SYLLABUS

1. Program information

1.1	Higher education institution	Technical University of Cluj-Napoca
1.2	Faculty	Civil Engineering
1.3	Department	Buildings and Management
1.4	Field of study	Civil Engineering
1.5	Study area	Bachelor
1.6	Study program/ qualification	Civil engineering/Engineer
1.7	Form of education	FE-Frequency education
1.8	Discipline code	57.10

2. Discipline information

2.1	Name of the discipline					High Performance Energy-Efficient Building (Construcţii Civile de Inaltă Performanţă Energetică)					
2.2	Subject area					Civil Engineering					
2.3	Course coordinator					Assoc.prof. Moga Ligia Mihaela					
2.4	Discipline coordinator					Assoc.prof. Moga Ligia Mihaela					
2.5	Year	IV	2.6	Semester	2	2.7	Evaluation	Exam	2.8	Discipline type	**DOP/DS**

3. Estimated time of the discipline

Year / Sem.	Discipline name	Weeks.	Course	Application			Curs	Application			Individual study	TOTAL	Credit
			[hours/week]				[hours/sem.]						
				S	L	P		S	L	P			
II	High Performance Energy-Efficient Building	14	2		1		28		14		84	126	5

3.1	Hours per week	3	3.2	course	2	3.3	applications	1
3.4	Total hours from curricula	42	3.5	course	28	3.6	applications	14
Individual study								Hours
Study based on course manuals, bibliography and notes								25
Additional documentation at the library, on e-learning platforms and in the field (on sites)								15
Seminars/ Laboratories, homework, reports, portfolios, essays preparation								20
Tutoring								15
Examinations								4
Other activities								5

3.7	Total individual study hours	84
3.8	Total hours per semester	126
3.9	Credits	5

4. Prerequisites

4.1	Of curricula	Knowledge regarding building design, Termotechnics of Constructions, construction materials.
4.2	Of competences	Termotechnics calculation

5. Requirements

5.1	For course	Class attendance is not mandatory, but it will be a plus for the final grade.
5.2	For applications	Class attendance is mandatory.

6. Acquired specific competences

Professional competences	Theoretical knowledge, (what he knows)	To know the legal and regulatory framework for high performance energy efficient buildings design. To know methodologies, implementation and certification standards for high performance energy efficient buildings. To know the types of high performance energy efficient buildings. To know the principles of achieving various types of high performance energy efficient buildings in line with EU requirements regarding the design only of these types of buildings starting from 2018.
	Acquired skills: (what he can do)	To distinguish between types of high performance energy efficient buildings. To perform calculations using expeditious methods for the thermal performance of building envelope elements. To elaborate the global energy analysis of a high performance energy efficient building.
	Habits acquired: (What tools is able to handle)	To use software tools for design, assessment and energy analysis activities of high performance energy efficient buildings. To use national and international standards and norms from the field of energy performance of buildings.
Transversal competences		The gained knowledge will be applied in writing a technical report that will include the calculations for high performance energy efficient buildings design. The paper will be presented afterwards. The calculations will be the ones foreseen at point 1.5 of the C107/1 which are mandatory in obtaining the construction permit.

7 Subject objectives

7.1	General objectives	Developing skills for designing high performance energy efficient buildings
7.2	Specific objectives	1. Acquiring knowledge regarding legislation and design norms for high performance energy efficient buildings 2. Skills development in designing high performance energy efficient buildings

8. Contents

8.1. Course (syllabus)		Teaching methods	Remarks
1	Overview, objectives, history. Energy efficiency at buildings	Exposure, applications	Video-projector
2	Legislation and norms regarding thermal performance of new buildings and thermal rehabilitation process at existing buildings		
3	Methodologies and implementation and certification standards for high performance energy efficient buildings		
4	Types of high performance energy efficient buildings		
5	Energetic compliance and performance of high performance energy efficient buildings.		
6	Structural and thermal insulation materials used at high performance energy efficient buildings.		
7	Constructive solutions used at high performance energy efficient buildings.		

8	Types of energy efficient windows.		
9	Non-conventional sources of energy used at high performance energy efficient buildings.		
10	Principles in designing low energy buildings.		
11	Principles in designing passive houses.		
12	Principles in designing zero energy buildings.		
13	Aspects in ensuring a healthy environment in the exploitation phase of high performance energy efficient buildings and emissions reduction in the atmosphere.		
14	Economic aspects achieved with high performance energy efficient buildings.		
8.2. Applications (seminar/ project)		Teaching methods	Remarks
1	Manual and software methods for determining the energy performance of high performance energy efficient buildings.	Exposure, applications	Standards and Norms, softwares: AutoCad, MathCad, MathLab, energy design tools
2	Modern software methods for analyzing the energy performance of high performance energy efficient buildings.		
3	Modern software methods for analyzing the energy performance of high performance energy efficient buildings by using expeditious methods.		
4	Modern methods for analyzing the energy performance of high performance energy efficient buildings by using calculation software.		
5	Global energy analysis of a high performance energy efficient building. Geometric characteristics calculation.		
6	Thermal performance calculation of the building envelope elements of a high performance energy efficient building.		
7	Energy grading and certification of high performance energy efficient buildings.		

Bibliography

1. Comşa, E., Moga, I., Munteanu, C., *Proiectarea funcţională şi constructivă a clădirilor de locuit, Partea a II-a*, Editura I.P.C.-N., Cluj-Napoca, 1987
2. Comşa, E., Moga, I., *Construcţii civile-Higrotermica şi acustica clădirilor*, vol II, Editura U.T.C.-N., Cluj-Napoca 1992
3. Moga, I., Manea, D., *Termotehnica clădirilor Culegere de probleme*, U.T. Press, Cluj-Napoca, 1999
4. Moga, I., Manuale de utilizare pentru programe de calcul în higrotermica clădirilor
5. Moga Ioan, Comşa Emil, Munteanu Constantin. - *Proiectarea higrotermică prin metode exacte a clădirilor* - Curs postuniversitar pentru Auditori Energetici, EdituraUT PRESS, Cluj-Napoca, 2010
6. Focşa, V., *Higrotermica şi acustica clădirilor*, Editura Didactică şi Pedagogică, Bucureşti, 1975
7. *** Normativele C107/0...7-2005
8. *** Metodologia de calcul al performanţei energetice a clădirilor. Partea I-a –Anvelopa clădirii- Indicativ MC 001/1-2006; Partea a II-a – Performanţa energetică a instalaţiilor din clădiri - Indicativ MC 001/2-2006; Partea a III-a – Auditul si certificatul de performanţă energetică - Indicativ MC 001/3-2006
9. *** Legea 372/ 13.12.2005 privind performanţa energetică a clădirilor, care transpune Directiva 91/2002/CE a Parlamentului European şi a Consiliului European;
10. *** Legea 372/2005 aparuta in M.O. 1144 - 19/12/2005, actualizată la 20 iulie 2013 cf. Legii 159/2013 din M.O. 283 - 20/05/2013
11. *** OUG nr. 18/2009 privind creşterea performanţei energetice a blocurilor
12. *** OUG nr. 18/2009 privind creşterea performanţei energetice a blocurilor de locuit;
13. *** Directiva 2010/30/UE a Parlamentului European şi a consiliului privind performanţa energetică a clădirilor.

Software:

1. AutoCAD, Student Version
2. Allplan Inginerie Starter, Student Version

9. Cross discipline collaboration with the economic environment

The gained knowledge will be necessary for employees that will work in building design field.
Graduates of this course may enroll in the qualifying examination of energy auditors, where this course is required as a criterion for eligibility.

10. Evaluation

Activity	10.1	Evaluation criteria	10.2	Evaluation methods	10.3	Percentage for final grade
Course		10 theoretic questions		Written test of 1.0 h		30%
Application		Evaluation of written part, calculations and drawings		Project presentation for 30 min.		70%
10.4 Minimum standards for passing the exam						
Exam grade E≥5; Project/paper grade A≥5						

Data	Discipline coordinator	Course coordinator
15 September 2016	Assoc.prof. Moga Ligia Mihaela	Assoc.prof. Moga Ligia Mihaela

Department approval date
.....

Department Director
Assoc.prof. Aciu Claudiu