CU 9.11: COMPREHENSIVE APPROACH TO A WOOD PROJECT

Director of studies: Frédéric GABRYSIAK

General CU objectives:

The process of building a project begins with an idea and the formulation of the architectural plans.

It is then necessary to develop different technical choices and to be able to quantify their consequences in economic terms on the overall cost of a site.

One of the objectives of this CU will be to estimate the costs of carrying out the different stages inherent in a wood project.

In addition, it will be necessary to acquire knowledge of the various aspects of fire safety in timber construction, in particular for multi-family housing buildings and public access buildings.

Consists of:

- Part 1: Overall design approach
- Part 2: Fire safety and design for elevated temperatures
- Part 3: Insurance and Site / Workshop Safety
- Part 4: Parametric design for Timber Engineers

Hourly volume

In-person		*Self-directed study*
28.00 H	**Lectures**	**50.00 H**
64.00 H	**Tutorials**	
0.00 H	**Practicals**	

Positioning of the CU in the School reference system:

after semester 8

Units of skills

In accordance with the RNCP sheet

Updated on 8 November 2024

CU 9.11: COMPREHENSIVE APPROACH TO A WOOD PROJECT

Part 1: Overall design approach	Coefficient 1
Session leaders: Denis Bachmann (Caillaud LC, 3)	
Teaching assistants:	
Prerequisites: none	
Teaching materials: Course notes – Presentation slides	
Assessment methods: in groups File	

Learning outcomes	Description	Number of student hours (in-person)		
		Lectures	Tutorials	Practicals
Be able to develop different technical choices and to be able to quantify their consequences in economic terms on the overall cost of a site. Be able to fully pre-size a timber structure taking into consideration thermal, mechanical and acoustic aspects.	Evaluate the energy, acoustic and mechanical performance of a building by varying the main architectural design parameters	3.50		
	Conduct a sensitivity study to propose improvements in order to achieve the desired performance objective	3.50		
	Case studies on different types of buildings.		16.00	
		7.00	**16.00**	**0.00**

CU 9.11: COMPREHENSIVE APPROACH TO A WOOD PROJECT

Part 2: Fire safety and design for elevated temperatures	**Coefficient 1**
Session leaders: Stéphane HAMEURY (CSTB Project Manager)	
Teaching assistants:	
Prerequisites: none	
Teaching materials: Course notes – Presentation slides	
Assessment methods: individual Class assignment– Report	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Acquire knowledge of the various aspects of fire safety in timber construction, for multi-family housing buildings and public access buildings. Be able to verify the sizing of a timber structure under a combination of actions in a fire situation (sizing of simple elements, calculation of hot assemblies).	Goals and principles of regulation European Context. Reaction to fire, Fire resistance: definition, orders, justifications and conventional solutions. Regulation: – Public access buildings – housing: case of natural separators, case of façades – workplaces – Regulated Facilities for Environmental Protection "New" technical solutions: wooden mantle walls, prefabrication, new materials, façade cladding.	1.75	4.00	
	Verification of a structure in the Ultimate Limit State (ELS) with regard to fire (Combinations of actions in a fire situation, Reduced section)	3.50	6.00	
	Verification of fire sizing of assemblies according to Eurocode 5	1.75	6.00	
		7.00	**16.00**	**0.00**

CU 9.11: COMPREHENSIVE APPROACH TO A WOOD PROJECT

Part 3: Insurance and Site / Workshop Safety — Coefficient 1

Session leaders: François BRILLARD (Bureau Alpes Contrôle), Francis MARIETTE (ITECH)

Teaching assistants:

Prerequisites: CU 9.7

Teaching materials: Course notes – Reading list – Arche page –

Assessment methods: individual
Class assignment– Practical examination

Learning outcomes	Description	Number of student hours (in-person)		
		Lectures	Tutorials	Practicals
Implement regulatory audits of structures under seismic stress. Know the role and functions of a technical controller.	Case study of a regulatory verification of the resistance of a structure under seismic stress using the ACORD-BAT software.	3.50	12.00	
	• Technical controller role • Role of the inspection office in relation to that of the companies, the architect, the project manager and the contracting authority • Different control office assignments – Solidity of the enclosure and cover: mission L – Strength of separable elements: P1 mission – PS: Earthquake resistance – Fire Safety: SEI, SH, STI – Acoustics: Pha, PHH – Thermal: Th – Accessibility for people with disabilities: HAND – Certificates: ATRA, ATTH, ATHNAD – Other assignments: F, GTB, etc. • Case of mandatory technical control • Fire safety regulation architecture – Public access building – Housing – Labour Code – Classified installations for environmental protection • Key points in each phase: – Outline (Regulatory context and classification, emergency access, location, lifts, stairs,) – APS (C+D, Smoke extraction, Clearance) – APD (Clearances) – PRO (Reaction to fire, fire safety system) – Tender documents (observations taken into account in PRO) – Performance – Reception • Study of an apartment building with 5th category public access premises on the ground floor – Emergency services access – Separation between the public access premises and housing – Separation between housing units – Reaction of interior coatings to fire – Façades (Reaction to fire, C+D) – Separation	3.50	4.00	

CU 9.11: COMPREHENSIVE APPROACH TO A WOOD PROJECT

7.00	16.00	0.00

Part 4: Parametric design for Timber Engineers — Coefficient 1

Session leaders: Victor Fréchard (URM MC MAP)

Teaching assistants:

Prerequisites: none

Teaching materials: Course notes – Presentation slides – Tutorial files

Assessment methods: individual
Class assignment – Report –

Learning outcomes	Description	Number of student hours (in-person)		
		Lectures	Tutorials	Practicals
Know the key concepts and describe the value of parametric design for the modelling and engineering design of timber projects. Acquire a working methodology allowing for increased flexibility in the design process. Be able to parametrically model a timber structure. Know and be able to use shape generation and structural calculation tools. Know and use multi-criteria optimisation engines. Know and use tools that develop direct links, without sending files, between the software involved in the design of a wood project.	Understand the key concepts of parametric design (associativity, automation, integration, geometric complexity) as well as the algorithmic and 3D modelling bases necessary for its implementation in Grasshopper software. Presentation of case studies presenting the contributions of parametric design compared to current approaches.	1.75		
	Evaluate and optimise the mechanical, economic and environmental performance of a wooden structure using a multi-criteria parametric approach. Look at the structures integrating re-used elements (Phoenix 3d) and shaped structures {phrase incomplète}	3.50		
	Develop a collaborative, parametric, flexible working method, allowing a large number of iterations of the design, based on the interoperability of parametric design software (Grasshopper), structural design, wooden structure design (Cadwork), structure calculations (RFEM) based on the Rhino.Inside project. Look at the interoperability of architectural and parametric design software based on the Speckle project.	1.75		
	Parametric design of a wooden structure: model it from an imported context without sending files from Cadwork, evaluate it, optimise it with regard to identified criteria, and integrate elements from a reused resource. Directly transfer the structure designed in Cadwork, without sending files.		16.00	
		7.00	**16.00**	**0.00**

CU 9.1: COMPREHENSIVE APPROACH TO A WOOD PROJECT

Updated on 8 November 2024