1A FISE	CU 6.5
Semester 6	7 School ECTS

CU 6.5: DESIGN AND IMPLEMENTATION OF PROCESSES

Director of studies: Alain RENAUD

General CU objectives:

• Design a digital 3D model of a product or a component of a living space

• Steer industrial means of production

• Manage the preparation of materials and resources necessary for production

• Knowledge of the production process

• Ensure the exchange of information with the design

• Choose and implement a wood adhesive

• Recommend tests and use test results

Consists of:

- Module 1: CAM and Design of a digital model for construction
- Module 2: Knowledge of wood processing
- Module 3: Adhesives for gluing wood
- Module 4: Industrial digitised means of production

Hourly volume

In-person	*Self-directed study*
14.00 H Lectures	**60.00 H**
24.00 H Tutorials	
50.00 H Practicals	

Positioning of the CU in the School reference system:

semester 6: after CU 5.5

Units of skills

In accordance with the RNCP sheet

Updated on 11 April 2023

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Module 1: CAM and Design of a digital model for construction	**Coefficient 1**
Session leaders: Pierre-Jean MÉAUSOONE, Sébastien AUCHET, Alain RENAUD, Marc JAFFRES, CADWORK	
Teaching assistants:	
Prerequisites: none	
Teaching materials: Reading list– Reference book– Projects– Tutorials	
Assessment methods: individual Daily assessment by CADWORK	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Generate and modify a numerical control program in order to adapt it to a production situation. Characterise the different principles of the CAM. Design a digital model of a Construction or part of a Construction.	Principles of Numerical Control machine tools, Numerical control programming CAM applied to timber and its processing areas.	3.50	4.00	
	Representation tools (CADWORK): Use of timber and structural construction software packages – Exploitation of the software functionalities relating to the definition drawing with: * View * Construction of cuts, sections... * Presentation of the drawing: standard pricing, background, various writings, etc. * Editing BOMs – Product renderings – Production of macros.			20.00
		3.50	**4.00**	**20.00**

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Module 2: Knowledge of timber processing	**Coefficient 1**
Session leaders: Pierre-Jean MÉAUSOONE, Alain RENAUD, Marc JAFFRES	
Teaching assistants:	
Prerequisites: none	
Teaching materials: Course notes – Presentation slides – Reading list – Reference book – Files	
Assessment methods: individual In-class exam– File	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Define and characterise the different processes and means of production of the 1st processing. Define and characterise the different processes and means of production of the 2st processing.	Functional analysis of the sawmill circuit. Sawmill equipment following the timber circuit.	1.75		
	Log flow mode and material yield characterisation. Timber grading Organisation of panel production (OSB, MDF, CP, PPSM). Raw material optimisation methods.		4.00	
	Functional analysis of machines: – Flow machines (trimmer, chainsaw,etc.) – Processing machines (planer, moulder, etc.) – Numerically controlled machinery and Robot		4.00	
	– Organisation of the production of joinery products (parquet floors, joinery, panelling,etc.) – Machining settings (cutting and feed rates, feed per tooth, chip thickness) – Machining results (surface condition – machining quality, etc.) – The cutting tool and its angular characteristics/ Production cycle of metallic materials for cutting tools – Characterise optimal settings / Evaluation of cutting forces and calculation of power consumption	3.50	8.00	
		5.25	**16.00**	**0.00**

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Module 3: Adhesives for gluing wood	**Coefficient 1**
Session leaders: Emmanuel FREDON, Caroline SIMON	
Teaching assistants: Cyril DEHARBE, Marie-Laure ANTOINE, Christelle PERRIN	
Prerequisites: CU 5.1, M3, Chemistry refresher course (CU 5.3, M1)	
Teaching materials: Course notes – Presentation slides – Reading list – Arche page – Reference book	
Assessment methods: individual and in groups Class assignment– Report	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Choose or recommend an adhesive for panels and solid wood (structural, non-structural, dry to wet climate). Research, decipher and exploit technical information or information from scientific studies in the field of adhesives. Recommend tests to characterise the performance of a bond according to standards and exploit experimental results.	Structural and non-structural adhesives, general criteria for choosing an adhesive. Standard classification of adhesives. Physico-chemical classification of adhesives. Standardised testing and performance requirements.	1.75		
	Chemical description of binders. Corresponding uses (solid wood and panels), panel classifications, environmental criteria, emissions, costs.	1.75	4.00	
	Principles of cohesion and adherence. Bonding processes (panels and solid wood). Materials (gluing, pressing, etc.), specific times,. Factors affecting adherence (surface condition, extractables, density, temperature, humidity).	1.75		
	PRACTICALS: – preparation and planning of tasks, choice of adhesives and preparatory calculations of panels Manufacturing, testing			2.00
	PRACTICALS: – manufacture of test specimens, panels, Glulam, physico-chemical tests			8.00
		5.25	**4.00**	**10.00**

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Module 4: Industrial digitised means of production	**Coefficient 1**
Session leaders: Pierre-Jean MÉAUSOONE, Sébastien AUCHET, Alain RENAUD, Marc JAFFRES	
Teaching assistants: Cyril DEHARBE	
Prerequisites: none	
Teaching materials: Course notes – Reading list – Reference book – Tutorials	
Assessment methods: individual and in groups Evaluation of the use of machine tools (permit to use machine tools) / Manufacturing of products	

Learning outcomes	**Description**	**Number of student hours (in-person)**		
		Lectures	**Tutorials**	**Practicals**
Implement programmable production Guarantee production Optimise production Assemble products	Numerically controlled machines (positioning and contouring) Establishment of optimal machining conditions, defect analysis Production of products according to pre-established manufacturing files with a group work logic Measurement and inspection of parts, Installation, assembly and mounting of products (assembly table, assembly equipment, nailer, portable tools)			20.00
		0.00	**0.00**	**20.00**

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