SYLLABUS

1. Data about the program of study

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

2. Data about the subject

2.1	Subject name			Indoor environmental quality and well-being	Subject code	9.00
2.2	Course responsible/lecturer			Assoc.prof.PhD.Eng. Tania RUS - tania.rus@insta.utcluj.ro		
2.3	Teachers in charge of laboratory			Assoc.prof.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
	Optionality					DOB

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) Exams and tests	2
(b) Manual, lecture material and notes, bibliography	21
(c) Supplementary study in the library, online and in the field	15
(d) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
(e) Tutoring	6
(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
5.2	For the applications	Laboratory room - 21 December 1989 Blvd., no. 128-130

6. **Specific competences**

Professional competences	CP4 – promotes awareness of environmental issues CP12 – use measurement instruments CP25 – manage air quality
Cross competences	CT2 – thinks holistically CT3 – dealing with problems

7. Expected Learning Outcomes

Knowledge	CP4 – Knows the main types of pollution and their impact on health, comfort and well-being in indoor spaces (air, lighting, noise, microclimate). Knows the regulatory framework and relevant standards for indoor environmental quality and environmental protection (European directives, national legislation, technical standards). Understands the relationship between indoor environmental quality, resource consumption and the objectives of sustainable / regenerative development at building and community level. CP12 – Knows the operating principles, fields of application and limitations of the main measuring instruments used for assessing indoor environmental quality (temperature and humidity probes, anemometers, lux meters, sound level meters, CO_2 and VOC sensors, etc.). Knows the requirements for calibration, traceability and uncertainty associated with the measurement of indoor environmental parameters, in line with standards and good metrological practice. Understands standard operating procedures for measurement campaigns in buildings (planning, spatial and temporal sampling, documentation of test conditions). CP25 – Knows the main indoor air pollutants (gaseous, particulate, microbiological contaminants), their sources in built spaces, and their effects on the health, comfort and performance of occupants. Knows the standards and guidelines on indoor air quality and ventilation of spaces (European and national regulations and international recommendations) and how to apply them in different types of buildings. Understands the principles of sizing and operation of ventilation and air filtration systems, as well as strategies for controlling sources and flows of pollutants in the indoor environment.
Skills	CP4 – Explains, in a way that is understandable to different categories of occupants, the effects of indoor environmental conditions on health, performance and well-being, using examples and data from studies or measurements. Uses data on air quality and thermal, visual and acoustic comfort to develop information materials (posters, presentations, guidelines) that increase awareness of indoor environmental issues. Justifies the need for interventions to improve the indoor environment to decision-makers, using professional but accessible language and drawing on scientific evidence. CP12 – Selects the measuring instruments appropriate for the type of indoor space and the parameters of interest, considering technical specifications and the purpose of the assessment. Configures operate and routinely maintain the measuring equipment, applying standardized procedures for installation, reading, recording and storage of data. Processes and validates the data obtained (filtering, consistency checks, graphical representations), identifies possible errors and documents the measurement conditions to ensure the reproducibility of the results. CP25 – Assesses indoor air quality by interpreting monitoring data (continuous or campaign-based) and correlating them with data on occupants, space use and outdoor conditions. Identify the main sources of indoor air pollution, diagnoses ventilation problems and formulates intervention scenarios to reduce occupants' exposure. Prepares reports and technical recommendations on indoor air quality management (ventilation strategies, material selection, operational protocols), tailored to the specific context of the building and user categories.

Responsibilities and autonomy	CP4 – Initiates and coordinates educational activities or awareness campaigns on indoor environmental quality and its impact on well-being in institutions, companies or communities. Assumes responsibility for the accuracy of messages communicated to the public and for compliance with ethical standards when communicating environmental risks to occupants and beneficiaries. Acts as a promoter of an organizational culture oriented towards prevention, sustainability and well-being, influencing practices of building use and operation. CP12 – Organizes and autonomously coordinates indoor environment measurement campaigns (scheduling, distribution of measurement points, management of equipment). Assumes responsibility for the quality and integrity of the measured data, including compliance with safety procedures and data protection regulations in studies involving occupants. Critically evaluates the adequacy of equipment and methodology, makes informed decisions on repeating measurements and proposes improvements to experimental protocols. CP25 – Coordinates, within project teams or facility management teams, the processes of monitoring, analyzing and improving indoor air quality, ensuring coherence between health, comfort and energy efficiency objectives. Assumes responsibility for the compliance of proposed solutions with relevant standards and regulations and for clear communication of risks and benefits to stakeholders (owners, users, authorities). Makes autonomous decisions on prioritizing intervention measures (technical, operational or behavioral) and monitors in the long term their effects on air quality and occupants' well-being.

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

8.1	General objective	Development of master students' capacity to assess and manage indoor environmental quality in buildings through the integrated use of standards, measuring instruments and improvement strategies, so as to promote health, well-being and the sustainability of the built environment.
8.2	Specific objectives	• To explain the fundamental concepts of indoor environmental quality (IEQ) and their relationship with occupants' health, comfort and well-being. • To identify and interpret the main standards and regulations on indoor air quality and thermal, visual and acoustic comfort at European and national levels. • To describe the main categories of indoor air pollutants, their sources and the mechanisms by which they impact occupants' health and performance. • To correctly use measuring instruments specific to the indoor environment (temperature, humidity, air velocity, CO_2, VOCs, illuminance, noise level, etc.) in accordance with relevant procedures and standards. • To critically analyze data on indoor air quality and other environmental parameters, identifying non-compliances, trends and correlations with space use and occupants' perception. • To propose technical and operational solutions for improving indoor air quality and the other components of the indoor environment (thermal, visual, acoustic), considering energy efficiency and the specific characteristics of the building.

		• To integrate a holistic perspective and principles of regenerative design when formulating objectives for the indoor environment, so that buildings support human well-being and development.

9. Contents

9.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
1. Introduction in indoor environmental quality (IEQ)	2	Video-Projector Teaching style based on the interactive teacher-student partnership; Presentation of case studies.	
2. Standards for IEQ evaluation	2		
3. Indoor air quality – indoor ventilation			
4. Indoor air quality – contaminants			
5. Indoor air quality – occupant satisfaction			
6. Objective assessment of the thermal comfort	2		
7. Subjective assessment of the thermal comfort	2		
8. Occupant responses to thermal comfort/discomfort	2		
9. Interaction between outdoor climate and thermal comfort	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. Rus Tania, Indoor Environmental Quality and Wellbeing, U.T. Press, 2026, ISBN 978-606-737-842-9, 166 pages; https://biblioteca.utcluj.ro/files/carti-online-cu-coperta/842-9.pdf
2. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), (2013). ANSI/ASHRAE Standard 55. Thermal Environmental Conditions for Human Occupancy. Atlanta;
3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), (2016). ANSI/ASHRAE Standard 62-1. Ventilation for Acceptable Indoor Air Quality. Atlanta;
4. 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;
5. World Health Organization – Air quality guidelines for Europe, 2000;
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7. U.S. Environmental Protection Agency (1990). (EPA) (b), Facts About Formaldehyde [Online]. Retrieved from https://www.epa.gov/formaldehyde/facts-about-formaldehyde#whatisformaldehyde
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9.2. 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. Indoor air-quality: measurements of the chemical and natural contaminants			
3. Objective and subjective assessment of the thermal comfort	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. Rus Tania, Indoor Environmental Quality and Wellbeing, U.T. Press, 2026, ISBN 978-606-737-842-9, 166 pages; https://biblioteca.utcluj.ro/files/carti-online-cu-coperta/842-9.pdf
2. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), (2013). ANSI/ASHRAE Standard 55. Thermal Environmental Conditions for Human Occupancy. Atlanta;
3. 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;
4. 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;
5. World Health Organization (WHO) (2000). Air Quality Guidelines for Europe. Second Edition
6. World Health Organization – Air quality guidelines for Europe, 2000;
7. International Well Building Institute (IWBI), (2019). The Well Building Standard

10. 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.

11. Evaluation

Activity type	11.1 Assessment criteria	11.2 Assessment methods (and evaluation form: continuous/summative)	11.3 Weight in the final grade
11.4 Course	The exam consists in verifying the theoretical and practical knowledge acquired	Quiz	75%
11.5 Laboratory	Completion and submission of laboratory papers conditions the entrance to the exam.	Submission of laboratory papers	25%
11.6 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: June 2026		**Title Surname Name**	**Signature**
	Lecturer	Assoc.prof.PhD.Eng. Tania RUS	
	Teachers in charge of application	Assoc.prof.PhD.Eng. Tania RUS	

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