2A FISA	CU 8.1
Semester 8	2 School ECTS - 3 Company ECTS

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
- Industrial assessment

Hourly volume

In-person	*Company*
22.75 H Lectures	**30.00 H**
18.00 H Tutorials	
12.00 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 29 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 Class assignment– Practical report assessment– Tutorial examination	

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.). Practical lesson application: Complete energy audit on a building / dwelling, introduction to performance monitoring and evaluation tools.	3.50	10.00	4.00
	Bioclimatic, solar design: The building envelope in its environment. Application: calculation of heating needs on PHPP (study of a project on PHPP software)	1.75		
	Air quality: Description of issues related to air renewal, impact on indoor comfort and air quality: Application: air quality analysis.	3.50		
		10.50	**10.00**	**4.00**

Updated on 29 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:	
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 – Arche page	
Assessment methods: individual Class assignment– Viva– Practical lesson report	

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		4.00
	Renovation of the existing stock (housing), technical-economic approach (ALEC)	1.75	6.00	
	Presentation of an inventory of BIM deployment, application to building heating. Presentation of solutions and/or case studies.	1.75		
		12.25	**8.00**	**8.00**

CU 8.1: BUILDING ENERGY PERFORMANCE

Industrial **assessment**	**Coefficient 1**
Session leaders: Apprentice supervisor (Construction Company)	
Teaching assistants:	
Prerequisites:	
Teaching materials:	
Assessment methods: Individual File	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Learn about building energy performance design and control tools. Know how to implement these tools/methods on a simple construction case.	Based on an industrial project (apprentice's company, company's customers or provided by the school), this project will put into practice on a concrete example the skills acquired during this teaching unit. The work requested will consist of the production of a technical file including the thermal study of a construction and the justification (needs, regulations, etc.) of the solutions implemented for the construction elements (envelope) as well as the systems (heating, ventilation, possibly DHW and cooling). Expected deliverables: 10-15 page report Depending on the company's area of expertise, the documents may be submitted either to the company or to the CU supervisor and the company. Note: the project must be related to the company's activity.			
		0.00	**0.00**	**0.00**

Updated on 29 March 2022