subject category	Formative category				DS	
	Optional				DI	

3. Estimated total time

3.1 Number of hours per week		of which	3.2 Course		3.3 Seminar		3.3 Laboratory		3.3 Project		
3.4 Total hours in the curriculum		of which	3.5 Course		3.6 Seminar		3.6 Laboratory		3.6 Project		
3.7 Individual study:											
(a) Manual, lecture material and notes, bibliography											-
(b) Supplementary study in the library, online and in the field											-
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays											-
(d) Tutoring											-
(e) Exams and tests											-
(f) Other activities											-
3.8 Total hours of individual study (sum (3.7(a)…3.7(f)))											
3.9 Total hours per semester (3.4+3.8)											
3.10 Number of credit points											10

4. Pre-requisites (where appropriate)

4.1	Curriculum	Knowledge gained in the subjects of the curriculum
4.2	Competence	Knowledge gained in the subjects of the curriculum

5. Requirements (where appropriate)

5.1	For the course	

5.2	For the development of dissertation thesis presentation	Faculty of Building Services Engineering, 21 December 1989 no 128-130 onsite or Microsoft Teams platform online

6. Specific competences

Professional competence	After defending the dissertation, the graduates acquire knowledge in design, execution and project management in the field of specialized disciplines, having the possibility to elaborate technical projects and execution details in the field approached in the dissertation.
Cross competences	Efficient use of information sources, communication resources and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in an international circulation language.

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

7.1	General objective	✓ To design programs and perform practical activities to evaluate the functional energy performance of different categories of installations.
7.2	Specific objectives	• To know the recent technical and scientific achievements and the national and international trends for the development of the field; • To know in depth the role and behavior of equipment and installation systems corresponding to functional requirements; • To use specialized calculation methods and programs for modeling installation systems and simulating their behavior in different functional hypotheses; • To apply techniques for measuring functional parameters, to process and interpret the results of measurements for different categories of installations; • Prepare projects and reports for field-specific programs.

8. Contents

8.1. Theme area	Number of hours	Teaching methods	Notes
-			
8.2. Applications	Number of hours	Teaching methods	Notes
-			
Bibliography -			

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

The content of the discipline is correlated with the needs of the employers in the field of building services engineering, as well as adjacent fields, the graduate of this university module having employment possibilities, according to COR and ISCO08:
214206 construction building services engineer; 214235 specialist in monitoring the behavior of constructions; 2142.1.7 07 pipeline engineer; 2142.1.11 water engineer; 2142.1.5 hydropower engineer; 2142.1.3 drainage engineer; 214234 facility manager; 214239 technically responsible with execution.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	-		
10.5 Applications	Knowledge of the current stage of the topic Personal contributions to the dissertation Defence of the dissertation thesis	Defence of the dissertation thesis	50% dissertation thesis 50% presentation
10.6 Minimum standard of performance			
Final grade for the dissertation ≥ 6			

Date of filling in: 11.11.2021		**Title Surname Name**	**Signature**
	Lecturer		
	Teachers in charge of application	Assoc.prof.PhD. Dorin Beu	

Date of approval in the Department of Building Services Engineering 18.11.2021	Head of department Assoc.Prof.PhD.Eng. Carmen MÂRZA
Date of approval in the Council of Faculty of Building Services Engineering 19.11.2021	Dean Assoc.Prof.PhD.Eng. Florin DOMNIŢA