Civil Engineering

International Private Higher Polytechnic School of Sousse (EPI)

Civil engineering department has an orientation or development council:

- ●Total number of members: 4
- ●Number of representatives from the economic world: 2
- ●Frequency of meetings: 2 to 3 meetings per semester

In the Civil Engineering department of EPI-Polytechnique, the objective is to train engineers capable of designing, analyzing, calculating, realize, to appraise and of manage works in the sectors of construction.

The GC Engineer is an engineer specialized in the design and implementation of means, the management of people in the act ofbuild.
He engaged her responsibility with respect to their community and of the company in artwork tour towards humans:

- Construction of buildings has use residential, of shops, of buildings industrial, of offices or of shows
- Construction of communication and land-use infrastructure (roads, bridges, tunnels, logistics centers, dams,power stations energy) or backup of the environment (management of the waters, storage of waste)

The engineer can intervene in anything what stage of the operation of construction, since the study of ground until their reception of the work:

- study of ground, calculation of the foundations

- design of the work (calculation, methods, study of price)
- conduct of the works
- control technical

The training offered by EPI-Polytechnique is constantly adapted to the needs of companies by integrating the evolution of techniques andmethods In the area of civil engineering.

- ***Repository skills:***

The training offered in civil engineering at EPI-Polytechnique allows engineering students to have the necessary tools to deal with problems complex which will constitute their future missions. This training is characterized by basic scientific training, and training in speciality In THE areas of Civil Engineering And by a training transversal. There training understand also of the modules of entrepreneurship, visits and conferences, two internships of one month each in a company in the 3rd and 4th year and an end-of-study project in 5th – year of 3 month minimum.

- ***Basic skills***

- solid knowledge in science fundamental and science of the engineer.
- There awareness and understanding of field scientist of the speciality.
- There mastery of the methods and of the tools of the engineer
- Their ability has integrated in organization Or a team
- Involvement In THE challenges professionals

- ***Research scientist skills:***

  - Be able of to do a state of art of the works of research related has a thematic
  - Se endows of the mind critical and of analysis of there literature
  - Mastering deadlines and time management for an applied research project
  - Working in a group

- ***Civil Engineering skills***

Technology and processes of construction

Know analyze their structure of a building simple, identify The role of the different elements In all of a project, to propose a phasing constructive simple.

Principles of design and execution of building and civil engineering structures: role of the structure, overall stability, joints. Design And implementation work of frames, of the floors, of the foundations, of the casings and of the tanks.

Knowledge of the materials of construction

The main materials: their nature, composition, characteristics and properties, in connection with their microstructure; their design, manufacturing and use in construction.

Construction materials management and life cycle analysis;

Concrete

- Concrete armed: Knowledge of base indispensable has there determination of the sections reinforcement of the elements of supporting structures (posts, beams) subjected to simple stresses. Knowledge of verification methods of the constraints in the different materials constituents of the element.
- Concrete prestressed: Mastery of analysis And there design of beams, of slabs unidirectional And of membranesloaded axially in concrete prestressed.

Construction metallic

Analysis And sizing of the frames in steel

Calculation of the structures

Mastery of the tools of calculations of the structures, traditional Or computerized, effective, And of calculation dynamic.

Mechanical soils

Knowledge fundamental on THE properties of the floors And mastery of the concepts required For analyze THE behavior mechanical of the floors.

Knowledge essential For the study of there stability of the slopes And there design of works in mechanical of the floors And mastery of the methods recognized For THE calculation of the walls of support And of the foundations superficial and deep.

Dynamic of the structures

Mastery of methods for analyzing dynamic problems and vibrations

Hydrology and Hydraulic

To know the relationships fundamental of hydraulics - To know THE main features hydrogeological of the rocks of a basement and the fundamental bases of groundwater flow and groundwater level fluctuations - Know how to use useful formulas to needs of geotechnical engineer

In the case of drainage Or of drawdown of tablecloth. Design in sanitation And water drinkable.

Thermal and Acoustic

Developments and applications of basic thermal transfer elements to the study of heat transfer from enclosures and equipment heating and air conditioning of the buildings.

Applications of architectural acoustic studies to airborne noise

Management of the risks

Understand the risks incurred by civil engineering works and the people occupying them. Acquire some assessment tools risks and risk management. Be aware of risk engineering. Learn to know the phenomena, causes and consequences; consider of the solutions For satisfy the precautionary principle

Artwork

Principles of there realization of the main works And principles of calculation (sizing And verification)

Roads

Knowledge techniques specific on there road in so much that system technical, destined has there traffic of vehicles For THEtransportation of the people And of the goods. A system road East built And maintained, maintained And exploited in traffic, designed And planned.

Diagnostic And repair of works

Knowledge of the main causes of pathology in civil engineering works: knowing how to analyze the phenomenology and causes of aging of concrete and steel. Furthermore, this analysis results from the exposure of preventive and curative remedies generally employees.

Software of civil Engineering

Mastery of the tools IT And software of drawing, design , calculations and planning for the Civil Engineering in agreement with the novelties of

sector

Project Management:

Strong project management skills are necessary for overseeing construction projects from conception to completion. This involves planning, scheduling, budgeting, and coordinating resources effectively to ensure project success.

Communication and Collaboration:

Effective communication skills are vital for interacting with clients, architects, contractors, and other stakeholders throughout the design and construction process. Collaboration skills are also essential for working within multidisciplinary teams.

- ***The skills of Buildings & Energy Speciality***

Building Structural Engineering:

Understanding the principles of structural engineering is crucial for designing safe and durable buildings. You should be adept at analyzing and designing various structural elements such as beams, columns, and foundations.

Building Design and Construction:

Proficiency in building design software like AutoCAD, Revit, or Tekla Structures is essential. You should also have knowledge of construction techniques, materials, and building codes to ensure compliance and efficiency in construction projects.

Energy Efficiency and Sustainable Design:

Given your specialization in energy, you would have expertise in optimizing building designs for energy efficiency. This includes knowledge of green building practices, renewable energy systems, energy modeling software (e.g., EnergyPlus, eQUEST), and sustainable materials.

HVAC Systems Design:

Understanding Heating, Ventilation, and Air Conditioning (HVAC) systems is crucial for maintaining indoor air quality and thermal comfort in

buildings. You should be familiar with HVAC design principles, equipment selection, and energy-efficient HVAC technologies.

Building Energy Analysis:

Proficiency in conducting energy audits and simulations to assess the energy performance of buildings is essential. This involves using software tools like EnergyPlus, DesignBuilder, or IES VE to analyze factors such as heat transfer, lighting, and occupant behavior.

Renewable Energy Integration:

Knowledge of integrating renewable energy systems such as solar photovoltaics, wind turbines, or geothermal systems into building designs. This includes understanding the technical requirements, feasibility assessments, and economic considerations of renewable energy installations.

- ***The skills of Bridges & Roadways Speciality***

Bridges Structural Analysis and Design:

Proficiency in structural analysis. This includes analyzing loads, determining structural integrity, and designing components such as beams, columns, and decks.

Bridge Design Standards:

In-depth knowledge of bridge design codes and standards such as AASHTO LRFD Bridge Design Specifications, Eurocodes, or relevant local standards. This ensures compliance with safety and performance requirements for different types of bridges.

Geotechnical Engineering:

Understanding soil mechanics and geotechnical principles is essential for designing stable foundations for bridges and evaluating slope stability along roadways. Skills in soil testing, site investigation, and foundation design are valuable in this aspect.

Transportation Engineering:

Familiarity with transportation planning principles, traffic engineering, and geometric design standards for roadways. This includes designing road

alignments, intersections, and traffic control measures to ensure safe and efficient transportation systems.

Bridge Inspection and Maintenance:

Proficiency in bridge inspection techniques and knowledge of maintenance practices is necessary for ensuring the long-term safety and functionality of bridges. This includes conducting inspections, assessing structural health, and prioritizing maintenance and rehabilitation activities.

Risk Assessment and Management:

Skills in identifying and mitigating risks associated with bridge and roadway projects, including factors such as environmental impacts, geotechnical hazards, and regulatory compliance issues

Objective Module Matrixes: Civil Engineering – Option: Bridges & Roadways

Families of the SKILLS	SKILLS	Level	Matter
Mathematics 1	Master the methods of solving equationsmathematics of there physical, of the problems optimization…	1-2	Mathematics of the engineer - Analysis digital – Probabilities And statistical – Research operational
MMC-RDM-Structures	- Theory of the beams. - Modelization And Design of the structures	1-2	MMC, RDM, Structural Calculations, Elements finished, Dynamic of the structures, Plates & Hulls.
PGC &Topography	- Technology of construction. -Identify THE processes of construction of the elements carriers - Establishment of the lifted.	1	General construction processes ,Topography
Mechanical	-Acquire the theoretical bases of fluid mechanics andhydraulics. - to study THE properties physical, mechanical And hydraulicof the floors of foundation of works civil engineering in order to classify And from to know THE behavior.	2	Fluid mechanics , Hydraulics, Mechanical of the Floors.
Materials of Construction	- Identify And master THE different types of materials of construction used in Civil Engineering.	1	Materials of Construction

Software of GC	- Modelization & Calculation digital of the works. - Mastery And integration softwares. -Realization of the drawings of execution. -Elaboration of the notes of calculation.	2-3	CAD, GC Software: Arche – Robot – Revit
Roads And Transportation	- Identify the different types of roads, use data fromcount traffic and set build parametersgeometric of a road. -Sizing And rehabilitation of the roads.	2-3	Roads 1, Roads 2, Software GC: Track – Covadis Design and calculation of road projects
Concrete armed	- To know THE behavior of material composite Concrete Armed, his qualities And his defaults And THE terms application	2-3	Concrete armed1, Concrete armed2, Software GC
Prestressed concretePathology	of regulation in force. He must be in measureto carry out a load descent and apply the differentcombinations of loadings. - Calculate THE frames longitudinal And transverse And to carry out the necessary checks of an isostatic beam of rectangular section and tee section subjected to bending simple And to draw up correctly her plan of reinforcementcorresponding. - Master THE calculations And there technology of concrete prestressed. -Do A diagnostic of the orders In THE constructions Andto propose of the solutions For remedy.		Robot Arch, Prestressed Concrete, Diagnostic and repair books.
Construction metallic	- Design And sizing of the structures metallicaccording to regulation in force (Eurocode 3)	2	construction , GC Software:Robot

Hydrology And Hyd urban	-Estimate the needs of a community or a building and toconnect to the network of drinking water. - Know the main types of networks in housing estatesurban. Study their design, sizing, and implementation artwork.	2	Hydrology And Hydraulic urban – VRD – Hydraulic structures
Metre, Management And securityConstruction sites	-coordinate and control the means necessary for the realization work to develop the various schedules for a project workspublic. - Develop a preliminary bill of quantities and a quantity survey and carry out a studyprices. -To know THE laws And regulations concerning there health And there security For to work on THE construction sites of construction. Become familiar with the security protocol and know how to apply itplan security	2-3	Quantity measurement and price estimation, planning and organization of construction sites, management of risks, Software GC: Primavera
Artwork	- To know there terminology of the works art And of dimension some elements of a work of art. - To know there technology of realization some specials -Get started to calculations of current works	2-3	Design And construction of the bridges, Works art
Computer science	- Development of the programs computers.	1	Algorithms And structures of the data Preparations for certification: MOS
SKILLS general	Communication in different LANGUAGES, opening on the socio-economic environment, international openness, creativity, initiative, autonomy, spirit self-training.	2-3	English, French, HRM, Right work, ESB certification, Internship, PFA, PFE.

Research Scientist	Be able to do a state of art of the works of research relatedhas a thematic Se endow of the mind critical And of analysis of there literature lead well has term A project of research applied	2-3	Scientific subjects Mathematics LANGUAGES PFA & PFE

Level 1: Elementary *Level 2: Intermediate* *Level 3 : Advance*

Objective Module Matrixes: Civil Engineering – Option: Buildings & Energy

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PGC &Topography	- Technology of construction. -Identify THE processes of construction of the elements carriers - Establishment of the lifted.	1	General construction processes , Topography
Mechanical	-Acquire the theoretical bases of fluid mechanics andhydraulics. - to study THE properties physical, mechanical And hydraulicof the floors of foundation of works civil engineering in order to classify And from to know THE behavior.	2	Fluid mechanics , Hydraulics, Mechanical of the Floors.

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Buildings & Energy Ecology	- Master the different stages of design and calculation relating to the building sector. - Design buildings with low energy consumption - Build while respecting ecological transition issues - introduction to Eco-construction.	2-3	Design and calculation of projects buildings,Works individuals of GC, Energy study of buildings, Ecological buildings
Computer science	- Development of the programs computers.	1	Algorithms And structures of the data Preparations for certification: MOS
SKILLS general	Communication in different LANGUAGES, opening on the socio-economic environment, international openness, creativity, initiative, autonomy, spirit self-training.	2-3	English, French, HRM, Right work, ESB certification, Internship, PFA, PFE.

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