

ENVIRONMENTAL CURRICULUM IN CIVIL ENGINEER IN BRASOV (ROMANIA)

Radu MUNTEAN (UTBv)



Transilvania
University
of Brasov



▣ INTRODUCTION

Transilvania University (UTBv) is a state institution of higher education located in Brasov, Romania, and by its "educational offer, scientific research and number of students represents one of Romania's large universities, being the representative university for Central Region"



▣ INTRODUCTION

The University includes 18 faculties with a total of about 20 000 students and 800 teaching staff:

- Mechanical Engineering
- Technological Engineering and Industrial Management
- Materials Science and Engineering
- Product Design and Environment
- Electrical Engineering and Computer Science
- Silviculture and Forest Engineering
- Wood Engineering
- Food and Tourism
- **Civil Engineering**
- Mathematics and Computer Science
- Economic Sciences and Business
- Administration
- Psychology and Education Sciences
- Physical Education and Mountain Sports
- Music
- Medicine
- Letters
- Law
- Sociology and Communication

■ FACULTIES OF CIVIL ENGINEERING IN ROMANIA





Transilvania
University
of Braşov

FACULTY OF CIVIL ENGINEERING

- has started in 2003 with 3 Undergraduate study programs:
 - Civil, Industrial and Agricultural Engineering (CCIA)
 - Railways, Roads and Bridges (CFDP)
 - Buildings equipment (IC)
- since 2009, a Master's Degree Program:
 - Energy Upgrading for the Built Environment
- 500 students
- 35 staff members





■ PRESENT CURRICULA IN CIVIL ENGINEERING IN BRASOV

- any university curricula is certified by ARACIS - The Romanian Agency for Quality Assurance in Higher Education - an autonomous public institution, of national interest;
<http://www.aracis.ro/en/>
- an external certification audit is made once at 5 years;
- an internal audit is made once a year;
- several important conditions:
 - differences between similar curricula (similar study programs in different faculties around Romania) should be less than **20%**;
 - any change should be made at least 1 year before coming into action;





■ PRESENT CURRICULA IN CIVIL ENGINEERING IN BRASOV

■ General courses (1st and 2nd year of study):

- Math
- Mechanics
- Strength of materials
- Technical drawing and infographics
- Geological and Geotechnical engineering.

■ Specific and domain related courses (2nd, 3rd and 4th year of study):

- Building materials
- Concrete structures
- Timber structures
- Steel structures
- Safety of buildings
- Civil, Industrial and Agricultural buildings.



■ PRESENT CURRICULA IN CIVIL ENGINEERING IN BRASOV

■ Environmental related courses:

- **Law and regulations concerning buildings and buildings services**

- Law no. 50/1991 regarding authorizing the execution of construction works and some measures for housing;
- Law 10/1995 regarding the quality in construction (last addition to the law regards the *sustainable use of natural resources*);
- Regulations on monitoring the building behavior in service, interventions and post-use of buildings.





■ PRESENT CURRICULA IN CIVIL ENGINEERING IN BRASOV

■ Environmental related courses:

- **Environment engineering**

- Methods for environmental factors protection: water, air, soil;
- Using unconventional energy sources;
- Passive houses;
- Thermal rehabilitation of the existing buildings.





■ FUTURE CURRICULA IN CIVIL ENGINEERING IN BRASOV

- in 2017 was the last external audit for certification of study programs;
- some proposal ware made: exclusions and combining of courses and

■ NEW Environmental related courses:

- **Special concrete and composite materials**
 - general knowledge about component materials, matrices used in composites, technologies of obtaining, physical and mechanical characteristics, fields of use for concrete with superior characteristics and composite materials;

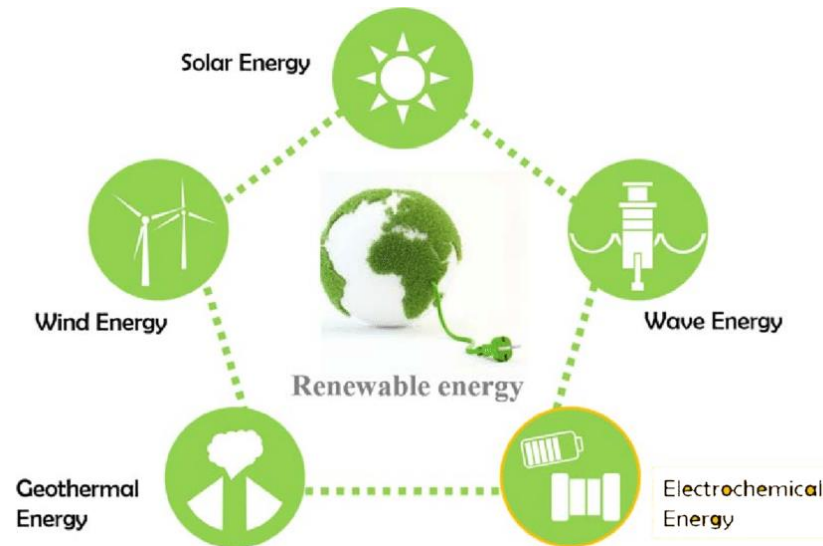


■ FUTURE CURRICULA IN CIVIL ENGINEERING IN BRASOV

■ NEW Environmental related courses:

- **Renewable energy sources**

- energy savings, wind energy systems, solar basics and thermal solar heating systems, combustion of biomass and biogas, heat pump applications, renewable energy management (tax structures, costs for energy production, cost analyses, environmental issues).





■ FUTURE CURRICULA IN CIVIL ENGINEERING IN BRASOV

■ NEW Environmental related courses:

- **Constructions sustainability**

- 2 hours / week for course;
- 2 hours / week for laboratory / practical works;
- 4 ECTS credits.

- Proposed topics:

- European and national environmental legislation,
- Relationships between sustainability requirements and resources used in construction projects,
- Sustainable building materials,
- Eco-labels,
- Environmental impact on the life cycle assessment of a construction product,





■ FUTURE CURRICULA IN CIVIL ENGINEERING IN BRASOV

- Proposed topics:
 - Calculation of the CO₂ emissions for all phases of the construction processes,
 - Concepts related to recycling and reuse,
 - International systems for voluntary certification (LEED, BREEAM, etc.),
 - Energy efficiency of buildings,
 - Sustainable design.
- Proposed practical applications:
 - Examples of sustainable buildings in Romania and Worldwide;
 - Case studies for sustainable buildings;
 - Cost estimations for sustainable buildings
 - Carbon footprint estimating tools: CO₂ TOOL;





FUTURE CURRICULA IN CIVIL ENGINEERING IN BRASOV

COURSE OUTLINE

1. Data about the study programme

1.1 Higher education institution	Transilvania University of Brasov
1.2 Faculty	Civil Engineering
1.3 Department	Civil Engineering
1.4 Field of study ¹⁾	BA
1.5 Study level ²⁾	BA
1.6 Study programme/ Qualification	Civil, Industrial and Agricultural Constructions / Civil Engineer

2. Data about the course

2.1 Name of course			Constructions sustainability					
2.2 Course convenor			Radu MUNTEAN, Ph.D					
2.3 Seminar/ laboratory/ project convenor			Radu MUNTEAN, Ph.D					
2.4 Study year	IV	2.5 Semester	VII	2.6 Evaluation type	E	2.7 Course status	Content ³⁾	SC
							Attendance type ⁴⁾	EC

3. Total estimated time (hours of teaching activities per semester)

3.1 Number of hours per week	4	out of which: 3.2 lecture	2	3.3 seminar/ laboratory/ project	0/2/0
3.4 Total number of hours in the curriculum	56	out of which: 3.5 lecture	28	3.6 seminar/ laboratory/ project	0/28/0
Time allocation	hours				
Study of textbooks, course support, bibliography and notes	12				
Additional documentation in libraries, specialized electronic platforms, and field research	8				
Preparation of seminars/ laboratories/ projects, homework, papers, portfolios, and essays	4				
Tutorial					
Examinations	4				
Other activities.....					
3.7 Total number of hours of student activity	28				
3.8 Total number per semester	84				
3.9 Number of credits ⁵⁾	4				

4. Prerequisites (if applicable)

4.1 curriculum-related	• none
4.2 competences-related	• none

5. Conditions (if applicable)

5.1 for course development	• Medium capacity classroom equipped with video - projector, blackboard
5.2 for seminar/ laboratory/ project development	• Laboratory classroom equipped with video-projector, computers with internet access, blackboard

6. Specific competences

Professional competences	- C5. Compliance with quality and sustainable development requirements specific to civil, industrial and agricultural constructions - C5.1 Identification and use of technical regulations specific to civil, industrial and agricultural constructions - C5.2 Adaptation of calculation methods used in civil, industrial and agricultural constructions to their behavioural particularities. - C5.4 Application of the quality standards provisions for the design of a civil, industrial and agricultural construction.
Transversal competences	•

7. Course objectives (resulting from the specific competences to be acquired)

7.1 General course objective	- gaining basic knowledge about the sustainable development of society - understand, interpret and correctly use the basic concepts of green buildings
7.2 Specific objectives	- acquiring knowledge about environmental legislation - knowledge about sustainable building materials - knowledge about green certificates, greenhouse gas emissions, carbon footprint, environmental conservation - tools used for cost and carbon footprint estimations

8. Content

8.1 Course	Teaching methods	Number of hours	Remarks
Fundamentals. Global context. Definitions.	Interactive method: power-point presentation, followed by debates on the topic approached	2	
European and national environmental legislation		2	
Relationships between sustainability requirements and resources used in construction projects		4	
Sustainable building materials		2	
Eco-labels		4	
Environmental impact on the life cycle assessment of a construction product		4	
Calculation of the CO2 emissions for all phases of the construction processes		2	
Concepts related to recycling and reuse		2	
International systems for voluntary certification (LEED, BREEAM, etc.)		2	
Energy efficiency of buildings		4	
Sustainable design			
Bibliography			
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- Rojanski V., Bran F., Diaconu Gh. Protecția și ingineria mediului, Ed. economica, Buc. 2002.
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- USGBC, Green Building and LEED Core Concepts Guide, First Edition (E-Book)

8.2 Seminar/ laboratory/ project	Teaching-learning methods	Number of hours	Remarks
Examples of sustainable buildings in Romania and Worldwide	power-point presentation, debates on the topic approached	4	
Case studies for sustainable buildings		8	
Cost estimations for sustainable buildings	off-line and online cost estimation tools	8	
Carbon footprint estimating tools: CO2 TOOL	online tools	8	

Bibliography
<http://www.oerc2.eu>
<http://www.rogbt.org/>
<http://www.mmediu.ro/>
<http://www.dviz.ro/>

9. Correlation of course content with the demands of the labour market (epistemic communities, professional associations, potential employers in the field of study)

The knowledge gained during the course is necessary for the professional activity as a Civil engineer.
 The knowledge taught within the discipline meets the requirements of the employers in the field of design and execution of sustainable constructions.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of the final grade
10.4 Course	Score on each subject	written exam	50%
10.5 Seminar/ laboratory/ project	Score on each practical application	oral presentation	50%

10.6 Minimal performance standard

- obtaining a minimum score of 5 for both the written evaluation and the presentation and support of the project

This course outline was certified in the Department Board meeting on 18/09/2017 and approved in the Faculty Board meeting on 26/09/2017.

Prof. dr. eng. Ioan TUNS,
Dean

Assoc. prof. dr. eng. Marius Florin BOTIS,
Head of Department

Lect. dr. eng. Radu MUNTEAN,
Course holder

Lect. dr. eng. Radu MUNTEAN,
Holder of seminar/ laboratory/ project

Note:

- 1) Field of study – select one of the following options: BA/MA/PhD. (to be filled in according to the forceful classification list for study programmes);
- 2) Study level – choose from among: BA/MA/PhD;
- 3) Course status (content) – for the BA level, select one of the following options: FC (fundamental course) / DC (course in the study domain)/ SC (specialty course)/ CC (complementary course); for the MA level, select one of the following options: PC (proficiency course)/ SC (synthesis course)/ AC (advanced course);
- 4) Course status (attendance type) – select one of the following options: CPC (compulsory course)/ EC (elective course)/ NCPC (non-compulsory course);
- 5) One credit is the equivalent of 25 – 30 study hours (teaching activities and individual study).



■ CONCLUSIONS

- OERCO2 project was received very well by the students and academic staff from the Faculty of Civil Engineering;
- as a normal consequence, the developed site and CO2 TOOL can be a start for future development of the Curricula for Civil Engineering field of study;
- the proposed course (Constructions sustainability) will run in the academic year 2020 – 2021;
- until then, updated information regarding sustainability, passive houses, carbon footprint, certifications, environmental regulations and so on, will be inserted into the existing courses.



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■ THANK YOU!

