



## SYLLABUS/FISA DISCIPLINEI

### 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	28

### 2. Discipline information

2.1	Name of the discipline	Thermotechnics of Constructions (Termotehnica construcțiilor)									
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	II	2.6	Semester	2	2.7	Evaluation	Exam	2.8	Discipline type	DID/DOB

### 3. Timpul total estimat

Year / Sem.	Discipline name	Weeks.	Course	Application			Course	Application			Individual study	TOTAL	Credit
			[hours/week]			[hours/sem.]							
				S	L	P		S	L	P			
II	Thermotechnics of Constructions	14	1	1			14	14			24	52	2

3.1	Hours per week	2	3.2	course	1	3.3	applications	1
3.4	Total hours from curricula	28	3.5	course	14	3.6	applications	14
Individual study								Ore
Study based on course manuals, bibliography and notes								14
Additional documentation at the library, on e-learning platforms and in the field (on sites)								3
Seminars/ Laboratories, homework, reports, portfolios, essays preparation								3
Tutoring								2
Examinations								2
Other activities								-
3.7	Total individual study hours	24						
3.8	Total hours per semester	52						
3.9	Credits	2						

### 4. Prerequisites

4.1	Of curricula	Knowledge regarding construction materials.
4.2	Of competences	Not applicable

### 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)	<p>To know the thermal parameters used in current hygrothermal design of buildings.</p> <p>To know the existing climatic zones in Romania.</p> <p>To know the heat transfer modes and the differential equations of heat transfer.</p> <p>To know the main calculation methodology for condensation calculations of an element of the building envelope.</p> <p>To know the difference between damp and condensation, superficial condensation and condensation in the mass of the element.</p>
	Acquired skills: (what he can do)	<p>To distinguish between thermal parameters of the environment and thermal parameters of the construction materials, and the thermal parameters that characterize the thermo-energetic behavior of an element of the building envelope.</p> <p>To identify the climatic zone where the building is placed.</p> <p>To identify the layers of materials of construction detail and to establish the thermal properties of it.</p> <p>To distinguish between the thermal conductivity values obtained through various measurements and between the thermal resistances of an element.</p> <p>To calculate the thermal resistances and the temperature distribution for any given element of the building envelope.</p> <p>To calculate the medium adjusted thermal resistance for any given panel of the building envelope.</p> <p>To establish the optimum insulation thickness for an element.</p> <p>To calculate the mass transfer parameters for a construction element.</p> <p>To distinguish between damp and condensation phenomena.</p>
	Habits acquired: (What tools is able to handle)	<p>To use software tools for design, assessment and thermal analysis activities of construction details for the element of the building envelope.</p> <p>To use measuring tools for establishing the thermal characteristics of a construction material or of a construction detail.</p>
Transversal competences	<p>The gained knowledge will be applied in writing a technical report that will include the calculations for the hygrothermal design of construction details for an element of the building envelope.</p>	

## 7 Subject objectives

7.1	General objectives	Developing skills in the thermotechnics of construction field, in order to design high performance energy efficient buildings
7.2	Specific objectives	<p>1. Acquiring knowledge regarding basic concepts of physics of constructions.</p> <p>2. Skills development for making preliminary calculations in hygrothermal design of buildings.</p>

## 8. Contents

8.1. Course (syllabus)		Teaching methods	Remarks
1	General presentation, objectives, historical data. The building as a factor for the thermal comfort.	Exposure, applications	Video-projector
2	Hygrothermal parameters, interior and exterior climatic parameters.		
3	Heat transfer laws: conduction, convection and thermal radiation.		
4	Differential equations of heat transfer.		
5	The answer of the building envelope elements at heat transfer in stationary and non-stationary regime.		
6	Manual and automatic solving of heat transfer equations.		
7	The answer of building envelope elements at water diffusion.		



8.2. Applications (seminar/ project)		Teaching methods	Remarks
1	Calculation of the thermal resistance for construction elements.	Exposure, applications	Standards and Norms, Calculator
2	Calculation of temperatures on the surface and in the mass of the construction elements		
3	Optimum sizing of the thermal insulation layer for construction elements		
4	Calculation of the overall thermal characteristics of an element of the building envelope R'		
5	Heat storage and heat release of a construction element.		
6	Main methodology for condense calculations of an element of the building envelope.		
7	Thermal retrofit of the building envelope elements for existing buildings.		
Bibliography			
<ol style="list-style-type: none"> <li>Comșa, E., Moga, I., Munteanu, C., <i>Proiectarea funcțională și constructivă a clădirilor de locuit, Partea a II-a</i>, Editura I.P.C.-N., Cluj-Napoca, 1987</li> <li>Comșa, E., Moga, I., <i>Construcții civile-Higrotermica și acustica clădirilor</i>, vol II, Editura U.T.C.-N., Cluj-Napoca 1992</li> <li>Moga, I., Manea, D., <i>Termotehnica clădirilor Culegere de probleme</i>, U.T. Press, Cluj-Napoca, 1999</li> <li>Moga, I., <i>Manuale de utilizare pentru programe de calcul în higrotermica clădirilor</i></li> <li>Moga Ioan, Comșa Emil, Munteanu Constantin. - <i>Proiectarea higrotermică prin metode exacte a clădirilor</i> - Curs postuniversitar pentru Auditori Energetici, Editura UT PRESS, Cluj-Napoca, 2010</li> <li>Focșa, V., <i>Higrotermica și acustica clădirilor</i>, Editura Didactică și Pedagogică, București, 1975</li> <li>*** Normativele C107/0...7-2005, 2010</li> <li>*** Metodologia de calcul al performanței energetice a clădirilor. Partea I-a –Anvelopa clădirii- Indicativ MC 001/1-2006; Partea a II-a – Performanța energetică a instalațiilor din clădiri - Indicativ MC 001/2-2006; Partea a III-a – Auditul și certificatul de performanță energetică - Indicativ MC 001/3-2006</li> </ol>			

### 9. Cross discipline collaboration with the economic environment

The gained knowledge will be necessary for employees that will work in building design field.

### 10. Evaluation

Tip activitate	10.1	10.2	10.3	Pondere din nota finala
Curs	3 theoretical questions	Written test of 1.0 h		25%
	3 theoretical questions	Viva voce test of 15'		25%
Aplicatii	Solving 2 or 3 problems	Written test of 1.0 h		50%
10.4 Standard minim de performanta				
Grade for problem test $A \geq 8,50$ , Grade for written theory exam $E \geq 5$ ; Grade for viva voce exam $E \geq 5$ ;				

Data  
29 September  
2017

Discipline coordinator  
Assoc.prof. Moga Ligia  
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Course coordinator  
Assoc.prof. Moga Ligia Mihaela

Department approval date  
September 2017.

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