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4th year vocational modules

I4-8 Presentation

Toulouse

1. B - GC (Construction and Civil Engineering) Module Specification

Note: This module should focus on teamwork, HR management, relationship management and on-site work.

Module section	Subject	Total hours	Teaching			Self study (other)
			Lessons, lectures (class or group)	Tutorial/practical project (group)	Individual project	
Introduction	- Presentation of the subject - Urban planning	14 hrs	8	6	-	-
Public works Project engineer Works engineer	- Technical building-related knowledge - Bid for tenders	56 hrs	8	18	10	20
Eco building Design engineer (building and public works)	- Building's energy audit - Use of solar energy	52 hrs	6	18	8	20
Intelligent building Intelligent building engineer	- Home automation techniques - Electric power transmission - Energy production	52 hrs	8	18	6	20
Conclusion	Sustainable development	6 hrs	6	-	-	-
Evaluation		4 hrs	-	-	-	-
	Module total	184 hrs	36 hrs	60 hrs	24 hrs	60 hrs

2. Description of the B - GC module

4.1. Module introduction

Module	B - GC	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/ Practicals project	Individual project	
Introduction	- Presentation of the subject - Urban planning	14 hrs	8	6		

➤ This section of the module's content :

Presentation of the subject : Energy and regulatory issues

- Presentation of the sector and those involved
- Regulations and norms** to adhere to in the building and public works sector:
 - Safety on site
 - Energy issues

Urban planning : Presentation of various aspects of the urban fabric and the issues facing it: technical, political, managerial, economic and social

- Presentation of innovative urban projects
- Study of innovative procedures in place in Toulouse's ecodistricts
- Presentation of the various mechanisms affecting urban innovation (regulations, requirements from EDF, GDF, Valeo etc.)
- Analysis of the evolution of the engineer's role

4.2. Public works

Module	B - GC	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/ Practicals project	Individual project	
Public works Project engineer & Works engineer	- Technical building-related knowledge - Bid for tenders	56 hrs	8	18	10	20

➤ **This section of the module's content :**

A building and public works study

Students must bid for a tender :

- Read specifications
- Work packages
- Read plans
- Surface evaluation
- Choice of materials and constituents
- External survey (subcontractor, experts)
- IT tools: MS Project, AutoCAD
- Breakdown of material and staff requirements
- Bid delivery deadline
- Opening of bids
- Contract
- Co-contractor, PPP contract (public-private partnership)

Risk analysis : Financial, contractual/legal, technical, security (health and safety, special guides), environmental (AES)

Planning and follow up :

- Planning preparation
- Site visits, visit reports

HR management :

- Employment (indefinite contract, indefinite site contract, definite contract, temporary contract) and subcontractor contracts
- Employment law

Materials management :

- Hire contracts
- TP machinery (hydraulic)

4.3. Eco building

Module	B - GC	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/ Practicals project	Individual project	
Eco building Design engineer (building and public works)	- Building's energy audit - Use of solar energy	52 hrs	6	18	8	20

➤ This section of the module's content :

Passive houses

- Energy management
- Impact on the environment : green energy, wastewater treatment, carbon reporting, diagnostics, toxicity of materials.

Construction systems, special structures

- Constructions in concrete, brick, wood, glass etc.
- Calculations for reinforced concrete, steel framing
- Resistance to snow, wind etc. (EUROCODE 3 standard)

Energy efficiency

- Energy and consumption diagnosis
- Energy basics and parameters for buildings (unit of measurement, thermal energy laws, consumption parameters)
- Material properties (isolation, fire resistance, acoustic)
- Thermal isolation of walls (new materials)
- Ventilation and aeration
- Heating and air-conditioning :
 - Heat pumps
 - Air conditioners
- Use of solar water heating and solar energy (panel energy output)

⇒ Example of use : solar energy

- General presentation of solar energy
- Technical section : use of silicon, technical analysis and scaling, structure project, energy output etc.
- Research section : market analysis, resource management depending on site category etc.

4.4. Intelligent building

Module	B - GC	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/ Practicals project	Individual project	
Intelligent building Intelligent building engineer	- Home automation techniques - Electric power transmission - Energy production	52 hrs	8	18	6	20

➤ **This section of the module's content :**

Electric power transmission

- High current and low current
- Transport, distribution
- Norms (NF C 15-100, R7)

Home automation techniques

- What is an intelligent building ?
- Data feed :
 - Technical management of installations (lighting, heating, air conditioning, ventilation)
 - Understanding of thermal, acoustic and visual comfort
- Energy flow :
 - Lighting, heating, air conditioning and ventilation
 - Security (fire and flight safety system, panic button, CCTV)
 - Communication: communication networks (wireless or not)
- Techniques: sensors & actuators, automation & feedback by central control system

Energy production

- Energies (wind, solar etc.)
- Design a system using renewable energy sources
- Energy transformation
- Redistribution on networks

4.5. Module conclusion

Module	B - GC	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/ Practicals project	Individual project	
Conclusion	Sustainable development	6 hrs	6	-	-	-

➤ This section of the module's content :

Introduction to sustainable development

How can the concept of sustainable development work in a company ?

3 spheres of activity : Economic, Social, Environment

4.1. Presentation of the type of subject for the final project in the B-GC module

Design engineer (building and public works)

- Case studies : partial cost breakdown of works, material specification based on plans/drawings, measurements
- Optimisation of an installation to improve a sector's productivity
- Site risk analysis
- Site management : progress monitoring, planning and reporting updates
- Study of the rehabilitation or renovation of a building

Sustainable environment

- Building energy survey
- Energy diagnosis
- Waste treatment studies
- Validation of special structure scaling
- Choice of material with low carbon footprint

Intelligent building

- Performance tests on energy production equipment for houses
- Case studies : Integration of an automation system in a building
- Drawings and diagrams of a building's electric plans