ULT Civil Engineering

Subjects Modules for S4

Semester 2 Year 2

4.1: Mechanics 4
Soil Mechanics 2

Module designation	**Mechanics 4**
Module level, if applicable	2nd year
Code, if applicable	U4.1
Subtitle, if applicable	****
Courses, if applicable	Soil Mechanics 2
Semester (s) in which the module is taught	2nd semester (S4)
Person responsible for the module	Dr Issam Khezami
Lecturer	Hatem KAROUI
Language	French
Relation to curriculum	Scientific Subject (compulsory), To continue studying Soil Mechanics, and familiarize with applications during workshop.
Type of teaching, contact hours	42 hours, of Integrated Course (Classroom Lecture) 21 hours practical workshop in Lab
Workload	Total 105 Hrs/Semester (42 hours of Self Study)
Credit points	4 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Continuum Mechanics, Materials Technologies, Soil Mechanics 1
Module objectives/intended learning outcomes	**Objectives:** 1. To understand foundation principles, structures and stability. 2. To practice experimental measurement of physical and mechanical soil properties commonly used in civil engineering. 3. To understand and be able to apply the modeling and analysis techniques used in soil mechanics **Learning Outcomes:** Students will be able to: 1. To solve a range of soil related problems, mainly problems related to water flow and soil settlement. 2. To use modern soil mechanics equipment and soil investigation procedures.

Content	**CLASSROOM COURSES:** **Chapter I: Shallow foundations** 1- Soles and rafts 2- Bearing capacity factors 3- Calculation of shallow foundations 4- Distribution of stresses under the foundations **Chapter II: Deep Foundations** 1- Piles and wells 2- Threshing formulas 3- Static determination of the bearing load 4- Horizontal forces 5- Ballasted columns **Chapter III: Soil survey** 1- In situ tests 2- Scissometer and pressuremeter 3- Static penetrometer 4- Pathology of foundations **Chapter IV: retaining structures** 1- Sliding and pushing wedge 2- Thrusts on gravity retaining walls 3- Stability of weight walls 4- Reinforced concrete retaining walls **Chapter V: Stability of slopes** 1- Landslide 2- Calculation of slope stability 3- Influence of water flows on the stability of slopes 4- Embankments, dikes and dams **PRACTICAL WORK:** **TP1 - PROCTOR Test (Normal and modified)** **TP2 - (California Bearing Ratio) CBR Test** **TP2 - Box Rectilinear Shear Test** **TP3 - Oedometer Test on Compressible and Incompressible Materials**
Study and examination requirements and forms of examination	Written Mid-term Exam (25%) + Practical exam (25%) + Written Final Exam (50%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Practical Workshops in Lab Video projection
Reading list	1- G. Sanglérat, G. Olivera et B. Combou « Cours de mécanique des sols et de fondations » 2- F . Schlosser " Eléments de mécanique des sols » 3- F . Schlosser " Exercices de mécanique des sols » 4- G. Philipponnat « Fondations et ouvrages en terre » 5- Robert W. Day « Foundation Enginnering Handbook »

U4.1: Mechanics 4
Theory of Structures 2

Module designation	**Mechanics 4**
Module level, if applicable	2nd year
Code, if applicable	U4.1
Subtitle, if applicable	****
Courses, if applicable	Theory of Structures 2
Semester (s) in which the module is taught	2nd semester (S4)
Person responsible for the module	Dr Issam Khezami
Lecturer	Mansour EL JEMLI
Language	French
Relation to curriculum	Scientific Subject (compulsory), To continue studying Structures, and familiarize with applications.
Type of teaching, contact hours	42 hours, of Integrated Course (Classroom Lecture)
Workload	Total 84Hrs/Semester (42 hours of Self Study)
Credit points	3 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Continuum Mechanics, Resistance of Materials , Theory of Structure 1
Module objectives/intended learning outcomes	**Course Objectives:** 1. Understand the principles of behaviour of reticulate structures and development of the force and displacement method to calculate it. 2. Deepen the knowledge of hyperstatical structures behaviour in linear regime. **Learning Outcomes** Student will be able to: 1. Calculate displacements and internal forces of statically indeterminate structures 2. Design and evaluate structural components and systems to meet the specification.

Content	**Chapter 1: Resolution of continuous beams by the method of the three moments** 1. Degree of hyperstaticity of a continuous beam 2. Three moments or Clapeyron theorem 3. Expressions of bending moment, shearing effort and support reactions 4. Three-moment method calculation steps **Chapter 2: Influence Lines** 1. Definition of Influence lines 2. Isostatic Beam Influence lines 3. Representations of Influence lines 4. Reading an Influence line 5. Use of the Influence line **Chapter 3: Triangular system (or plane trellis)** 1. Terminology (Knots, bars) 2. Isostatic and hyperstatic systems 3. Type of trellis 4. Calculation assumption 5. Solicitation of bars 6. Calculation of isostatic plane lattices by the node method 7. Calculation of isostatic plane lattices by the section method (de Ritter)
Study and examination requirements and forms of examination	Format: Written Mid-term Exam (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection
Reading list	[1] Analyse et calcul des structures/ Aram Samikian.-Paris : Gaëtan Morin Editeur, 1994. -580 pages ; 20cm x 25cm. [2] Calcul des structures : cours avec problèmes résolus/Kaouther Ben Kaddour Machta, Samir Ellouz.-Tunis : éditions centre de publication universitaire, 2007. -192 pages ;16cm x 20cm. [3] Comprendre simplement la résistance des matériaux : la structure, principes et enjeux pour la conception / Rémy Mouterde et François Fleury.-Paris : éditions du Moniteur, 2007. -320 pages ; 24cm x 24cm. [4] Conception et calcul des structures de batiment : formulaire / Henry Thonier -Paris : éditions Presses Ponts et Chaussées, 1999. - 295 pages ; 17cm x 24cm [5] Formulaire de resistance des Materiaux / Youde Xiong - Eroylles, Dalta , 2002. -342 pages ; 20cm x 25cm

U4.2: Public Works 2
Projects Planning

Module designation	**Public Works 2**
Module level, if applicable	2nd year of engineering Cycle
Code, if applicable	U4.2
Subtitle, if applicable	-
Courses, if applicable	Projects Planning
Semester (s) in which the module is taught	2nd Semester (S4)
Person responsible for the module	Dept. Head
Lecturer	Riadh OTHMEN
Language	French
Relation to curriculum	Professional Module, Compulsory
Type of teaching, contact hours	12h Workshop in Lab 9h for Group Project
Workload	Total 51 Hours (30 Hours of Self Study)
Credit points	2
Requirements according to the examination regulations	-Minimum Attendance rate : 80% >20% of non-attendance= elimination for exams
Recommended prerequisites	Organisation des chantiers – Evaluation Economique de la construction
Module objectives/intended learning outcomes	**Objective:** Coordinate and plan the various actions that lead to the delivery, on time and in the best conditions, of the civil engineering work or project for which you are responsible. **Learning Outcomes:** Students will be able to: 1. Breaking down a into elementary tasks 2. Know how to apply and know the constraints between the different tasks 3. Treat punching, fatigue problems 4. Estimate the beginning and end of each task and the delivery time of the work

Content	**Workshop in Lab** **Chapter I: PROJECT MANAGEMENT:** BALANCE BETWEEN CONTENT, TIME, BUDGET AND SECURITY **Chapter II: MAIN COMMANDS OF MSPROJECT** **Chapter III: PROJECT DEFINITION AND PLANNING** **1**. Summary and Subtasks 2. Duration 3. Bindings 4. Fixed work versus fixed duration **Chapter IV: RESOURCE ALLOCATION** **1.** List of resources 2. Types of resources 3. Resource Calendar **Chapter V: ANALYSIS AND ADJUSTMENT OF THE SCHEDULE** 1. Quantity of work 2. Resource Audit 3. Critical tasks and path 4. Changing the total duration 5. Changing resource assignments **Chapter VI: MONITORING AND CONTROL** 1. Initial planning 2. Follow-up of work progress and expenses 3. Analysis of project performance 4. Corrective measures
Study and examination requirements and forms of examination	100 % Oral presentation & Project report
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection
Reading list	

U4.2: Public Works 2
Urban Hydraulics

Module designation	**Public Works 2**
Module level, if applicable	2nd year
Code, if applicable	U4.2
Subtitle, if applicable	****
Courses, if applicable	Urban Hydraulics
Semester (s) in which the module is taught	2nd semester (S4)
Person responsible for the module	Dr Issam Khezami
Lecturer	Ismail YOUSFI
Language	French
Relation to curriculum	Professional Subject (Compulsory) To introduce Urban Hydraulics, classification, implementation, and area of applications to students
Type of teaching, contact hours	21 hours, of Integrated Course (Classroom Lecture) 21 hours for Projects
Workload	Total 84 Hrs/Semester (42 hours of Self Study)
Credit points	3 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Hydraulics & Applied Hydrology, Continuum Mechanics, Fluid Mechanics
Module objectives/intended learning outcomes	**Objectives :** 1. Understand how to calculate and size rainwater and wastewater treatment networks as well as hydraulic structures. 2. Understand operation of wastewater treatment plants **Outcomes :** The students will be able to: 1. Describe the objectives of urban hydraulic networks 2. Evaluate rainwater and wastewater flows 3. Design urban hydraulic networks, and wastewater treatment plants and work on related projects. 4. Work with experts in the legal environment of urban hydraulic networks

Content	**Part I: Course:** **CHAPTER 1: Introduction to urban sanitation** 1. What is sanitation? Definitions. 2. The different methods of sanitation. 3. Choice of sanitation system **CHAPTER 2: Calculation of rainwater and wastewater flows** 1. Urbanized drainage basins: Caquot model and Rational method. 2. Large urbanized watersheds 3. Calculates wastewater flow rates. 4. Maximum flow rates for the future **CHAPTER 3: Sizing of sanitation networks** 1. Morphology of the network. 2. Network design. 3. Sizing of the storm water network. 4. Sizing of the wastewater network 5. Software application in Excel **CHAPTER 4: Wastewater treatment plant** 1. Primary treatment.-Secondary treatment and tertiary treatment. 2. Sizing of a wastewater treatment plant **CHAPTER 5: Hydraulic works** 1. Storm basins on sanitation networks 2. Storm spillways 3. Pumping stations 4. Complementary works:. Treatment overflow and overflow, works and pre-treatment equipment **Part II: Projects** - Project 1: Delimitation and Characterization a Watershed by Global mapper software. - Project 2: Study and sizing culvert - Project 3: Determination of the flow of a watershed - Project 4: Study of a water treatment plant - Project 5: Design of a potable water system
Study and examination requirements and forms ofexamination	Format: Report and oral presentation of each project (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection
Reading list	*J. BONNIN « Hydraulique urbaine » Eyrolles* *Walter H. GRAF AND M. S ALTINAKAR "Traité de Génie Civil , Vol 16 . " Hydraulique fluviale"* *W. Hager and Richard O. Sinniger "Traité de Génie civil, Vol 15, Constructions Hydrauliques Ecoulements stationnaires"*

U4.2: Public Works 2

Prestressed Concrete1

Module designation	Sciences & Technology
Module level, if applicable	2nd year
Code, if applicable	U4.2
Subtitle, if applicable	-
Courses, if applicable	Prestressed Concrete 1
Semester (s) in which the module is taught	Semester 4 (S4)
Person responsible for the module	Dr Issam Khezami
Lecturer	Abdelmajid BOUABEN
Language	French
Relation to curriculum	Professional Subject(Compulsory) To introduce Prestressed Concrete, realization, and area of applications to students
Type of teaching, contact hours	42 hours, of Integrated Course (Classroom Lecture)
Workload	Total 84Hrs/Semester (42 hours of Self Study)
Credit points	3 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Resistance Of Materials, Theory Of Structures 1 &2, Reinforced Concrete 1
Module objectives/intended learning outcomes	**Objectives:** 1. Understand Prestressed Concrete and its application (Bridges, Buildings, etc.) 2. Understand the evaluation of the prestressing force and the losses, **Outcomes:** Students will be able to: 1. Evaluate the behavior and design of prestressed concrete beams and slabs. 2. Analyze the stresses in anchorage zones and design end anchorages for prestressed concrete beams and slabs; 3. Study the short-term and long-term losses in prestressing

Content	**CHAPTER I:** Actions and Solicitations **CHAPTER II:** Mode of Realization of the Prestressing **CHAPTER III:** Prestressing Losses **CHAPTER IV:** Service limit state of resistance of beams in bending **CHAPTER V:** Ultimate limit state of resistance of beams in bending **CHAPTER VI:** Sharp forces
Study and examination requirements and forms of examination	Format: Written Mid-term Exam (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection,
Reading list	Pratique du béton précontraint. Dreux Edition Eyrolles. Le Béton précontraint aux états limites Henry Tonnier, Presse de l'Ecole Nationale Ponts et Chaussées.

List of Electives-S4:

Elective Unit 1: Building Technique	Module 1: Reinforced Concrete 2
	Module 2: Building Information Modeling BIM 3
	Module 3: Metallic Construction CM 1
Elective Unit 1: Bridges & Roads	Module 1: Road Engineering 2
	Module 2: Road Projects Design
	Module 3: Artwork 1

Elective Unit 1 Building Technique

Elective Module 1: Reinforced Concrete 2

Module designation	**Building Technique**
Module level, if applicable	2nd year
Code, if applicable	U4.2
Subtitle, if applicable	****
Courses, if applicable	Reinforced Concrete 2
Semester (s) in which the module is taught	2nd semester (S4)
Person responsible for the module	Dr Issam Khezami
Lecturer	Samy ANTIT
Language	French
Relation to curriculum	Elective Module -Professional Subject Continue to study Reinforced Concrete concepts, application and testing techniques.
Type of teaching, contact hours	42 hours, of Integrated Course (Classroom Lecture)
Workload	Total 84Hrs/Semester (42 hours of Self Study)
Credit points	3 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Resistance of Materials , Theory of Structure 1&2, Reinforced Concrete 1
Module objectives/intended learning outcomes	**Objectives :** 1. Understand the principles and rules of Design and reinforcement of sections. 2. Understand the Design and reinforcement of shallow foundations 3. Become familiar with issues in the design and fabrication of reinforced concrete. **Outcomes :** Students will be able to: 1. Design the sections subjected to compound bending, continuous beams and shallow reinforced concrete foundations. 2. Perform an industry relevant design project within teamwork. 3. Students will be able to analyze and design for deflection and crack control of reinforced concrete

Content	**Chapter 1.** Design and reinforcement of sections subjected to compound bending. Dimensioning and longitudinal reinforcement of continuous beams **Chapter 2.** Dimensioning of shallow foundations (rigid and flexible) **Chapter 3.** Sections (rectangular, T-shaped) subjected to simple bending (rule of three pivots). Dimensioning of transverse reinforcements. **Chapter 4.** Verification of the slabs during punching. **Chapter 5.** Constructive arrangements of the reinforcements.
Study and examination requirements and forms of examination	Format: Written Mid-term Exam (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection
Reading list	· *Pratique du BAEL 91 Cours avec exercices* · *Pratique du béton précontraint. Dreux Edition Eyrolles.* · *Cours de Béton armé J. P Morgan* · *Le Béton précontraint aux états limites Henry Tonnier, Presse de l'Ecole Nationale Ponts et Chaussées.* . *Eurocodes 0 et 1*

Elective Unit 1 Building Technique

Elective Module 2: Building Information Modeling BIM 3

Module designation	**Building Technique**
Module level, if applicable	2nd year
Code, if applicable	U4.1
Subtitle, if applicable	****
Courses, if applicable	Building Information Modeling BIM 3
Semester (s) in which the module is taught	2nd semester (S4)
Person responsible for the module	Dr Issam Khezami
Lecturer	Ahmed DRIDI
Language	French
Relation to curriculum	Elective Module -Professional Subject Continue to study BIM concept and modelling techniques with application using computer Tools
Type of teaching, contact hours	21 Hours of practical workshop in Lab
Workload	Total 51 Hrs/Semester (30 hours of Self Study)
Credit points	2 Credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	BIM 1 et 2 – CAD– Arche – Structures Theory, Reinforced Concrete
Module objectives/intended learning outcomes	**Objectives:** 1. Achieve relevant graphic production 2. Understand the process of using Revit software to design Structures elements (vertical & Horizontal) 3. Understand the process of using Revit software to add floors, steel frames, and braces in the building project. **Learning Outcomes:** Student will be able to: 1. Work on building model projects according to specification 2. Design Architectural and Structures Models for a project, component, or process to meet desired needs or specifications, and provide deliverables. 3. Identify, formulate and solve engineering problems through the use of BIM technology,

Content	**1. Creation of structural elements** - Add a floor frame - Create steel-type structures **2. Creation of vertical elements** - Creation and management of structural columns MC (Mixed Construction) - Creation and management of structural walls - Drawing of reinforcements **3. Creation of horizontal elements** - Creation of joists and beams - Creation of joist systems - Column beam junction - Management of trusses and bracing - Drawing of reinforcements **4. Addition of steel frame floors** - Definition of sub-layers and load-bearing elements - Copy and paste a slab and objects at other levels - Addition of joists - Framing of the slab (slab edge) **5. Addition of bracing** - Creation of a frame view - Addition of bracing - Multiple copy - Adding labels
Study and examination requirements and forms of examination	-Practical exam (100%) -Report for each project, exercise to be submitted and evaluated. -Final assessment at the end of the semester
Media employed	Video Projector, Demo & Tutorials in Computer Lab
Reading list	Autodesk Guides and Tutorials for Revit Tools

Elective Unit 1 Building Technique

Elective Module 3: Metallic Construction MC 1

Module designation	**Building Technique**
Module level, if applicable	2nd year
Code, if applicable	U4.2
Subtitle, if applicable	****
Courses, if applicable	Metallic Construction MC 1
Semester (s) in which the module is taught	2nd semester (S4)
Person responsible for the module	Dr Issam Khezami
Lecturer	Wissem TAKTAK
Language	French
Relation to curriculum	Elective Module- Professional Subject To introduce Metallic Construction and modelling techniques, areaof applications to students
Type of teaching, contact hours	42 hours, of Integrated Course (Classroom Lecture)
Workload	Total 84Hrs/Semester (42 hours of Self Study)
Credit points	3 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Resistance Of Material, Structures 1&2, Reinforced Concrete 1&2
Module objectives/intended learning outcomes	**Outcomes:** 1. Understand the calculation of stresses in cross sections, applying theory of elasticity 2. Understand the main types of connections, i.e. bolts and welds 3. Understand typical design of joints in steel structures. **Outcomes:** Student will be able to: 1. Determine forces and stresses in bolted and welded connections 2. Calculate and design simple steel structures subjected to static loading.

Content	**Chapter 1. General introduction.** **Chapter 2. Steel and its properties.** **Chapter 3. Regulatory charges and surcharges.** **Chapter 4. Rules defining the effects of snow and wind on buildings.** **Chapter 5. Bolted assemblies "Regular bolts and preloaded bolts".** **Chapter 6. Welded assemblies.** **Chapter 7. Classification of sections.** **Chapter 8. Calculation of elements subjected to axial stresses.** **Chapter 9. Calculation of elements subjected to pure bending** **Chapter 10. Calculation of elements subjected to simple bending** **Chapter 11. Calculation of the elements subjected to deflected bending**
Study and examination requirements and forms of examination	Format: Written Mid-term Exam (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection
Reading list	M.A.HIRT et M. CRISINEL « Charpente métalliques, conception et dimensionnement des halles et bâtiments », Presse Polytechniques et Universitaire Romandes, 2001. J.MOREL « Structures Métalliques », EYROLLES, 1997. Eurocode 2 NV65

Elective Unit 2 : Bridges & Roads

Elective Module 1 Roads Engineering 2

Module designation	**Bridges & Roads**
Module level, if applicable	2nd year
Code, if applicable	U4.3
Subtitle, if applicable	****
Courses, if applicable	Road Engineering 2
Semester (s) in which the module is taught	2nd semester
Person responsible for the module	Dr Issam Khezami
Lecturer	Dr Issam Khezami
Language	French
Relation to curriculum	Elective module-Professional Subject To continue studying Road Engineering, and focus on pavements,
Type of teaching, contact hours	42 hours, of Integrated Course (Classroom Lecture)
Workload	Total 84Hrs/Semester (42 hours of Self Study)
Credit points	3 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Roads Engineering 1, Soil Mechanics 1, Hydraulics
Module objectives/intended learning outcomes	**Objectives:** 1. Understand the main concepts related to the design of roads and their maintenance. 2. Understand Soil Characteristics, Pavements 3. Understand road maintenance techniques. **Outcomes:** Students will be able to: 1. Read and understand road project construction technical specifications, 2. Carry out study on soil characteristics, pavements, and hydraulics during several projects steps. 3. Work on roads rehabilitation projects within a team, and contribute to resolving related issues.

Content	**Chapter I - The Soil Class Study** 1 - Classification based on the California Bearing Ratio CBR 2 - Classification according to the moduli of rigidity 3 - Classification based on the road class of soil in Tunisia 4 - Special provisions for bad soils **Chapter II - The Different Families Of Pavement Structures** 1 - Constitution of a body of roadways 2 - The different families of pavement structures 3 - Interfaces between layers **Chapter III - Classes Of Pavements** 1 - Determination of the pavement class from the sections of the pavement 2 - Determination of the pavement class from the structure indices 3 - Classification of roads according to deflection 4 - Final choice of the class of a road **Chapter V - Sizing Of Pavements** 1 - Sizing by catalog 2 - Sizing by Alize-LCPC Software **Chapter VI - Road Hydraulics** 1 - Hydrology 2 - Sizing Of Hydraulic Structures **Chapter VII - Rehabilitation And Maintenance Of Roads** 1 - Road damage and their generating factors 2 - Description of road damage and their causes 3 - Description of deterioration of shoulders and outbuildings 4 - Road maintenance and rehabilitation
Study and examination requirements and forms of examination	Format: Written Mid-term Exam (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection
Reading list	B40 Normes techniques d'aménagement des routes MTP – Catalogue de dimensionnement de chaussées neuves MTP – Techniques de l'ingénieur – Routes T1 et 2 Coquand – Conception et construction des chaussées, Jeuffroy – Les normes tunisiennes pour le granulat, bitume et enrobés bitumeux – Les normes tunisiennes pour le granulats, bitume et enrobés bitumeux – www.lcpc.fr – www.brunel-ejm.com/bazaar/**cours**deroutev10.pdf

Elective Unit 2: Bridges & Roads

Elective Module 2 Road Project Design

Module designation	**Bridges & Roads**
Module level, if applicable	2nd year
Code, if applicable	U4.3
Subtitle, if applicable	****
Courses, if applicable	Road Project Design
Semester (s) in which the module is taught	2nd semester (S4)
Person responsible for the module	Dr Issam Khezami
Lecturer	Wassim MEJRI
Language	French
Relation to curriculum	Elective Module- Practical Workshop in Lab,
Type of teaching, contact hours	21 hours, Practical Workshop
Workload	Total 51Hrs/Semester (30 hours of Self Study)
Credit points	2 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Road Engineering 1 & 2, Urban Hydraulics
Module objectives/intended learning outcomes	**Objectives :** 1. Basic training on COVADIS Tools in order to understand commands, interfaces, etc. 2. Use COVADIS for Roads project examples **Outcomes:** Students will be able to: 1. Run and use COVADIS Tools in Laboratory 2. Design Roads and go through all steps starting from survey's, layout plans, surface calculation, networks, etc.

Content	**Presentation of the COVADIS Software:** Covadis is a software not only for generating an automatic drawing of a topographic survey from an interface called GeoBase but also it can be used in road projects: - Able to quickly calculate the volume of earthworks, - Visualize the layout in plan, the longitudinal profile and the cross sections on the screen - A full plot can be obtained - Dimensioning (linear, surface, coordinates, sketch, slope etc.); - Division of surfaces; - Survey listing (subdivision, locations, networks, areas, etc.); - Thematic mapping - Roads and Miscellaneous Networks RMN (dimensioning, network design, road design); - Landscape analysis - Topographic survey calculations. **Student will practice on several examples using COVADIS software in Laboratory:** 1. Definition of the horizontal axis 2. Tabulation of cross sections 3. Definition of the long-project profile 4. Definition and application of standard profiles 5. Project calculation 6. Project drawing and measurements
Study and examination requirements and forms of examination	-Practical exam (100%) -Report for each project, exercise to be submitted and evaluated. -Final assessment at the end of the semester
Media employed	Video Projector, Demo & Tutorials in Computer Lab
Reading list	Guide and User Manuals of Covadis by GEOMEDIA

Elective Unit 2: Bridges & Roads

Elective Module 3 Art work 1

Module designation	Bridges & Roads
Module level, if applicable	2nd year
Code, if applicable	U4.3
Subtitle, if applicable	-
Courses, if applicable	Art work 1
Semester (s) in which the module is taught	Semester 5 (S5)
Person responsible for the module	Dr Issam Khezami
Lecturer	Wassim MEJRI
Language	French
Relation to curriculum	Elective Module- Professional Subject To introduce Earthwork and Dams, classification, implementation, and area of applications to students
Type of teaching, contact hours	42 hours, of Integrated Course (Classroom Lecture)
Workload	Total 84Hrs/Semester (42 hours of Self Study)
Credit points	3 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	HYdraulics,
Module objectives/intended learning outcomes	**Objectives :** 1. Understand Dams dimensioning methods, and ancillary works 2. Understand the safety measures that need to be taken 3. To simulate stability and have a hands on experience on Talren Software **Outcomes:** Students will be able to: 1. Plan and design earth dams including safety measures. 2. Assess the seepage discharge and its control 4. Monitor quality control during and after construction using proper instrumentation.

Content	**Chapter I: Definitions of the different types of dams** **Chapter II: Earth dams:** 1. The different types of earth dams 2. Dimensioning methods 3. Protection against the effects of water: -Waterproofing, -Filters -Drains 4. Stability **Chapter III: Ancillary works:** 1. The water intake 2. The spillway 3. The drain gallery **Chapter IV: Using the TALREN software**
Study and examination requirements and forms of examination	Format: Written Mid-term Exam (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Practical Workshop Video projection,
Reading list	Les barrages, conception et maintenance. Patrick Le Delliou. ENTPE. Presses Universitaires de Lyon. Design of small dams (A Water Resources Technical Publication)

U4.4: Languages & Soft Skills
English TOEIC 2

Module designation	**Languages & Soft Skills**
Module level, if applicable	2nd year
Code, if applicable	U4.4
Subtitle, if applicable	****
Courses, if applicable	English TOEIC 2
Semester (s) in which the module is taught	2nd semester
Person responsible for the module	Dr Issam Khezami
Lecturer	Nadia ZARDI
Language	English
Relation to curriculum	Transversal Subject (Soft Skills-Compulsory), Continue preparation of Students for the TOEIC Exams and help them prepare for their professional life.
Type of teaching, contact hours	42 hours, of Integrated Course (Classroom Lecture)
Workload	Total 56Hrs/Semester (14 hours of Self Study)
Credit points	2 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Upper intermediate level in both listening and reading skills.
Module objectives/intended learning outcomes	**Objectives:** 1. Prepare students to take TOEIC test by providing related necessary linguistic knowledge. 2. Focus is put on how to approach the different parts of test items and to develop test taking skills, in order to reach the highest score possible. **Learning Outcomes:** By the end of the course the student should be able to: 1. General Competencies - Reach the highest score possible - Develop at most his/her Listening and reading skills. 2. Specific Competencies - Recognize the different parts of TOEIC. - Develop tactics and strategies appropriate to each type of activity, (ex: skimming and scanning). - Distinguish tasks to be performed in every activity. - Establish a proper pace to follow throughout the exam. - Managing allocated time. - Follow steps

Content	***To Continue from Semester 1*** **<u>Unit 4 Retailing</u>** Vocabulary builder: • Shopping, stores, products, services. • Starting a new business Venture. Grammar check: • Comparatives and superlatives • Tag questions **<u>Unit 5 Industry</u>** Vocabulary builder: • Production, construction, automation. • Factory tour, Industrial problems Grammar check: • Active/ passive form • Definite/ indefinite articles **<u>Unit 6 Trade</u>** Vocabulary builder: •Marketing, shipping, import and export •Financial market, stock exchange, auction house, international port. Grammar check: •Cause and effect •Future forms •Phrasal verbs (part 1) **<u>Unit 7 Money</u>** Vocabulary builder: • Banking, budgets, expenditure • Investment, personal finance Grammar check: • Modals verbs • Phrasal verbs (part 2)
Study and examination requirements and forms of examination	Format: Written Mid-term Exam (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection, TOEIC preparation book,
Reading list	- *Market leader, David cotton, David Falvey , Simon Ken; FINANCIAL TIMES (Pearson Longman)* - *Tactics for TOEIC® Listening and Reading Test: Grant Trew, OUP Oxford, 2007.* - *Target Score Student's: A Communicative Course for TOEIC® Test Preparation, Charles Talcott & Graham Tullis, Cambridge University Press, 2007* - *Understanding and Using English Grammar, Betty Schrampfer Azar; Prentice Hall Regents;* - *YouTube Videos*

U4.4: Languages & Soft Skills
Construction 4.0

Module designation	**Languages & Soft Skills**
Module level, if applicable	2nd year
Code, if applicable	U4.4
Subtitle, if applicable	****
Courses, if applicable	Construction 4.0
Semester (s) in which the module is taught	2nd semester (S4)
Person responsible for the module	Dr. Issam KHEZAMI
Lecturer	Prof. Zoubeir LAFHAJ
Language	English
Relation to curriculum	Transversal Subject (Soft Skills-Compulsory),
Type of teaching, contact hours	21 hours, of Integrated Course (Classroom Lecture)
Workload	Total 51Hrs/Semester (30 hours of Self Study)
Credit points	2 credits
Requirements according to the examination regulations	- Minimum attendance rate: 80% of the total contact hours >20 % of nonattendance = elimination for exams
Recommended prerequisites	Basic knowledge - BIM
Module objectives/intended learning outcomes	**Objectives:** -Understand the issues, concepts, technologies as well as the impacts of this industrial revolution on the building and the city. -The digital revolution opens up prospects for modernization for our industry. -It is an opportunity to reduce costs and accelerate the construction of buildings. -Understand the demand for the sharing economy, collaborative networks and community building.
Content	**Chapter 1 – Introduction to the building of the future** 1. Evolution of the industry 2. Circular economy and real estate 3. Construction: an industry undergoing profound change **Chapter 2 - Building 4.0** 1. Introduction, background 2. “Building 4.0”? 3. The design of a flexible building with simplified architecture 4. The constructive principle of a reversible building 5. A smart multi-contractor building, simplified for users 6. An intelligent building with guaranteed performance 7. A building with a “positive economy” for a better valuation **Chapter 3 - Concepts, Tools and Technology**

	1. New construction methods 2. New project management tools 3. New technologies **Chapter 4 - Case studies** 1. The Black Swans (Strasbourg) 2. The YHNOVA house (Nantes) 3. Confluence eco-district (Lyon)
Study and examination requirements and forms of examination	Format: Written Mid-term Exam (40%) + Final Exam (60%)
Media employed	Course Material (Hard/ Soft copy) for Classroom & Online (Moodle ULT) Video projection,
Reading list	(1) - BDC - industrie 4.0 : la nouvelle révolution industrielle, les fabricants canadiens sont t ils prêts ? - (2017). (2) - THE BOSTON CONSULTING GROUP - The Industry 4.0 – The future productivity and growth in manufacturing industries - (2015). (3) - OBSERVATOIRE CONSTRUCTION TECH - Innovation des nouvelles technologies sur les marchés de la construction et de l'immobilier - (2019). (4) - BEDDIAR (K.), GRELLIER (C.), WOODS (E.) - Construction 4.0, - édition Dunod (2019). (5) - SBA - des bâtiments intelligents pour des territoires responsables et durables - (2017). (6) - BEDDIAR (K.), LEMALE (J.) - Bâtiment intelligent et efficacité énergétique,

U4.5: Project
Annual Project 2

Module designation	**Project**
Module level, if applicable	2nd year
Code, if applicable	U4.5
Subtitle, if applicable	****
Courses, if applicable	Annual Project
Semester (s) in which the module is taught	Annual
Person responsible for the module	Dr Issam Khezami
Lecturer	Khalil FRADI
Language	French
Relation to curriculum	Professional Module- Compulsory
Type of teaching, contact hours	42h Supervision- On Campus Tutorial guidance throughout the academic year that follows the work of project/traineeship
Workload	Total 84Hrs/Semester (42 hours of Self Study)
Credit points	3 credits
Requirements according to the examination regulations	Public defense of the work, in jury - (Regular, Student Worker) (Final, Supplementary, Special) -
Recommended prerequisites	Road Engineering 1 & 2, Urban Hydraulics Reinforced Concrete 1 & 2, CAD, Revit
Module objectives/intended learning outcomes	Learn about civil engineering projects: Public works, buildings, Metal construction ... Design a structure and calculate the descent of loads and bracing with models combining traditional methods and sophisticated digital modelling
Content	Scoop and Project specifications: 1. Architectural reading of plans 2. Carry out a design taking into account architectural constraints 3. Calculation of structural elements 4. Make an estimate of the project 5. Make a digital model of the project
Study and examination requirements and forms of examination	Projects - 100% (Evaluation of the final report of project) Defence Session
Media employed	Video projection – Remote Supervision
Reading list	References to be provided by supervisor depending on project.