



## 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	26

### 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 – ligia.moga@ccm.utcluj.ro									
2.4	Discipline coordinator	Assoc.prof. Moga Ligia Mihaela									
2.5	Year	II	2.6	Semester	1	2.7	Evaluation	Exam	2.8	Discipline type	DD/DI

### 3. Timpul total estimat

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								20
Additional documentation at the library, on e-learning platforms and in the field (on sites)								6
Seminars/ Laboratories, homework, reports, portfolios, essays preparation								6
Tutoring								4
Examinations								11
Other activities								-
3.7	Total individual study hours	47						
3.8	Total hours per semester	75						
3.9	Credits	3						

### 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	<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 condense 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> <p>To distinguish between thermal parameters of the environment and thermal parameters of the construction materials, and the thermal parameters that characterizes 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 conductivities values obtain 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> <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	<ol style="list-style-type: none"> <li>1. Acquiring knowledge regarding basic concepts of physics of constructions.</li> <li>2. Skills development for making preliminary calculations in hygrothermal design of buildings.</li> </ol>

## 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	Building envelope components behaviour at water diffusion.		
References			



1. 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			
2. Comșa, E., Moga, I., <i>Construcții civile-Higrotermica și acustica clădirilor</i> , vol II, Editura U.T.C.-N., Cluj-Napoca 1992			
3. Moga, I., Manuale de utilizare pentru programe de calcul în higrotermica clădirilor			
4. 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 Focșa, V., <i>Higrotermica și acustica clădirilor</i> , Editura Didactică și Pedagogică, București, 1975			
8.2. Applications (seminar/ proiect)		Teaching methods	Remarks
1	General formula for thermal resistances, temperatures and the temperature variation diagram,	Exposure, applications	Standards and Norms, Calculator
2	Calculation of the thermal resistance and the temperature variation diagram for a building component.		
3	Optimum dimensioning of the thermal insulation layer for construction components.		
4	Calculation of the adjusted thermal resistance $R'$ . the wall panel method.		
5	Thermal rehabilitation of the wall panel. Evaluation of the energy and cost savings due to thermal rehabilitation process.		
6	Heat storage and heat release in and from a building component.		
7	Exam		
References			
1. Moga, I., Manea, D., <i>Termotehnica clădirilor Culegere de probleme</i> , U.T. Press, Cluj-Napoca, 1999			
2. *** Normativele C107/0...7-2005, 2010, 2016			
3. *** 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			
4. ***Ordinul nr. 2641/2017 privind modificarea și completarea reglementării tehnice "Metodologie de calcul al performanței energetice a clădirilor", aprobată prin Ordinul ministrului transporturilor, construcțiilor și turismului nr. 157/2007			

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

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

### 10. Evaluation

Tip activitate	10.1	Criterii de evaluare	10.2	Metode de evaluare	10.3	Ponderea din nota finala
10.4 Curs		3 theoretical questions		Written test of 1.0 h		25%
		3 theoretical questions		Viva voce test of 15'		25%
10.5 Seminars		Solving 2 or 3 problems		Written test of 1.0 h		50%
10.6 Standard minim de performanta						
Grade for problem test S=Pass, Grade for written theory exam $E \geq 5$ ; Grade for viva voce exam $E \geq 5$ ;						
Data completării:	Titulari	Titlu Prenume NUME			Semnătura	
	Curs	Conf.dr.ing. Moga Ligia Mihaela				
	Aplicații	Conf.dr.ing. Moga Ligia Mihaela				



Data avizării în Consiliul Departamentului

Director Departament CCM  
Conf.dr.ing. Aciu Claudiu

Data aprobării în Consiliul Facultății de Construcții

Decan  
Conf.dr.ing. Nicolae CHIRA