CU 8.1: BUILDING ENERGY PERFORMANCE

Director of studies: Eric MOUGEL

General CU objectives:

• Providing all the essential knowledge to understand how a building and its envelope function in terms of energy performance, comfort, and environmental quality.

• The teaching content is designed to be practical, enabling students to learn the key tools for designing, sizing, and assessing a building's performance.

Consists of:

- Module 1: Building envelope and performance
- Module 2: Applications and regulations
- Module 3: Not applicable
- Module 4: Not applicable

Hourly volume

In-person	*Self-directed study*
22.75 H Lectures	**50.00 H**
18.00 H Tutorials	
38.00 H Practicals	

Positioning of the CU in the School reference system:

after CU 5.3, CU 5.4, CU 6.3 and CU 7.1

Units of skills

In accordance with the RNCP sheet

Updated on 23 March 2022

CU 8.1: BUILDING ENERGY PERFORMANCE

Module 1: Building envelope and performance	**Coefficient 1**
Session leaders: Eric MOUGEL, Caroline SIMON and Alexis NICOLAS	
Teaching assistants: Stéphane AUBERT	
Prerequisites: Heat and mass transfer bases (CU 5.3.M4, CU 6.3) and humid air (CU 5.4.M2)	
Teaching materials: Course material – Presentation slides– Technical documents	
Assessment methods: individual and in groups Class assignment– Viva– Practical examination assessment– File	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Understand the operation of a building envelope, and its role in energy performance, comfort, and even environmental quality.	Environmental and regulatory context. Presentation of the challenges of energy performance and the regulatory context.	**1.75**		
	Physical features of the envelope: Description of the functions of the envelope. Heat, humidity and air transfers. Applications: performance monitoring tools (air permeability, energy performance diagnostics, IR imaging, etc.)	**3.50**	**10.00**	
	Bioclimatic, solar design: The building envelope in its environment.	**1.75**		
	Practical lesson application: Complete energy audit on a building / dwelling, introduction to performance monitoring and evaluation tools			**12.00**
	Air quality: Description of issues related to air renewal, impact on indoor comfort and air quality: Practical lesson application: air quality analysis.	**3.50**		**4.00**
		10.50	**10.00**	**16.00**

Updated on 23 March 2022

CU 8.1: BUILDING ENERGY PERFORMANCE

Module 2: Applications and regulations	**Coefficient 1**
Session leaders: Eric MOUGEL, Romain REMOND, Vincent NICOLAS, Nadja REMOND (LIGNATEC– 8 hours), Alexis NICOLAS (PAST), Olivier FEDER (ALEC– Espace Info Energie– 8 hours)	
Teaching assistants: Stéphane AUBERT	
Prerequisites: Heat and mass transfer bases (CU 5.3.M4, CU 6.3) and humid air (CU 5.4.M2)	
Teaching materials: Course notes – Presentation slides	
Assessment methods: individual Class assignment– Report– File– Software	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Master the concepts of pre-sizing building and system envelopes. Learn about design and control tools. BIM in building heating.	Pathology and rehabilitation: Description of issues related to moisture transfers. Application: coupled heat mass transfer modelling software (WUFI)	5.25	2.00	4.00
	Regulation and labels, heating needs, DHW, ventilation: Performance evaluation / compliance verification: Application to RE2020 thermal regulations and labels.	3.50		
	Renovation of the existing stock (housing), technical-economic approach (ALEC)	1.75	6.00	
	Applications: – Practical lesson on ventilation on double flow with exchanger and thermodynamic unit. – introduction to RT + STD software (Pleiades) study of a simple project on STD software			18.00
	Presentation of an inventory of BIM deployment, application to building heating. Presentation of solutions and/or case studies.	1.75		
		12.25	**8.00**	**22.00**

Updated on 23 March 2022