CIVIL ENGINEERING STUDENT GUIDE

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1. Warm-up speech by the direction 1

2. General hierarchy presentation 1

3. Vision of IPSAS 1

4. Missions.....2.

5. Objectives .....2.

6. Program conception 3

7.Comprehensive presentation of the specialty 4

8.Access conditions …….....7

9. Skills profile 9

9.1. Competence matrix - objectives - learning outcomes.....9

9.2. Program plan.....11

9.3. The module sheets.....20

10. Regulations 119

11. The student`s chart 136

1. Welcome from the General Manager

Twenty-seven (27) years or a little more is not a long time in the life of an institution, but it is enough to be able to stand out from the crowd. In its vision of the training of executives of a continent (Africa) in the making, IPSAS has always proposed to achieve a double objective:
To train engineers in the latest technologies;
To give them the capacity to react and adapt to situations where often the minimum of technology is assured.
By choosing IPSAS, you make the choice to learn how to think, react and manage situations.
Thanks to a teaching staff totally involved in this process of acquiring a method in addition to knowledge, IPSAS can already be proud of its graduates who are making careers in Tunisia and throughout Africa and the world.
By becoming an IPSAS student, you make a choice, the best one, and you guarantee yourself the possibility to choose your future profession. As you progress through our site, you will hopefully feel part of the IPSAS world, the world of a future that can be achieved.

2. General presentation of the hierarchy

Chairman and Managing Director: Mr Najib KAMOUN
Director: Mr Mohamed Achraf KAMOUN
Secretary General: Mr Mohamed ZGHAL
Director of Studies: Mr George KANTCHEV
Financial Director: Mr Farid KAMOUN
Communication Managers: Mrs Wabo Ulrich Kengne/ Ayman KAMOUN
Quality Manager: Mr Karim JELLALI
Laboratory Manager: Anis KAMOUN

3. IPSAS Vision

The vision of the programme is an essential component of the IPSAS strategy and must necessarily reflect the core business of our organisation. A strategy clearly described in the IPSAS quality policy based on a fundamental principle that makes the satisfaction of stakeholders (such as students, teachers...) a priority of the organisation. Learner satisfaction should not only be understood as satisfaction during the student's academic career. The vision is broader than this concept because it is closely linked to the creation of programmes that respect the global evolution in the industrial and technological context and especially the

demand imposed by the labour market. This will provide the learner with the opportunity to be an active component in the labour market upon graduation. This makes IPSAS a dynamic player in its societal contribution through the creation of value in the university training sector. A training that is not only based on theoretical training but also on a dynamic vision allowing the training of engineers with a combination of theoretical knowledge and practical know-how allowing the engineer to exercise and impose himself by his achievements as being competent in the labour market. This vision can only be successful if a set of practical elements is implemented with a clear mission.

4. Missions

The missions that reflect the implementation of the IPSAS strategic vision for all its programmes can be summarised in five key points:

1) Organise innovative education based on innovative research results to produce graduates who are competent, respectful, entrepreneurial and competitive on a national and international scale;

2) To provide the necessary resources for the implementation of this curriculum;

3) Develop a quality assurance system for education based on good governance.

4) Organise a monitoring and evaluation service for the civil engineering programme to continuously improve its content.

5) Develop a network of cooperation with stakeholders related to the application of innovation in learning through the creation of a network of experts to participate in the updating of the programme.

The programme offers students the opportunity to acquire the required competences in the taught field of expertise are expected and needed. The learning outcomes are also determined according to the objectives.

5.The aims

IPSAS aims to :

1) Train and certify graduates who are competent in their specific engineering field, entrepreneurial and globally competitive. Engineers who :

a.have widely recognised "business" skills in their specific technological field;

b.are open-minded, adaptable and highly reactive due to a strong mix of cultures (wide range of recruitment both in terms of profile and social background);

c.apt to disseminate in the industrial fabric a culture of complex problem solving acquired through the diversity of practical cases studied throughout their course.

2) To deliver training :

Able to respond to the national and international needs and problems that concern their sector of activity.

Based on the results of research into recent technologies and labour market demand.

Where consultation with basic and applied industry stakeholders forms a basis for programme design and evaluation.

Able to respond to specific problems.

4) Strengthen the system of governance, quality assurance and awareness of the programmes.

5) Expand collaborative networks with stakeholders related to their discipline of study.

6. Curriculum design

Learning is no longer focused solely on outcomes, but also on the educational objectives of the civil engineering curriculum. Objectives that focus on producing graduates who are capable of becoming reliable professionals, leaders and change agents in the organization where they regularly practice and contribute to development.

The updating of the programme is an essential element of continuous improvement that allows us to offer training that evolves together with the demands of the labour market, the evolution of technology and the societal expectations of IPSAS. To this end, it is essential to review the competency profile by experts and teachers in the field, periodically to improve the quality of the graduates' profile. This also includes the evaluation and updating of the programme with the participation of the Scientific Council, teaching staff, students and related institutional stakeholders. The procedure for the development of the competency profile related to the redesign of the curriculum is explained below:

1) Assess and redesign the curriculum

2) Implement the follow-up study of graduates in their start-up and career development with the participation of relevant institutional stakeholders.

3) Construct the competence profile based on the outcome of the study and the improvement of the curriculum.

The participants in this process are the IPSAS Scientific Board, the students, the programme managers, the organisations with expertise in the field of civil engineering (building and

construction companies, consultancies etc.) and the teaching staff. This vision of continuous improvement, based on the intervention of the stakeholders, is the approach that will be taken into account by the IPSAS management.

7. General presentation of the programme

The engineering cycle "Civil Engineering" is a curriculum conceived and designed by the Polytechnic Institute of Advanced Sciences (IPSAS) based in Sfax, Tunisia. This program has been authorized by the Tunisian Ministry of Higher Education since 2003.

Civil engineering

Job reference: what are the targeted activities for the graduates, at the end of the training?

The mission of the Civil Engineering Department of IPSAS is to train engineers capable of leading projects and sites related to building and public works, to lead teams and to manage operations in compliance with the law, safety and sustainable development and in a local, national and international context.

The IPSAS Civil Engineering engineer apprehends, through methodical thinking, complex problems and acts as a manager capable of leading projects and sites relating to building and public works, leading teams and managing operations. They work in companies, design offices or control offices in the building and public works sector, engineering, architecture, project management and Research & Development in the construction field.

The IPSAS civil engineer is capable of managing a building site, functional work, engineering work for the structural part or all trades, i.e. he/she is entrusted with the following responsibilities

- Choosing structural or finishing materials;
- Choosing the materials and techniques to be used;
- Organising the teams, planning the work on site;
- Organise teams, plan work on site; Ensure the financial management of the site;
- Manage the interfaces between trades;
- Ensure safety and quality on the site as well as environmental quality.

He/she is capable of managing an earthworks, road, external works or drainage site, i.e. of

- Choose the materials and techniques to be used;
- Organise the teams, plan the work on site;

- Ensure the financial management of the site;
- Ensure safety and quality on the site as well as environmental quality.

He/she is capable of analysing and calculating a structure in compliance with national or European regulations and sustainable development, i.e. of :

- Choose a soil survey, analyse it and propose a foundation;
- Choose structural materials;
- Model the structure or structural elements;
- Checking that the work complies with the standards and regulations in force.

He/she is capable of carrying out functions related to project management or contracting which include

- Costing,
- Technical programming,
- Setting up operations,
- Drawing up written documents,
- Technical management of the building.

Competence framework: what are the competences attested at the end of the training?

The certification of a Civil Engineer implies the verification of the following qualities

1.Ability to mobilise the resources of a wide field of basic sciences.

2.Knowledge and understanding of a specialised scientific and technical field.

3.Mastery of engineering methods and tools: identification and resolution of problems, even unfamiliar and not completely defined ones, data collection and interpretation, use of computer tools, analysis and design of complex systems, experimentation.

4.Ability to integrate into an organisation, to lead it and to make it evolve: commitment and leadership, project management, communication with specialists and non-specialists.

5.Taking into account industrial, economic and professional issues: competitiveness and productivity, innovation, intellectual and industrial property, compliance with quality and safety procedures.

6.Ability to work in an international context: mastery of one or more foreign languages,

security, economic intelligence, cultural openness, international experience.

7.Respect for societal values: knowledge of social relations, environment and sustainable development, ethics.

IPSAS aims to train and certify engineers :

- with widely recognised "business" skills in their specific technological field ;

- who are open-minded, adaptable and highly reactive due to a strong mix of cultures (wide range of recruitment both in terms of profile and social background);
- able to disseminate in the industrial fabric a "research culture" acquired through the proximity of laboratories with technological and scientific research activities recognised by the national authorities;

IPSAS Civil Engineering graduates have a solid scientific and technical background, which enables them to carry out multidisciplinary missions in various sectors of activity.

In engineering sciences:

- He/she knows the scientific bases of modelling and the modern tools of scientific language mathematics, statistics, numerical methods.
- He/she has the scientific bases of mechanics for civil engineering: mechanics of continuous media, resistance of materials, structural mechanics, soil mechanics.
- He/she knows civil engineering materials: building materials, finishing materials, road materials.
- He/she knows the basics of soil mechanics and infrastructures: soil mechanics, geotechnics, hydraulics, roads and other networks.
- He/she masters the behaviour of new structures or those in service: structures: design and pathology, inspection, maintenance and repair.
- He/she masters the modern methods of structural design: reinforced and prestressed concrete, metal construction, mixed construction.
- He/she has a solid technical culture of civil engineering worksites: technology, general construction processes, organisation and management of worksites.
- He/she knows the main technical equipment of the building: thermal, acoustic, heating, ventilation/air conditioning.
- They know the constraints linked to design: urban planning, architecture and engineering. In human, economic and social sciences:
- He/she masters the tools of communication: English, French; expression - communication, negotiation, conducting meetings.
- He/she masters the tools of human management: psychology, human resources management.
- He/she has a basic knowledge of economics and management: general and business economics, project management and business management.
- He knows the basics of law: labour law, contract law, construction law.

8. Conditions of access

Admission to IPSAS is in accordance with the provisions of Law No. 2000-73 of 25 July 2000 regulating private higher education.

25 July 2000 regulating private higher education. Two types of admission are possible:

- Direct admission: This concerns students who have a Tunisian or foreign baccalaureate.
- Access after decision of admission: It concerns the candidates of Tunisian or foreign nationality, who wish to register in an engineering cycle.
- Tunisian students who have completed a public or private preparatory cycle may apply for enrolment in the engineering cycle.
- The Tunisian student holder of a technological licence having links with the chosen engineering course of study, can apply for a registration in the engineering cycle.
- Foreign students who hold a preparatory cycle, a DUT, Licence, BTS or equivalent obtained in their country of origin can apply for registration in the engineering cycle.

When to fill in an application form?

You must fill in an application form:

When you wish to enrol in a study programme;

- If you have already applied for admission but have not yet registered;
- If you have suspended your enrolment at IPSAS for more than one year and wish to be re-admitted to the same programme;

Admission procedure:

- To be admitted to one of the IPSAS study programmes, you must: Complete an application form to be collected from our premises or online.

- Send the completed application and the required supporting documents to the admissions office in our offices or by email to :

Each form allows you to apply for admission to two programmes according to your first and second choice.

Admission file and required documents:

- A completed application form

- A birth certificate in French

- A complete school file including :

● For applicants still in high school or in a secondary school at the time of application: transcripts of marks obtained at that date for the current year and the previous year.

● For applicants who are still in secondary school at the time of application: transcripts of marks obtained at that time for the current and previous years, admission being subject to obtaining the baccalaureate.

● For all other persons: transcripts of marks obtained during the three previous years as well as those of the current year, if applicable.

●The diplomas obtained, certified as true copies of the original.

●Where applicable, the certificate of registration issued by the last university attended.

●Any additional information deemed useful or necessary.

●All documents submitted, except the original diplomas, remain the property of IPSAS.

Final admission:

Registration is considered final only after acceptance of the student's file by the university and payment of the tuition fees and other required fees.

NB: Tuition fees are due for the whole year and are payable at the time of registration, unless otherwise agreed by the General Management. Any amount paid remains the property of IPSAS. No refunds or reductions will be made for

cancellation of registration, late entry, absence, illness, voluntary departure or exclusion, etc.

As soon as IPSAS confirms the final admission, the student must complete his/her admission file with the following documents

- 2 identity photos

- A photocopy of the national identity card for Tunisians

- Proof of payment of tuition fees as fixed by the payment procedure for foreign students (additional documents to be produced)

9. Skills profile

9.1. Competence matrix - objectives – learning outcomes

IPSAS- Modules – Learning outcomes- Modules

Skillsfamily	Learningsoutcomes	Level	Modules
Mathematics	Introduce to Operations on matrices (inversion, determinants, iterative methods and triangularization), notions of vector space, subspaces (projection), Base change: eigenvalues and eigenvectors, Apply the concepts of differential and integral calculus of functions of several variables to geometry and optimization problems. Master the methods of solving algebraic or differential equations that are encountered in the modeling of physical phenomena.	1-2	Mathematics for engineers I, Mathematics for engineers II, Numerical analysis, Probability and statistics, Operational research.
Mechanics	Acquire the theoretical bases of fluid mechanics, and hydraulics. Study the physical, mechanical and hydraulic properties of the foundation soils of civil engineering structures. Know the characteristics and mechanical behavior of structural elements.	1-2	Mechanics of continuous media, Soil mechanics I and II, Resistance of materials, Mechanics of structures, Analysis of structures by finite elements, Elastoplastic calculation of structures, Plates and shells, Fluid mechanics, Urban hydraulics
Geologie	Know the concepts of geology applied to the context of Civil Engineering work	1	Engineering geology and geophysics, Hydrology
Building and works	- Acquire topographic knowledge - Design of buildings using dedicated software - Knowledge of fundamental acoustic and thermal principles	1-2-3	Topography, Building thermics, Building acoustics, Building electricity, Air conditioning and heating, Construction pathology, Organization and management of construction projects,
Transversal skills	- Acquire skills in entrepreneurship, communication techniques and languages (English). - Knowledge of town planning law	1-2	Urban Planning Law, Entrepreneurship, Business Creation and Management, Communication Technology, English.

Computer tools and software	- Master computer programming languages - Master the software dedicated to the design and modeling of civil engineering structures	1-2	Computer Science I: Programming Language and II, Computer Assisted Building Design, Geographic Information System, Civil Engineering Tools and Software
Synthesisproject	- Choose a synthesisproject	2	Synthesisproject
Construction	-Acquire the principles of dimensioning and construction in reinforced concrete and metal	1-2-3	Construction materials, Reinforced Concrete I and II, Dynamics and seismic analysis of structures, Safety and fire resistance of BA constructions, Prestressed concrete, Metal construction
Design and calculation of structures	- Learn the principles of Design and calculation of roads, structures and buildings	2	Design and calculation of Roads, Design and calculation of engineering structures, Design and calculation of building structures
Architecture	- Know the general construction processes and interior and exterior architecture.	1	Architecture and town planning, General construction procedures
Engineering and design offices	- Apply knowledge through mini projects such as (metal construction projects, roads, engineering structures, etc.)	3	Study office for metal constructions, Study office for reinforced concrete buildings, Study office for special foundations, Study office for civil engineering
Special constructions	- Study some special works such as special foundations, silos and reservoirs ...	3	Silos and tanks
End of studies' project		3	

Université Privée Du Sud
POLYTECHNIQUE
DES SCIENCES AVANCÉES
SFAX - TUNISIE

Civil Engineering

Program Plan

Modules repartition

Modules Sheets

Revised version October 2021

Civil Engineering First Year Semester 1

		Intitulé	CI	TP	CI+TP	T,per	T		Coef	E		GM
Course Id	Code		L	PW	L+PW	Self pr,	T	ECTS		E	Subject	
INFO I	MGCV11,01	Informatique I : Langage de Programmation	15	30	45	45	90	3	2	CC+E	Computer Science I: Programming Language	GM1-1
MPI I	MGCV11,02	Mathématiques pour Ingénieurs I	30	-	30	30	60	2	2	CC+E	Mathematics for Engineers I	GM1-1
PS	MGCV11,03	Probabilité et statistiques	30	-	30	30	60	2	2	CC+E	Probability and statistics	GM1-1
MMC	MGCV11,04	Mécanique des milieux continus	45	-	45	45	90	3	3	CC+E	Continuum mechanics	GM1-2
GGI	MGCV11,05	Géologie et géophysique de l'ingénieurs	30	-	30	30	60	2	2	CC+E	Geology and geophysics for Engineers	GM1-3
MF	MGCV11,06	Mécanique des fluides	30	15	45	45	90	3	2,5	CC+E	Fluid Mechanics	GM1-3
MC	MGCV11,07	Matériaux de construction	45	15	60	60	120	4	3,5	CC+E	Building materials	GM1-2
TB	MGCV11,08	Thermique de bâtiment	30	-	30	60	90	3	2	CC+E	Building Thermics	GM1-4
DBAO	MGCV11,09	Dessin de bâtiments assisté par Ordinateur	-	30	30	30	60	2	2	-	Computer Aided Building Drawing	GM1-4
TC	MGCV11,10	Technique de communication	30	-	30	30	60	2	2	CC+E	Communication Practice	GM1-5
DU	MGCV11,11	Droit de l'Urbanisme	30	-	30	30	60	2	2	CC+E	Town Planning Law	GM1-5
AN	MGCV11,12	Anglais	30	-	30	30	60	2	2	CC+E	English	GM1-5
Total: S1			345	90	435	465	900	30	27			

Civil Engineering First Year Semester 2

		Intitulé	CI	TP	CI+TP	T,per	T		Coef	E		GM
Course Id	Code		L	PW	L+Pw	Self pr,	T	ECTS		E	Subject	
A,NUM	MGCV12,13	Analyse numérique	30	15	45	45	90	3	2,5	CC+E	Numerical analysis	GM1-1
MPI II	MGCV12,14	Mathématiques pour ingénieurs II	30	-	30	30	60	2	2	CC+E	Mathematics for Engineers II	GM1-1
INFO II	MGCV12,15	Informatique II	-	30	30	30	60	2	1	E	Computer Science II	GM1-1
M, SOL I	MGCV12,16	Mécanique des sols I	45	-	45	45	90	3	3	CC+E	Soil Mechanics I	GM1-3
RDM	MGCV12,17	Résistance des matériaux	45	15	60	40	100	4	3,5	CC+E	Strength of materials	GM1-2
AB	MGCV12,18	Acoustique de bâtiment	24	-	24	36	60	2	1,5	CC+E	Building acoustics	GM1-4
HU	MGCV12,19	Hydraulique urbaine	30	15	45	45	90	3	2,5	CC+E	Urban hydraulics	GM1-3
TOPO	MGCV12,20	Topographie	30	15	45	45	90	3	2,5	CC+E	Geodesy	GM1-4
SIG	MGCV12,21	Système d'information géographique	-	30	30	30	60	2	1	CC+E	Geographic Information System	GM1-4
EC	MGCV12,22	Electricité de bâtiments	15	15	30	30	60	2	1,5	CC+E	Electricité de bâtiments	GM1-4
ENT	MGCV12,23	Entrepreneuriat	45	-	45	15	60	2	3	CC+E	Entrepreneurship	GM1-5
Total: S2			294	135	429	391	820	28	24			

Total	639	225	864	856	1720	58	51			

Civil Engineering Second Year Semester 1

		Intitulé	CI	TP	CI+TP	T.per	T		Coef	E		
Course Id	Code		L	PW	L+PW	Self pr.	T	ECTS		E	Subject	GM
MS	MGCV21.25	Mécanique des structures	45	15	60	75	135	4,5	3,5	CC+E	Structural mechanics	GM2-1
RO	MGCV21.26	Recherche opérationnelle	30	-	30	45	75	2	2	CC+E	Operations Research	GM2-5
BA I	MGCV21.27	Béton Armé I	45	15	60	60	120	4	3,5	CC+E	Reinforced Concrete I	GM2-2
OLGC	MGCV21.28	Outils et Logiciels en Génie Civil	15	30	45	45	90	3	2	R	Tools and Software in Civil Engineering	GM2-4
CCR	MGCV21.29	Conception et calcul des Routes	30	15	45	60	105	3,5	2,5	CC+E	Design and calculation of Roads	GM2-3
HYD	MGCV21.30	Hydrologie	15	15	30	45	75	2	1,5	CC+E	Hydrology	GM2-3
AU	MGCV21.31	Architecture et urbanisme	30	-	30	30	60	2	2	CC+E	Architecture and urbanism	GM2-4
CAC	MGCV21.32	Conditionnement d'air et chauffage	30	15	45	45	90	3	2,5	CC+E	Air conditioning and heating	GM2-4
CGE	MGCV21.33	Création et gestion d'entreprises	30	-	30	30	60	2	2	CC+E	Creation and management of companies	GM2-5
TC	MGCV21.34	Technique de communication	30	-	30	30	60	2	2	CC+E	Communication Practice	GM2-5
AN	MGCV21.35	Anglais	30	-	30	30	60	2	2	CC+E	English	GM2-5
		Total:	330	105	435	495	930	30	25,5			

Civil Engineering Second Year Semester 2

		Intitulé	CI	TP	CI+ TP	T.per	T		Coef	E		
Course Id	Code		L	PW	L+PW	Self pr.	T	ECTS		E	Subject	GM
ASOP	MGCV22.36	Analyse second ordre des portiques réguliers à nœuds déplaçables	30	-	30	30	60	2	2	CC+E	Elastic second order analysis of sway frames	GM2-1
ASEF	MGCV22.37	Analyse des structures par éléments finis	45	-	45	45	90	3	3	CC+E	Analysis of structures by FEM	GM2-1
PC	MGCV22.38	Plaques et coques	30	15	45	45	90	3	2,5	CC+E	Plates and shells	GM2-1
PS	MGCV22.39	Projet de synthèse	-	45	45	75	120	4	1,5	R+P	Synthesis project	GM2-5
BA II	MGCV22.40	Béton Armé II	30	-	30	45	75	2,5	2	CC+E	Reinforced Concrete II	GM2-2
CM	MGCV22.41	Constructions métalliques	45	-	45	60	105	3,5	3	CC+E	Steel construction	GM2-2
OA	MGCV22.42	Conception et calcul des ouvrages d'art	30	-	30	30	60	2	2	CC+E	Design and calculation of engineering structures	GM2-2
CCSBA	MGCV22.43	Conception et calcul des structures de bâtiments	45	-	45	45	90	3	3	CC+E	Design and calculation of RC structures	GM2-3
M.SOL II	MGCV22.44	Mécanique des sols II	30	15	45	45	90	3	2,5	CC+E	Soil Mechanics II	GM2-3
PGC	MGCV22.45	Procédés généraux de constructions	45	-	45	30	75	2	3	CC+E	Technics of constructions	GM2-4
		Total:	330	75	405	450	855	28	24,5			

Total:	660	180	840	945	1785	58	50	

Civil Engineering Third Year Semester 1

		Intitulé	CI	TP	CI+ TP	T.per	T		Coef	E		GM
Course Id	Code		L	PW	L+PW	Self pr.	T	ECTS		E	Subject	
NONCEP	MGCV31.47	Calcul des structures a l'état limite ultime	45	9	54	45	99	3	3,5	CC+E	Ultimate limit state analysis of strutures	GM3-1
ECMX	MGCV31.48	Eléments de construction mixte aux états limites	30	-	30	30	60	2	2	CC+E	Composite Beams and Columns to Eurocode 4	GM3-1
PC	MGCV31.49	Pathologie des constructions	30	-	30	30	60	2	2	CC+E	Construction pathology	GM3-1
OM	MGCV31.50 (*)	Ouvrages maritimes	30	-	30	30	60	2	2	CC+E	Marine works	GM3-3
RS		Renforcement Des Sols									Soil reinforcement	
BECM	MGCV31.51	Bureau d'étude constructions métalliques	15	30	45	45	90	3	2	P+R	Engineering and design office for steel constructions	GM3-1
DASS	MGCV31.52	Dynamique et analyse sismique des structures	45	-	45	45	90	3	3	CC+E	Structural dynamics and seismic analysis	GM3-2
BP	MGCV31.53	Béton précontraint	30	-	30	30	60	2	2	CC+E	Pre stressed concrete	GM3-2
STFC	MGCV31.54 (*)	Sécurité et tenue au feu des constructions en BA	30	-	30	30	60	2	2	CC+E	Safety and fire resistance of RC constructions	GM3-2
SR		Silos et réservoirs									Silos and tanks	
BEBA	MGCV31.55	Bureau d'étude bâtiment en béton armé	15	30	45	45	90	3	2	P+R	Engineering and Design office RC building	GM3-2
OGPC	MGCV31.56	Organisation et gestion des projets de construction	45	-	45	30	75	2,5	3	CC+E	projects of construction: Organization and management	GM3-3
BEFS	MGCV31.57	Bureau d'étude fondations spéciales	15	15	30	45	75	2,5	1,5	R	Design office special foundations	GM3-3
BEOA	MGCV31.58	Bureau d'étude ouvrage d'art	15	30	45	45	90	3	2	R+P	Engineering and design office for bridges	GM3-3
Total:			345	114	459	450	909	30	27			

Civil Engineering First Year

		Intitulé	CI	TP	CI+TP	T,per	T		Coef	E		GM
Course Id	Code		L	PW	L+PW	Self pr,	T	ECTS		E	Subject	
INFO I	MGCV11,01	Informatique I : Langage de Programmation	15	30	45	45	90	3	2	CC+E	Computer Science I: Programming Language	GM1-1
MPI I	MGCV11,02	Mathématiques pour Ingénieurs I	30	-	30	30	60	2	2	CC+E	Mathematics for Engineers I	GM1-1
PS	MGCV11,03	Probabilité et statistiques	30	-	30	30	60	2	2	CC+E	Probability and statistics	GM1-1
A,NUM	MGCV12,13	Analyse numérique	30	15	45	45	90	3	2,5	CC+E	Numerical analysis	GM1-1
MPI II	MGCV12,14	Mathématiques pour ingénieurs II	30	-	30	30	60	2	2	CC+E	Mathematics for Engineers II	GM1-1
INFO II	MGCV12,15	Informatique II	-	30	30	30	60	2	1	E	Computer Science II	GM1-1
Total GM1-1			135	75	210	210	420	14	11,5			
MMC	MGCV11,04	Mécanique des milieux continus	45	-	45	45	90	3	3	CC+E	Continuum mechanics	GM1-2
MC	MGCV11,07	Matériaux de construction	45	15	60	60	120	4	3,5	CC+E	Building materials	GM1-2
RDM	MGCV12,17	Résistance des matériaux	45	15	60	40	100	4	3,5	CC+E	Strength of materials	GM1-2
Total GM1-2			135	30	165	145	310	11	10			
GGI	MGCV11,05	Géologie et géophysique de l'ingénieurs	30	-	30	30	60	2	2	CC+E	Geology and geophysics for Engineers	GM1-3
MF	MGCV11,06	Mécanique des fluides	30	15	45	45	90	3	2,5	CC+E	Fluid Mechanics	GM1-3
M, SOL I	MGCV12,16	Mécanique des sols I	45	-	45	45	90	3	3	CC+E	Soil Mechanics I	GM1-3
HU	MGCV12,19	Hydraulique urbaine	30	15	45	45	90	3	2,5	CC+E	Urban hydraulics	GM1-3
Total GM1-3			135	30	165	165	330	11	10			
TB	MGCV11,08	Thermique de bâtiment	30	-	30	60	90	3	2	CC+E	Building Thermics	GM1-4
DBAO	MGCV11,09	Dessin de bâtiments assisté par Ordinateur	-	30	30	30	60	2	2	-	Computer Aided Building Drawing	GM1-4
AB	MGCV12,18	Acoustique de bâtiment	24	-	24	36	60	2	1,5	CC+E	Building acoustics	GM1-4
TOPO	MGCV12,20	Topographie	30	15	45	45	90	3	2,5	CC+E	Geodesy	GM1-4
SIG	MGCV12,21	Système d'information géographique	-	30	30	30	60	2	1	CC+E	Geographic Information System	GM1-4
EC	MGCV12,22	Electricité de bâtiments	15	15	30	30	60	2	1,5	CC+E	Electricité de bâtiments	GM1-4
Total GM1-4			99	90	189	231	420	14	10,5			
TC	MGCV11,10	Technique de communication	30	-	30	30	60	2	2	CC+E	Communication Practice	GM1-5
DU	MGCV11,11	Droit de l'Urbanisme	30	-	30	30	60	2	2	CC+E	Town Planning Law	GM1-5
AN	MGCV11,12	Anglais	30	-	30	30	60	2	2	CC+E	English	GM1-5
ENT	MGCV12,23	Entrepreneuriat	45	-	45	15	60	2	3	CC+E	Entrepreneurship	GM1-5
Total GM1-5			135	0	135	105	240	8	9			

Total	639	225	864	856	1720	58	51	

Civil Engineering Second Year

		Intitulé	CI	TP	CI+TP	T.per	T		Coef	E		
Course Id	Code		L	PW	L+PW	Self pr.	T	ECTS		E	Subject	GM
MS	MGCV21.25	Mécanique des structures	45	15	60	75	135	4,5	3,5	CC+E	Structural mechanics	GM2-1
ASOP	MGCV22.36	Analyse second ordre des portiques réguliers à nœuds déplaçables	30	-	30	30	60	2	2	CC+E	Elastic second order analysis of sway frames	GM2-1
ASEF	MGCV22.37	Analyse des structures par éléments finis	45	-	45	45	90	3	3	CC+E	Analysis of structures by FEM	GM2-1
PC	MGCV22.38	Plaques et coques	30	15	45	45	90	3	2,5	CC+E	Plates and shells	GM2-1
	Total: GM2-1		150	30	180	195	375	12,5	11			
BA I	MGCV21.27	Béton Armé I	45	15	60	60	120	4	3,5	CC+E	Reinforced Concrete I	GM2-2
BA II	MGCV22.40	Béton Armé II	30	-	30	45	75	2,5	2	CC+E	Reinforced Concrete II	GM2-2
CM	MGCV22.41	Constructions métalliques	45	-	45	60	105	3,5	3	CC+E	Steel construction	GM2-2
OA	MGCV22.42	Conception et calcul des ouvrages d'art	30	-	30	30	60	2	2	CC+E	Design and calculation of engineering structures	GM2-2
	Total: GM2-2		150	15	165	195	360	12	10,5			
CCR	MGCV21.29	Conception et calcul des Routes	30	15	45	60	105	3,5	2,5	CC+E	Design and calculation of Roads	GM2-3
HYD	MGCV21.30	Hydrologie	15	15	30	45	75	2	1,5	CC+E	Hydrology	GM2-3
CCSBA	MGCV22.43	Conception et calcul des structures de bâtiments	45	-	45	45	90	3	3	CC+E	Design and calculation of RC structures	GM2-3
M.SOL II	MGCV22.44	Mécanique des sols II	30	15	45	45	90	3	2,5	CC+E	Soil Mechanics II	GM2-3
	Total: GM2-3		120	45	165	195	360	11,5	9,5			
OLGC	MGCV21.28	Outils et Logiciels en Génie Civil	15	30	45	45	90	3	2	R	Tools and Software in Civil Engineering	GM2-4
AU	MGCV21.31	Architecture et urbanisme	30	-	30	30	60	2	2	CC+E	Architecture and urbanism	GM2-4
CAC	MGCV21.32	Conditionnement d'air et chauffage	30	15	45	45	90	3	2,5	CC+E	Air conditioning and heating	GM2-4
PGC	MGCV22.45	Procédés généraux de constructions	45	-	45	30	75	2	3	CC+E	Technics of constructions	GM2-4
	Total: GM2-4		120	45	165	150	315	10	9,5			
RO	MGCV21.26	Recherche opérationnelle	30	-	30	45	75	2	2	CC+E	Operations Research	GM2-5
CGE	MGCV21.33	Création et gestion d'entreprises	30	-	30	30	60	2	2	CC+E	Creation and management of companies	GM2-5
TC	MGCV21.34	Technique de communication	30	-	30	30	60	2	2	CC+E	Communication Practice	GM2-5
AN	MGCV21.35	Anglais	30	-	30	30	60	2	2	CC+E	English	GM2-5
PS	MGCV22.39	Projet de synthèse	-	45	45	75	120	4	1,5	R+P	Synthesis project	GM2-5
	Total: GM2-5		120	45	165	210	375	12	9,5			
	Total:		660	180	840	945	1785	58	50			

Civil Engineering Third Year

		Intitulé	CI	TP	CI+ TP	T.per	T		Coef	E		GM
Course Id	Code		L	PW	L+PW	Self pr.	T	ECTS		E	Subject	
NONCEP	MGCV31.47	Calcul des structures a l'état limite ultime	45	9	54	45	99	3	3,5	CC+E	Ultimate limit state analysis of strutures	GM3-1
ECMX	MGCV31.48	Eléments de construction mixte aux états limites	30	-	30	30	60	2	2	CC+E	Composite Beams and Columns to Eurocode 4	GM3-1
PC	MGCV31.49	Pathologie des constructions	30	-	30	30	60	2	2	CC+E	Construction pathology	GM3-1
BECM	MGCV31.51	Bureau d'étude constructions métalliques	15	30	45	45	90	3	2	P+R	Engineering and design office for steel constructions	GM3-1
Total GM3-1			120	39	159	150	309	10	9,5			
DASS	MGCV31.52	Dynamique et analyse sismique des structures	45	-	45	45	90	3	3	CC+E	Structural dynamics and seismic analysis	GM3-2
BP	MGCV31.53	Béton précontraint	30	-	30	30	60	2	2	CC+E	Pre stressed concrete	GM3-2
STFC	MGCV31.54 (*)	Sécurité et tenue au feu des constructions en BA	30	-	30	30	60	2	2	CC+E	Safety and fire resistance of RC constructions	GM3-2
SR		Silos et réservoirs									Silos and tanks	
BEBA	MGCV31.55	Bureau d'étude bâtiment en béton armé	15	30	45	45	90	3	2	P+R	Engineering and Design office RC building	GM3-2
Total GM3-2			120	30	150	150	300	10	9			
OGPC	MGCV31.56	Organisation et gestion des projets de construction	45	-	45	30	75	2,5	3	CC+E	projects of construction: Organization and management	GM3-3
BEFS	MGCV31.57	Bureau d'étude fondations spéciales	15	15	30	45	75	2,5	1,5	R	Design office special foundations	GM3-3
BEOA	MGCV31.58	Bureau d'étude ouvrage d'art	15	30	45	45	90	3	2	R+P	Engineering and design office for bridges	GM3-3
OM	MGCV31.50 (*)	Ouvrages maritimes	30	-	30	30	60	2	2	CC+E	Marine works	GM3-3
RS		Renforcement Des Sols									Soil reinforcement	
Total GM3-3			105	45	150	150	300	10	8,5			
Total:			345	114	459	450	909	30	27			

GCV 1

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester : 1

Languageprogramming

Code : Code : MGCV11.01

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		X	

Teacher :Ms. Salma Ksibi

Status :Permanent

E-mail : salmaksibi88@gmail.com

Courses	Practicalworks	Individualwork	Total volume
15hrs	30hrs	45hrs	90hrs

Coefficient:	ECTS credits :
2	3

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :1

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

This course focuses on the famous C programming language.

The C programming language is the basis of the operating systems we know today or at least the kernel of these systems such as Unix/Linux. The C language was initially designed to develop an operating system (Unix) but over time, thanks to its power, it has been adopted by a large community of developers which has allowed the language to evolve and above all to be standardised. This language is multi-platform, which means that a program that you create for example under Linux could be recompiled under Windows, ... without having to change anything in the source code.

In this module, the engineering student learns how to do data manipulations ("what") in pseudo-language and/or C language, transcribe algorithms ("how") in pseudo-language and/or C language, and code "console" programs with command line argument handling.

This course aims to provide a modern knowledge of programming so that a student can solve problems related to his or her discipline. The programming language used is C ANSI 89. More specifically, this course will allow the student to: acquire basic programming notions; acquire knowledge of the C language; use and implement abstract data types (stack, file and list).

1.2 Objectives :

This course aims to :

-Discover the C programming environment,

-To know how to react to a programming problem.

At the end of this module, the student engineer will be able to

-Manage the inputs/outputs.

-Consider computer solutions written in C for problems to be solved by computer.

-Solve problems of a mathematical nature

-Study all possible cases that can be considered in order to solve a specific problem

-Mastering control structures

-Mastering iterative structures

-Browse, manipulate and sort tables.

1.3 Prerequisites :

Uplstream modules	Taught module	Downstream modules
	MGCV11.01	MGCV12.15

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Introduction to the C Language	1hr30	At the end of this chapter, the engineering student will recognize the history and the basic notions of the C language.
Chapter 2	Variables in C	3hrs	At the end of this chapter, the engineering student knows how to manipulate variables in C.
Chapter3	Inputs/outputs	1hr 30	At the end of this chapter, the engineering student knows how to handle C input/output, i.e. how to display and input.
Chapter4	Conditional structures	3hrs	At the end of this chapter, the student engineer knows how to impose conditions and how to deal with the different cases proposed.
Chapter 5	Repetitive structures	3hrs	At the end of this chapter, the engineering student knows how to define repeating structures to make one or a block of instructions repeat a finite number of times.
Chapter 6	Tables	3hrs	At the end of this chapter, the engineering student knows how to create a one- and two-dimensional picture, navigate and manipulate it
Practical Work 1	Input/Output and manipulation of variables	8hrs	At the end of this PW, the engineering student will be able to manipulate variables, hand over their values to the user, and display their values and

			the results of their manipulations.
Practical Work 2	Conditional structures	6hrs	At the end of this tutorial, theengineering student is able to impose conditions and to deal with the different cases proposed by these conditions.
Practical work 3	Repetitive structures	8hrs	At the end of this tutorial, the engineering student will be able to manipulate the different repetitive structures in C, to make a block of instructions repeat a finite number of times.
Practicalworks 4	Tables	8hrs	At the end of this tutorial, the engineering student creates one- and two-dimensional arrays, can browse them and manipulate the data that resides in them.

2.METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	15 hrs
Practicalwork (h)	30 hrs
Project (h)	-
Visits (h)	-

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works	All chapters	100%
Continuous assessment		
Presentation		
Final Review		

4. Bibliography :

1. http://www.isetjb.rnu.tn/docs/supports-cours/progc-aasses-mblaghgi.pdf
2. https://www.labri.fr/perso/chaumett/enseignement/matieres/langage-c/slides/rappels-et-complements-langage-c.pdf
3. https://c.developpez.com/cours/?page=langage-c

	Module Description	**Department :Civil Engineering**
		Date : 11/10/1021
		Version N°: 02
		Semester : 01

Mathematics for engineersI

Code: MGCV11.02

Module group:1

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
	X		

Teacher :Bassem Ben Hamed

Status : Temporary

Mail :bassem.benhamed@gmail.com

Courses	Practical works	Individual work	Total volume
30 hrs		**30 hrs**	**60 hrs**

Coefficient:	ECTS credits :
2	2

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

The engineering sciences require the use of mathematical tools when writing calculation software or solving equations. These methods must be perfectly mastered to be applied efficiently.

Objectives

This course lays the foundations of mathematical analysis and provides all the necessary knowledge, from the methods of differential calculus to different integration methodsand their interventions in differential geometry.

1.2: Prerequisites :

Upstream Modules	Taught Module	Downstream Modules
	MGCV11.02	

1.3 :Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter 1	Multivariable functions	10hrs	Topology. Continuity. Differential calculus. First and higher order partial derivatives. Schwartz's theorem. Local extremums.
Chapter 2	Integrals in R^2	10hrs	Integral on a rectangle. Linearity. Growth. Invariance by translation. Additivity. Fubini's theorem. Polar coordinates. Integrals on a disk, a ring, an angular sector, etc.
Chapter 3	Integrals in R^3	10hrs	Linearity. Growth. Invariance by translation. Additivity. Successive integration. Cylindrical coordinates. Spherical coordinates. Integrals on a cylinder, a cone, a sphere, a paraboloid, etc.
Chapter4	Curvilinear integrals	10hrs	Integral along a curve. Length of an arc. Green-Riemann'stheorem.Circulation of a vector field.
PWs			

2.METHODOLOGY

The pedagogical approach of this course is based on a deep understanding of the methods rather than on the computational aspect. This means that the examples chosen are primarily intended to illustrate

different aspects of the methods and to highlight their advantages and disadvantages. This approach is partly justified by the fact that more and more engineers use software tools.

Integrated courses (h)	30hrs
Practical work (h)	
Project (h)	
Visits (h)	

3.Assessment:

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment	1& 2	0.25
Presentation		
Final Exam	2, 3& 4	0.75

4.References

[1] J.M. Poitevin, Outils mathématiques pour physiciens et ingénieurs, Edition DUNOD.

[2] L. Leroyer, P. Tesson, Mathématiques pour l'ingénieur, exercices et problèmes, Edition DUNOD

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 15/10/2021
		N° version : 02
		Semester : 1

Statistics & Probabilities

Code : MGCV11.03

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		×	

Teacher :Amina AROUSSE

Status : Permanent

Mail :Arousse.amina@gmail.com

Courses	Practical works	Individual work	Total volume
30		**30**	**60**

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 15/10/2021** **N° version : 02** **Semester : 1**

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

The information provided by the collection, analysis, presentation and interpretation of data enables managers and policy makers to better understand the business and economic environment and thus make better and more informed decisions.

The subject of statistics can usefully be divided into two parts, descriptive statistics and inferential statistics, which are based on probability theory. In this course we will focus on descriptive statistics and probability theory

Objectives

The main objective of this course is to make the theoretical foundations of statistics and probability accessible to anyone who has assimilated the program of a scientific bac

1.2 : Prerequisites :

Mathematics

Upstream Modules	Taught Module	Downstream Modules
MGCV11.02	MGCV11.03	

1.3 :Learning Outcomes

Chapter	Title	Duration	Learning Outcomes
Chapter 1	Generalities of statistics Statistical Distribution & Statistical Tables	4Hrs	Statistical vocabulary and statistical tables
Chapter 2	The graphical representation The Cumulative function	4Hrs	Graph a statistical study and calculate the proportions of a population
Chapter 3	Central tendency, dispersion and shape characteristic	5Hrs	Master the mode, median and arithmetic mean
Chapter 4	Probabilities	9Hrs 2Hrs	Master: Elements of Probability Calculus: Basic Probability Combinatorial analysis Conditional probability Bayes-Independence formula
Chapter 5	The random variables	3Hrs 3Hrs	Discrete random variable Continuous random variable

1. METHODOLOGY

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30
Practical work (h)	
Project (h)	
Visits (h)	

2. Assessment :

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1,2 et 3	
Presentation		
Final Exam	From 1 up to 5	

3. Bibliographic References :

- Mazerolle Fabrice. Statistique descriptive : séries statistiques à une et deux variables, séries chronologiques, indices. Paris : Gualino, 2005.

- Verlant, Bernard. Statistique Et Probabilités : Tome 2. Paris : Foucher, 1997.
-
- Ouvrage “ Statistiques & probabilités” ,Jamel Fakhfakh, edition 2014
- Cours Statistiques Descriptives, Julien Hamonier

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 01

CONTINUUM MECHANICS

Code : MGCV11.04

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
	x		

Teacher : Mr Adnen GUERMAZI

Status :Temporary

Mail :adnenguermazi@gmail.com

Courses	Practicalworks	Individualwork	Total volume
45 hrs		**45 hrs**	**90 hrs**

Coefficient:	ECTS credits :
3	3

	MODULEDESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		N° version : 02
		Semester : 01

1.DESCRIPTION OF THE COURSE AND COMPETENCES :

1.1 Description: This module starts by giving the necessary mathematical tools used in the development of the course (tensor algebra, differential operators). Then, firstly, it presents the mathematical formulations of the notions of stresses and strains, defines their properties and their physical meanings. Secondly, the mathematical writing of the elastic behaviour law that links these two notions is developed. Finally, the formulation of the elastic problem in the elasto-static case and the methods of resolution are given.

1.2 Objectives: Firstly, the students become familiar with the mathematical background tools, mainly the index notations. In addition, they learn how to define and treat mathematically the notions of stresses and strains and to derive their properties by using analytical and graphical methods (Mohr's circle). Finally, students learn the different techniques used to solve a static elasticity problem by dealing with some simple problems: deformation of a weighted block, oedometer, triangular dam.

1.3 Prerequisites: Math,

Upstream Modules	Taught Module	Downstream Modules
MGCV11.02	MGCV11.04	MGCV12.17 ; MGCV21.25 ; MGCV22.37 ; MGCV22.38

1.4 :Learning Outcomes

Chapter	Title	Duration	Learning Outcomes
Introduction	**Continuous medium concept**	1h30	Define the continuous medium Material point
Chapter1	**Mathematicalbackgrounds and tools**	4hrs30	Coordinate systems Index notations Vectors and tensors Vector and tensoranalysis
Chapter 2	**Stress Tensor**	9hrs	Stress vectors Stress tensor Stress state on a plane Differential equations of equilibrium Transformation of the components of the stress tensor Properties of the stress tensor Special stress states Geometric representation of stresses: Mohr's circle
Chapter 3	Strain Theory	9hrs	Description of motion, displacementvector, gradient tensors Tensors of finitedeformations

			(Almansi-Euler; Green-Lagrange) Small deformationslineartensor Principal straindeformations and principal directions Particular deformation states Compatibility equations Measurement of deformations, Rosette strain gage
Chapter 4	**Constitutive laws of solids**	3hrs	Behaviour of solids: Tensile / compression test Linear Elasticity: General Hooke's Law Stress limit criteria Stress energy : potential energy Thermoelasticity
Chapter5	**Linearelasto-staticproblems**	9hrs	Problem formulation Solving techniques Uniqueness theorem Principle of superposition Saint-Venant principle Analytical methods of resolution: Navier equations / Beltrami equations Examples of simple problems
Chapter 6	**Plane problems in elasticity**	9hrs	Plane deformations Plane stresses Plane problems in Cartesian coordinates: Airy function Plane problems in polar coordinates

2.METHODOLOGY :

The Contact hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	45
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1 et 2	1/3
Presentation		
Final Exam	All	2/3

4.Bibliographic references :

1) F. Sidoroff : Mécanique des milieux continus, Ecole Centrale de Lyon, 2010
2) J. N. Reddy : An introdution to continuum mechanics, Cambridge University Press, 2008
3) G. T. Mase and G. E. Mase : Continuum mechanics for engineers, CRC Press LLC, 1999
4) S. P. Timoshenko and J. N. Goodier : Theory of elasticity, Mc-Graw Hill Book Company, Inc., 1951

	Module Description	Department :Civil Engineering
		Date : 11/10/2021
		Version N°:02
		Semester :1

Geology and Geophysics for Civil Engineers

Code : MGCV11.05

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		x	

Teacher : Mr. Nabil Ghorbel

Status : Temporary

E-mail : ghorbil58mail.com

Courses	Practicalworks	Individualwork	Total volume
30 hrs		30hrs	60 hrs

Coefficient:	ECTS credits :
2	2

	MODULE DESCRIPTION	Department : civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :1

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description :

One of the aspects faced by the Civil Engineer relates to the natural conditions of a site and/or territory. For optimal implementation of design and construction works, a thorough knowledge and understanding of the characteristics of soils, rocks and their distribution in the subsoil, rock masses and groundwater, as well as the role of geological processes in action or potential is required. The disciplines to be covered by professional training are: classical geology, petrography, soil and rock mechanics, geotechnics, geophysics and hydrogeology. Geophysics, in particular, helps to **solve specific problems** such as **earthworks**, **detection of underground cavities** or other types of heterogeneities, determination of **density or watercontent**, **identification of clays**, evaluation of **fracturing**, approach to some **elastic moduli**, etc.

1.2 Objectives :

For the mastery of the principles and methods of mineral sciences and indirect techniques of soil and subsoil exploration, the course has set objectives based on

- The geological knowledge of the subsoil with the aim of its development, its exploitation, the construction on its surface or underground and the use of materials in the field of civil engineering.

- The development of a set of indirect and non-destructive approaches (theory, technique, implementation and interpretation) used in civil engineering, in particular: seismic refraction; the resistivity method; microgravity and georadar.

- The highlighting of the contribution of these geophysical techniques in the detection of possible problems which could be encountered during the realization of works

1.3 Prerequisites :

- Elements of undergraduate mathematics and physics.

- Some basic geology concepts : internal structure of the globe, dynamics of the lithosphere, lithosphere - hydrosphere - atmosphere interaction.

Upstream modules	Taught module	Downstream modules

MGCV11.02	MGCV11.05	MGCV12.16

1.4 Learning outcomes:

Chapter	title	Duration	Learning outcomes
Part I : Geology Elements			
Chapter 1	The Planet Earth	2 h	Earth is a dynamic planet
Chapter 2	Petrography and stratigraphy	3 h	Rocks and minerals: origin and genesis. The soil.
Chapter3	Tectonics	3 h	Main types of deformation. Scales of studies. Main tectonic accidents. Landslides. Collapse and subsidence. Collapse and block fall
Part II : The geophysic approach to Civil engineering			
Chapter1	Physical properties and mechanical behaviour of rocks	3 h	The development of the physical and mechanical aspects of rocks forms the basis of the geophysical approach and prepares the student to discover geophysical methods.
Chapter 2	Geophysics methods 1- Seismic methods	8 h	The purpose of seismic recognition is to: calculate the modulus of elasticity of the different layers; map the sabstratum; locate faults and fracture zones; solve problems related to ripability and earthworks.
	2-Electrical methods	5 h	Reading and interpretation of measurements made with an electric panel, the objective of which is to follow the variations in resistivity in the subsoil (electric tomography). This method is used to characterise geological formations, detect faults and locate the piezometric level.
	3- Micro gravimetry	3 h	Highlighting of cavities and small objects.
	4-Georadar	3 h	Detection of buried pipelines.

2.METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment:

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment	1,2 & 3	1/3
Presentation		
Final Review	All	2/3

4. Bibliography :

- J.-L. Mari et al (1998) Géophysique de gisement et de Génie civil. Editions Technip.

- Application de la géophysique aux recherches d'eaux (C. Meyer De Stadelhofen, Technique de documentation- Lavoisier 1991)

- Prospection électrique de surface (D. Chapelier, Université de Lausanne, Cours online)

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**Module Description**	**Department :Civil Engineering**
		Date : 11/10/2021
		Version N°: 02
		Semester :1

FLUID MECHANICS

Code : MGCV11.06

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Ms HibaJemai

Status : Permanant

E-mail :h.jemai@hotmail.fr

Courses	Practicalworks	Individualwork	Total volume
30	15	45	90

Coefficient:	ECTS credits :
2.5	3

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :1

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description :

This course aims to

- Have a basic understanding of fluid statics and dynamics
- Calculate the pressure losses experienced by a flowing fluid in a pipe.
- To give the basic knowledge necessary to calculate pumps (Hmt, NPSH,...)

1.2 Prerequisites :

Knowledge of the basic mathemathic concepts.

Upload modules	Taught module	Download modules
MGCV11.02	MGCV11.06	MGCV12.19

1.3 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Physical properties of fluids	3hrs	Mechanical behaviour and the difference between the physical properties of compressible and incompressible fluids.
Chapter 2	Fluidstatics	6hrs	Fundamental relation of hydrostatics. Pascal's theorem. The torsor associated with the pressure forces of a fluid on a plane wall. Archimedes' thrust

Chapter3	FluidKinematics	6hrs	Types of flow. The differential equation of continuity.
Chapter4	dynamics of perfectfluids	6hrs	- Flow rate and average velocity - Flow regimes - Euler'sequation - Bernoulli equation
Chapter 5	Viscousfluiddynamics	6hrs	- Concept of viscosity. Classification and calculation of pressure drops
Chapter 6	Pumpcalculation	3hrs	- Pump characteristic curve and network curve - Cavitation of a pump - Pump coupling and similarity laws

Practical work

Session	Title	Duration	Learning outcomes
1	Properties of fluids	4h	-Density measurement of fluids - Measurement of the viscosity of fluids (ball drop)
2	Pressure losses	4h	--Pressure losses (Linear, 45° elbow, and 90° elbow)
3	Venturi, valves, and filter	4h	--Venturi tube -Pressure losses (Filter, Valves)
4	Evaluation	3h	

2.METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30
Practicalwork (h)	15
Project (h)	-
Visits (h)	-

3. Assessment:

Designation	Chapter(s)	Rating
Mini-project	-	
Practical works	Chapter 1,3,4,5&6	1/4
Continuous assessment	Chapter 2	1/4
Presentation	-	
Final Review	All chapters	2/4

4. Bibliography:

1) Fortier, Mécanique des fluides et transferts de chaleur et de masse par convection, Masson,1975
2) R.B. Bird, W.E., Steawart, E.N. Lightfoot, Transport phenomena, John Wiley et Sons, New York, 1960
3) E. Baltaretu, Les pompes centrifuges: conditions fonctionnelles-constructives, chaînes de cotes, Eyrolles, 1975
4) H. Fauduet, Principes fondamentaux du génie des procédés et la technologie chimique, Lavoisier 1997.
5) G. Towler, R. Sinnott, Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design, 2008, Elsevier
6) R. Gibert, Génie chimique Tome 1 mécanique des fluides, Eyrolles, 1963

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester :01

BUOLDING MATERIALS

Code :MGCV11.07

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
×	×		

Teacher : JihenMallekJallouli

Status: PhD /Permanent

e-Mail : Mallek.jihen@gmail.com

Courses	Practicalworks	Individualwork	Total volume
45	15	60	120

Coefficient:	ECTS credits :
3.5	4

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :1

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

- Description ofcourses

This module mainly allows students to learn about civil engineering construction materials.these materials are used to build houses and structures.The relation between these materials of building and their environment is also developed. It aims to study their physical and mechanical properties.

- Description ofpractical work

We are interested in studying:

- The gradation curves for the aggregates
- The apparent and absolute density
- The strength of coarse aggregates by the Micro Deval and Los Angeles test
- The sand equivalent test
- The Vicat test
- The water absorption

1.2 : objectives

The student should be able to:

- Know the different types of construction materials
- Know how to formulate a concrete
- Measure the physical and mechanical parameters of construction materials

1.3 Prerequisites :

Uplstream modules	Taught module	Downstream modules
	MGCV11.07	MGCV22.45

1.1 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	**Classification of materials and their properties**	3	Concrete; physical properties; chemical properties;physical-chemical properties; thermal properties; mechanical properties;.
Chapter 2	**Aggregates**	6	Natural; artificial; recycled; aggregates; porosity; chloride ion penetration; sulphate attack.
Chapter 3	**Cement**	6	Limestone; clay; clinker; mineralogical composition; hydration of aluminates; hydration of silicates; setting; hardening; Blaine specific surface.
Chapter 4	**Adjuvants**	3	Robustness; rheology; segregation; durability; plasticity; setting.
Chapter 5	**Mortars**	3	Lime plaster; cement plaster; air content; workability and consistency; water content; drying shrinkage; mechanical strength
Chapter6	**Concrete, production and application**	6	Characterisation of concrete by fresh-state tests: workability, fluidity, consistency; mixing; preparation of specimens; surfacing of specimens; characterisation of concrete by hardened-state tests; cellular concretes; fibre-reinforced concretes; high performance concretes; self-compacting concretes; implementation of concrete on the building site; exposure classes of concrete.
Chapter 7	**Types of concrete and their compositions**	9	Formulation of ordinary concrete, Dreux-Gorisse method; Baron-Lesage; Bolomey; Self-compacting concrete: slump flow, L-box test, V-Funnel test, Sieve stability test; Formulation of self-compacting concrete; Formulation of high performance concrete.
Chapter 8	**Bituminous concretes**	3	asphalt concrete; flexible asphalt concrete; pervious asphalt concrete, semi-rough asphalt concrete; high modulus asphalt concrete; hot mix asphalt application
Chapter 9	**Ceramics products**	3	Molecular structure of ceramics; clay; thermal cycle

Practica work

session	Title	Duration	Learning outcomes
1	The gradation curves for the aggregates	2 hrs	Fineness module ; granulometricanalysis
2	The apparent and absolute density	2 hrs	Density
3	The strength of coarse aggregates by the Micro Deval and Los Angeles test	2 hrs	the coefficient Micro-Deval ; the coefficient Los Angeles.
4	The sand equivalent testand the Vicat test	2 hrs	Equivalent of sand (Es) concrete curing time; The Vicat test
5	The water absorption The water content	2 hrs	The water absorption (Ab) The water content

2. METHODOLOGY

The course consists of a power point presentation of the chapter and its objective, reminding and detailing the formulation and practice of solving the problems. The course is clarified by small applications. Problem solving is dealt with separately in the tutorial sessions or the student is obliged to prepare them in advance. For self-study activities, students have to do the exercises given as homework.

In the case of the practical hours, students are allowed to carry out tests to characterise the building materials and to write reports after each practical session.

Integrated courses (h)	45
Practicalwork (h)	15
Project (h)	0
Visits (h)	0

3. Evaluation

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practicalworks	1, 2, 3,4 &5	1/4
Continuousassessment	1, 2, 3,4 & 5	1/4
Presentation		
Final Review	All	1/2

4. References

1. Pkla, A. Mesbah, V. Rigassi et J. C. Morel, Empirical comparison of testing methods on measurements of the mechanical characteristics of soil mortars, Materials and Structures/Matériaux et Constructions, Vol. 36, March 2003, pp 108-117

2. XP P 18-458, (2008). “Test for hardened concrete : Accelerated carbonation test – Measurement of the depth of carbonation.” AFNOR.
3. XP P 18-462, (2012). “Test for hardened concrete: Accelerated test of chloride ion migration – Determination of the diffusion coefficient of chloride ion.” AFNOR.
4. P18-459, (2010). “Test for hardened concrete: Porosity and density test.” AFNOR.
5. EN 12350-8, (2010). “Self compacting concrete : Slump-flow test.”AFNOR.
6. EN 12350-10, (2010). “ Self compacting concrete : L-box test.” AFNOR.
7. EN 12350-11, (2010). “ Self compacting concrete: Sieve stability test.” AFNOR.
8. EN 206-9, (2010). “ Self compacting concrete: V-funnel test.” AFNOR.
9. EN 12350-6, (2012). “Density test.”
10. EN 12390-3, (2019). “Test for hardened concrete – compressive strength.” AFNOR.

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester : 1

BUILDING THERMICS

Code : MGCV11.08

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		×	

Teacher :Ahlem SDIRI

Status :PhD/temporary

e-Mail :ahlem.sdiri@yahoo.com

Courses	Practical works	Individual work	Total volume
30 hrs		30 hrs	60 hrs

Coefficient:	ECTS credits :
2	3

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :1

1. DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description:

The thermal of the building is the study of its energy needs, all factors, combination of construction processes, choice of materials and their implementation, as well as the options taken to ensure the comfort of the habitat and limit its energy losses.

1.2 Objectives :

The student engineer is expected to solve from this course the various problems related to heat loss in buildings. This resolution is based on the calculation of energy balances applied in the different walls of the building (wall, roof) taking into account the different sources of heat (solar radiation etc.). More precisely, the application of thermic requires examining, in its most generic way, the insulation of the building, to understand the phenomena of heat loss, but also the characteristics of each material with a final goal, which is the good choice of the thermal insulation.

1.3 Prerequisites:

Fluid mechanics, Mathematics for engineers, Construction materials.

Uplstream modules	Taught module	Downstream modules
MGCV11.02 , MGCV11.06 , MGCV11.07	MGCV11.08	MGCV21.32

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	**Introduction to heat transfer in buildings**	3h	General presentation of the different thermal environmental agents that act on buildings. Define the walls of buildings (roof, walls etc.) and their impact on heat transfer within the building. Present the different modes of heat transfer (convection, conduction and radiation). Present the dimensions of the walls used in civil engineering in Tunisia and their components.
Chapter 2	**Convection**	9h	Present and define analytically the mode of heat transfer in buildings: Convection. Fluid / solid heat exchange (treat the example of contact of outside and inside air with the walls of the building). Present the different modes of convection: forced and free.
Chapter 3	**Conduction**	9h	Present and define analytically the mode of heat transfer in buildings: Conduction. Conduction: solid/solid heat exchange: treat the case of interior layers in the wall: heat emission at the level of the layers. Applications: horizontal and vertical multilayer walls. Establish the expressions of thermal resistances of materials according to the shapes of the walls (cylindrical and rectangular).
Chapter 4	**Radiation**	9 h	To define the mode of heat exchange by radiation: surface exchange (Boltzmann's law). It is to absorb the energy of the sun in the form of electromagnetic waves in the infrared range (radiation invisible to the naked eye). The more the material absorbs the radiation, the more it will redistribute it later and the better its thermal mass will be. Apply the three modes of heat transfer: convection, conduction and radiation on a real example and evaluate the heat emission by

			applying a heat balance. Present the materials used in buildings that present themselves as thermal insulators.

2. METHODOLOGY

The Contact Hours consist of the presentation of different concepts, rules, and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students must do the exercises given as homework.

Integrated courses (h)	30
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Evaluation

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	All	
Presentation		
Final Review		

1. Bibliographic References

1. CORTES H., BLOT, J. (1999) Transferts thermiques Application à l'habitat, Ellipses, Paris, ISBN 2-7298-7841-6, 212 pages.
2. JOHN H LIENHARD. (2001) Heat Transfer, Phlogiston Press, Cambridge, Massachusetts, U.S.A, 705 pages.
3. JANNOT Y. (2005) Transfertsthermiques, Nancy, 158 pages.
4. BEJAN A., KRAUS A.D. (2003) Heat transfer handbook, John Wiley & Sons, Inc., Hoboken, New Jersey, U.S.A, 1480 pages.

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester : 1

Computer aided building drawing

Code : MGCV11.09

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
			×

Teacher: Jihen Mallek Jallouli

Status: PhD /Permanent

Mail :mallek.jihen@gmail.com

Courses	Practicalworks	Individualwork	Total volume
	30	30	60

Coefficient:	ECTS credits :
2	2

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :1

1. DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

This course will provide training on AUTOCAD. It highlights

- Reading architectural plans

- The drawing of the plan

- 3D representation

1.2 : Objectives

At the end of this course, students should be able to

- Draw plans (formwork, foundations, and reinforcements).

- learn 3D representation

1.3 : Prerequisites :

Uplstream modules	Taught module	Downstream modules
	MGCV11.09	MGCV21.28

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	**Introduction to the Auto CAD screen and the most commonly used controls.**	3 hrs	Toolbars; text; dimensions; layer; the most usual controls
Chapter 2	**Two-dimensional (2D) drawing**	3	Tracing architectural plans; formwork plan; relative coordinates; absolute coordinates; polar coordinates; hatching
Chapter 3	**A mini project: architectural plan**	6	An architectural plan of a multi-storey building of 500 m^2
Chapter 4	**Three dimensional (3D) drawing**	3	Block; orbit; extrusion; area

2. METHODOLOGY

The contact times provide a power point to present the chapter and its objectives, remind and detail the formulation and the practice of solving the problems. The course is clarified by small applications. Problem solving is dealt with separately in the tutorial sessions or the student is obliged to prepare them in advance. For self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	
Practicalwork (h)	30
Project (h)	
Visits (h)	

3. Evaluation

Designation	**Chapter(s)**	**Rating**
Mini-project	1 & 2	1/3
Practical works		
Continuous assessment		
Presentation		
Final Review	All	2/3

4. References

AutoCAD Tutorial for beginners

	MODULE DESCRIPTION	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 2

Communication skills I

Code : MGCV11.10

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
			×

Teacher : GHORBEL JOUDA

Status : Permanent

Mail : joudaghorbel@yahoo.fr

Courses	Practical works	Individual work	Total volume
30hrs		30hrs	60hrs

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 2

1. DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

This course is a preparation for entering a company; it starts with a general chapter on French communication which includes the different elements of the communication situation as well as the different language registers.

The second chapter is devoted to the study of the cover letter and the difference between the spontaneous cover letter and the one following an advertisement.

In the third chapter, this module proposes the study of the characteristics of a good CV.

The course ends with the last step of the recruitment preparation, the job interview, where we deal with the majority of the questions asked during an interview and how to find the right answers and succeed in getting the job.

1.2: Prerequisites :

Upstream Modules	Taught Module	Downstream modules
	MGCV11.10: Communication techniques I (Communication before business)	Communication techniques and soft skills (Communication within the company Professional writing)

1.3 :Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
1	communication	6hrs	The student masters the elements of the communication situation and the language registers.
2	Letter of application	9hrs	The student is able to write an effective cover letter and to distinguish between a spontaneous cover letter and a cover letter following an advertisement.
3	CV	6hrs	L'étudiant est capable de rédiger un CV dans les normes.
4	The job interview	9hrs	The student is able to pass a job interview; he/she is able to present him/herself correctly and answer the questions often asked during an interview.

2. METHODOLOGY

The Contact hours consist of an introduction to the course. Practical applications are dealt with separately in the guided exercises.

Active methods, brainstorming, simulations and group exercises are used in the applications.

For self-study activities, students have to complete the exercises given as homework.

3. Assessment :

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment	1-2	0.5
Presentation		
Final Exam	1-2-3	1.5

4. Bibliographic References :

Christelle Capo-Chichi ; Le CV. Studyrama. Collection Emploi

Uriel Megnassan ; *Le CV et la lettre de motivation, Mettez du punch dans vos candidatures*. Collection Eyrolles.

Uriel Megnassan ; *Décrochez le Job de vos rêves en 5 rounds*. Collection Eyrolles.

Patrick De Sainte Lorette ; *La lettre de motivation spécial étudiants et jeune diplômé. Edition d'organisations.*

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**Module Description**	**Department :Civil Engineering**
		Date : 11/10/2021
		Version N°: 02
		Semester :1

Urban planning law

Code : MGCIV11.11

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
			x

Teacher : MrRafaa Ben Mahfoudh

Status : temporary

E-mail :maitrerafaabenmahfoudh@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30 hrs		30hrs	60 hrs

Coefficient:	ECTS credits :
2	2

	MODULE DESCRIPTION	Department : Civill Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :1

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description :

This module is established to enable the engineering student to acquire in-depth knowledge of the rules of urbanisation and the various parameters to be taken into account when planning urban space, land use and urban planning regulations. In addition, he/she must know the rules governing the liability of the construction professional.

1.2 Objectives :

To prepare the student for professional life and know the legal rules of urban planning

To present the general principles and objectives of urban planning law

To Present the means of controlling urban expansion

To Study the responsibility of the construction professional

1.3 Prerequisites :

Upstream modules	Taught module	Downstream modules
	MGCIV11.11	

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Introduction	4hrs	- to know what is urban planning law - to know the evolution of town planning law in the light of the objectives of the national socio-economic development policy and the integration of town planning law into the new dynamics of environmental protection.
Chapter 2	Prospective documents in urban planning law: the SDAT and the PAU	6hrs 30	-to know the role of the SDAT as a global prospective document in the alignement between socio-economic

			development programmes and land use planning operations - to know the role of the SDAT in the establishment of an integrated spatial management approach - To know the role of the PAU in regulating land use and protecting agricultural land, forestry and archaeological heritage - To know the role of the PAU in advocating a balanced development between the urban space and the protection of natural resources as well as the protection of urban aesthetics.
Chapter3	Town planning authorisations: subdivision and building permits.	6hrs30	- To Know the purpose of planning permission and the formalities for granting it. - To Know the role of planning permission in land management and the control of land use rules. - To know the role of planning permission in the protection of agricultural land, forestry and archaeological heritage.
Chapter4	Urban structures	6hrs 30	- know what urban structures are - to know how to delimit urban structures - to know the legislator's objective in reconciling the needs of protection of public interests and the interest of the enjoyment of property rights in urban structures
Chapter 5	The responsibility of the construction professional	6hrs 30	- to know what the decennial liability and the single insurance contract of the building site is - to know the obligations of the professional in the guarantee of the defects of constructions

2.METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students must do the exercises given as homework.

Integrated courses (h)	30
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment:

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment	1, 2 & 3	30%
Presentation		
Final Review	All	70%

4. Bibliography :

Jacqueline Morand-Deviller, Droit de l'urbanisme, Dalloz, 10e édition, Paris, 2018.

Wahid Ferchichi , Aménagement des Espaces: Urbanisme et Occupation du Sol en Droit Tunisien, centre d'études juridiques et judiciaires, 2010.

Mustafa Beltaief, Les Politiques Urbaines en Tunisie, Aménagement urbain et transition postkeynésienne, Tunis, 2008.

	Module Description	**Department :Civil Engineering**
		Date : 20/10/2021
		Version N°: 02
		Semester : 1

English for SpecificPurposes

Code : MGCV11.12

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
	X		

Teacher : Mariem Feki

Status : Permanant

Mail :fekimariem@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30 hrs		30 hrs	60 hrs

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	Department : Civil Engineering
		Date : 20/10/2021
		versionN° : 02
		Semester :02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

English for specific purposes aims at offering the students an emphasis on spoken and written English within the field of Civil Engineering. The focus of the course is on speaking , reading and writing in English using civil engineering as the working topic area.

1.2Objectives :

-Knowledge : develop a certain level of knowledge about the vocabulary and the structures related to the domain of Civil engineering in some specific situations.
Develop a sense of interaction in an international and professional context.
-Skills: Ability to understand ,talk and write in English in contexts which are related to Civil Engineering issues.
Ability to speak and express oneself.
Reach, by the end of the year a B2 level of English understanding and production(written and oral): according to the Common European Framework of Languages.

1.3 Prerequisites :

- To be familiar with vocabulary and structures of the civil engineering domain , at least a B1 (intermediate) level.

- To be able to write simple, accurate and clear structures in general English.

- To be able to understand and deliver speeches and presentations in English.

Modules upstream	Module taught	Modules downstream
	MGCV11.12	

1.3 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Unit I : Teamwork 1- BRAINSTORMING: • Talking about roles and responsibilities • Explaining how an organization works (describing charts) • Describing jobs and experience • Discussing roles in an international construction project. 2- Language: • Present simple and present continuous • Question forms 3- Vocabulary, listening, writing • Jobs, roles and responsibilities • Describing on site workers and elements • Departments in an organization collocations with prepositions • Talking about innovations and new developments	6 hrs	The student should be able to make difference between different types of construction tasks. He should be able to talk about every single staff's job on site . The student should be able to present and describe charts and diagrams orally . By the end of the unit , students prepare a presentation (using given guiding materials) about organizations and construction projects and present it individually or in pairs.
Chapter 2	Design 1- Function: • Technical drawings description and explanation • Estimating • Discussing ideas and improvements about plans 2- Language: • Dimensions : imperial and metric • Conditionals • Introducing ideas • Discussing ideas 3- Vocabulary, writing: • 2D and 3D shapes	6hrs	The main outcome of unit 2 is to spell and pronounce numbers in measures and dimensions. - To prepare an estimate and plans in different types. - At the end of the unit students ae required to prepare presentations on the different plans types using dimensions and specifications.

	• Vocabulary related to technical drawings • Collocations related to estimating • Office features • Light tubes (technologies in European countries)		
Chapter3	Equipments: 1- Function: • Talking about equipments (heavy equipments and hand equipments) • Explaining faults • Maintaining and repairing • Discussing necessary equipments used for repairing specific situations. 2- Language: • Asking and answering about equipments (how it works/ how it should be maintained and repaired) • Passive voice with *be* and *get* • *Need to* Vs *need +ing* 3- Vocabulary ad writing: • Equipments • Faults and repairs • Conversations and reports of inspectors about on site faults and solutions.	8hrs	In unit 3 , students should be able to talk about types of equipments. By the end of the units students should be able to present measures of security and uses of different construction equipments.
Chapter4	Safety on site 1- Risks and hazards at work 2- Safety equipments 3- Health and safety guidelines 4- Giving instructions on traffic controls 5- Knowledge of signs and signals 6- Injuries	6hrs	Students should be able to introduce different hazards and accidents that may occur on site. A presentation of the PPE and a case study is required at the end of the unit.
Practicalworks	Presentations based on materials	4 hrs	Students prepare relevant topics to

	provided. Conversations on case studies.		present .

2.METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	Unit 1, 2	10%
Presentation	All units	10%
Final Review	All units	80%

4. Bibliography :

- Frendo,Evan: ***English for Construction: Vocational English Course Book***. Ed.David Bonamy

  www.pearsonELT.com/vocationalenglish

- Elaine Walker, Steve Elsworth: ***Grammar Practice for Intermediate Students.*** Ed Pearson Education Limited
- Caruzzo, Patrizia: Flash on English for Construction, ESP series

	Module Description	**Department :Civil Engineering**
		Date : 15/10/2021
		Version N°: 02
		Semester :01

Numerical Analysis

Code : MGCV12.13

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
	X		

Teacher : Mr. Bassem Ben Hamed

Status : Temporary

e-mail :bassem.benhamed@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30 hrs	**15 hrs**	**45 hrs**	**90 hrs**

Coefficient:	ECTS credits :
2.5	3

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 15/10/2021
		versionN° :02
		Semester :

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description

This course aims to:

- Develop basic skills in numerical analysis (convergence of algorithms, error analysis, correct formulation of problems in mathematical form).
- Practice the implementation of these skills by making optimal use of all available resources (effective programming, visualization of results, etc.)

1.2 Objectives :

The aim of this course is to provide an overview of the main basic numerical methods and to cover in particular the following topics:

- Roots of an algebraic equation
- Systems of linear and non-linear equations
- Interpolation
- Equations and systems of differential equations

1.3 Prerequisites :

Upstream modules	Taught module	Downstream modules
MGCV11.01, MGCV12.14	MGCV12.13	

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Interpolation	10 hrs	Vandermonde matrix. Lagrange interpolation. Newton's polynomial. Interpolation error. Cubic splines.
Chapter 2	Equations and differential systems	10 hrs	Euler's method. Taylor's method. Runge Kutta methods of order 2 and 4. Systems of differential equations. Higher order equation.
Chapter3	Systems of algebraic equations	10 hrs	Bisection method. Fixed point method: Convergence and Aitken

			extrapolation. Newton's method: Convergence and the case of multiple roots. Secant method.
Project	Software tools for solving problems	15 hrs	Justifying some approaches by the use of software tools.

2.METHODOLOGY :

The pedagogical approach of this course is based on a deep understanding of the methods rather than on the computational aspect. This means that the examples chosen are primarily intended to illustrate different aspects of the methods and to highlight their advantages and disadvantages. This approach is partly justified by the fact that more and more engineers use software tools.

Integrated courses (h)	30
Practicalwork (h)	15
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		0.15
Continuous assessment	1&2	0.15
Presentation		
Final Review	2&3	0.70

4. Bibliography :

[1] André Fortin, Analyse numérique pour les ingénieurs. 4ème édition, Presses Internationales Polytechnique.

[2] J. Stoer, R. Bulirsch, Introduction to NumericalAnalysis. Text in AppliedMathematics, Springer.

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**DESCRIPTION DU MODULE**	**Engineering training cycle: Industrial Engineering**
		2nd year Semester :1
		N° version : 02 -Date : 15/10/2021

Mathematics II

Code : MGIND21.26

Groupe de module :GM2-1

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
	X		

Teacher :Bassem Ben Hamed

Status : Temporary

e-Mail :bassem.benhamed@gmail.com

Courses	Practical works	Individual work	Total volume
30 hrs		30 hrs	60 hrs

Coefficient:	ECTS credits :
2	2

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

The engineering sciences require the use of mathematical tools when writing calculation software or solving equations. These methods must be perfectly mastered to be applied efficiently.

Objectives

This course lays the foundations of mathematical analysis and provides all the necessary knowledge, from the methods of solving differential equations to the use of the Fourier transform and functional analysis.

1.2: Prerequisites :

Upstream Modules	Taught Module	Downstream Modules
MGIND11.01	MGIND21.26	MGCV12.13

1.3 :Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter 1	Fourier sequences	6hrs	Dirichlet's theorem. Jordan's theorem. Non-periodic case. Parseval's equality.
Chapter 2	Fourier transform	8hrs	Fourier transform for functions. Inversion. Derivation. Convolution. Parseval-Plancherel theorem. Fourier transform of distributions.
Chapter 3	Laplace transform	8hrs	Link between laplace and Fourier. Abscissa of summability. Inversion. Convolution. Application to the solution of differential equations. Calculation of transfer functions in electronics.
Chapter4	Z-transformation	8hrs	Decomposition into simple fractions. Linearity. Shift and transform. Derivation. Convolution. Product of sequences. Initial value.

2.METHODOLOGY

The pedagogical approach of this course is based on a deep understanding of the methods rather than on the computational aspect. This means that the examples chosen are primarily intended to illustrate different aspects of the methods and to highlight their advantages and disadvantages. This approach is partly justified by the fact that more and more engineers use software tools.

Integrated courses (h)	30hrs
Practical work (h)	
Project (h)	
Visits (h)	

3.Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1& 2	0.25
Presentation		
Final Exam	2 & 3	0.75

4.References

[1] J.M. Poitevin, Outils mathématiques pour physiciens et ingénieurs, Edition DUNOD.

[2] L. Leroyer, P. Tesson, Mathématiques pour l'ingénieur, exercices et problèmes, Edition DUNOD

	Module Description	Department :Civil Engineering
		Date : 11/10/2021
		Version N°: 02
		Semester : 1

IT II

Code : MGCV12.15

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		x	

Teacher :Ms Salma Ksibi

Status :permanant

E-mail :salmaksibi88@gmail.com

Courses	Practicalworks	Individualwork	Total volume
	30hrs	30 hrs	60 hrs

Coefficient:	ECTS credits :
1	2

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :1

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

This module focuses on a C++ programming application.

C++ is a programming language: it is used to write computer applications. It is one of the most widely used programming languages nowadays.

Each program in C++ should be written according to very strict writing rules.

1.2 Objectives :

The main objectives of this course are :
-To discover the C++ programming environment,
-To beable to react to a programming problem.
At the end of this module, the engineering student will be able to:
-Manage input/output.
-Consider IT solutions written in C++ for problems to be solved by computer.
-Solve mathematical problems
-Study all possible cases that can be considered in order to solve a specific problem
-Control control structures
-Mastering iterative structures
-Browse, manipulate, and sort tables

1.3 Prerequisites :

Upstream modules	Taught module	Downstream modules
MGCV11.01	MGCV12.15	MGCV21.26

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Practical Works 1	Input/Output and manipulation of variables	8hrs	At the end of this tutorial, the engineering student will be able to manipulate variables in C++, hand over to the user to enter their values, and display their values as well as the results of their manipulations.
Practical Works 2	Conditional structures	6hrs	At the end of this tutorial, the student engineer will be able to impose conditions in C++ and to deal with the different cases proposed .
Practical Works 3	Repetitive Structures	8hrs	
Practical Works 4	Tables	8hrs	

2.METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment		
Presentation		
Final Review		

4. Bibliographicreferences :

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semester: 02**

SOIL MECHANICS 1

Code : MGCV12.16

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr Adnen GUERMAZI

Status : Temporary

Mail :adnenguermazi@gmail.com

Courses	Practicalworks	Individualwork	Total volume
45hrs		45hrs	90 hrs

Coefficient:	ECTS credits :
3	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester: 02

1.DESCRIPTION OF THE COURSE AND COMPETENCES :

1.1 Description:

In this module the fundamental basic of soil mechanics are developed. We begin by presenting the constituent elements and the physical properties of soils, defining the methods of identification and classification as well as the method of soil compaction. Then we study the flow of water in the soil and construct the flow nets and calculate the seepage forces. The mechanical aspect of soil is developed in the chapters related to the calculation of the stresses generated at any point of the soil mass and the definition and experimental determination of the mechanical characteristics of soils. Finally, the calculation of settlement amplitudes and their evolution over time is presented.

1.2 Objectives :

To acquire the basic notions of soil mechanics which are related to the physical, hydraulic and mechanical aspects. These notions are based on theoretical models and interpretations of experimental test results.

1.3 Prerequisites:

Mathematics / Continuous media mechanics / Fluid mechanics

Upstream Modules	Taught Module	Downstream Modules
MGCV11.02 ; MGCV11.04 ; MGCV11.06	MGCV12.16	MGCV22.44 ; MGCV31.57

1.4 :Learning Outcomes

Chapter	Title	Duration	Learning Outcomes
Chapter 1	**Introduction**	1h30	Different types of problems to be solved and aspects to be addressed
Chapter 2	**Physical properties of soils**	9hrs	Components of a soil Physical parameters of a soil Experimental determination of the physical properties of a soil Soil identification and classification tests Soil compaction
Chapter 3	**Soilseepage**	9hrs	Darcy's Law Measurement of Permeability Two-dimensional flow of water in the soil, flow nets and seepage forces Water pressure in the capillary fringe
Chapter 4	**Stress distribution in soil mass**	7hrs30	Stresses and strains in the soil

			Total and effective stresses Initial stress state in the soil Loading-induced stresses
Chapter 5	Mechanicalproperties of soils	9hrs	Compressibility of soils: Oedometer test Shear strength of soils: Failure criterion Direct shear test Triaxial tests Shear strength of soils: Sand and clay
Chapter 6	Settlement calculations and consolidation theory	9hrs	Immediate settlement and consolidation settlement Vertical consolidation: Terzaghi theory Secondary consolidation Measurement of consolidation coefficients

2.METHODOLOGY

The contact hours consist of a power point presentation of the fundamental notions related to each chapter. The course is clarified by applications treated separately in the tutorial sessions where the student must prepare them in advance. For the self-study activities, the students must do the exercises given as homework.

Integrated courses (h)	45hrs
Practicalwork (h)	
Project (h)	
Visits (h)	

3.Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	2 & 3	1/3
Presentation		
Final Exam	All	2/3

4. Bibliographicreferences :

1) T. W. Lambe and R. V. Whitman : Soil mechanics, John Wiley & Sons, Inc., New York, 1967.
2) R. D. Holtz and W. D. Kovacs : An introduction to geotechnical engineering, Prentice-Hall, Inc., New Jersey, 1981.
3) I. Smith : Elements of soil mechanics, Wiley Blackwell, 9th Edition, 2014

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department :Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 02

Strength of materials

Code : MGCV12.17

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr Fahmi BEN JEMAA

Status :Temporary Teacher

Mail : fahmi.benjemaa@enis.tn

Courses	Practical works	Individual work	Total volume
45 h	**15 h**	**60 h**	**120 h**

Coefficient:	ECTS credits :
3.5	4.0

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description:

This course is devoted to the development of the theory of bars. In this course we present the methods of determination of internal forces (axial force, shear force and bending moment) , the corresponding stresses and strain energy. Also, we present the methods of calculation of deflection curves in beams and displacement in axially loaded members. A chapter is devoted to the determination of stresses due to shear forces. We treat then the problems of statically indeterminate beams by the energy method.

1.2 Objectives:

The students learn how to calculate the deflections and internal forces and to draw their diagrams in beams in bending and axially load. Students learn also how to determine the shear stresses due to shear forces and torsion.

At the end of this course the students are prepared to deal with the design methods of structure.

1.3 Prerequisites:

Continuum mechanics.

Upstream Modules	Taught Module	Downstrean Modules
MGCV11.04	MGCV12.17	MGCV21.25 ; MGCV21.27 ; MGCV22.44

1.4 Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter 1	**Introduction**	2hrs	Purpose and scope Method of section Basic approach
Chapter 2	**Axial force, shear and bending moment**	6hrs	General remarks Calculation of reactions : conventions for supports, conventions of loads, calculation beam reactions. Calculation and diagrams of axial force, shear force and bending moment. Tutorials.
Chapter 3	**Deformation of axially loaded members**	4hrs	Strain, stress. Elastic strain energy Deflection of axially loaded members. Tutorials
Chapter 4	**Bending stresses in beam**	6hrs	Limitation of the theory Kinematic assumption Elastic flexure formula

			Pure bending of beams with unsymmetrical section Computation of moment of inertia Curved beams tutorials
Chapter 5	**Shearing stresses in beams due to torsion and shear force**	6hrs	Introduction Shear flow Shear stress formula Shear center solid bars and hollow circular bars under torsion tutorials
Chapter6	**Compound stress**	6hrs	Biaxial bending Eccentrically loaded member Superposition of shearing stresses
7	**Deflection of beams**		Introduction Moment-curvature relation Differential equation of deflection of beams Solution of beam deflection problem by double integration Elastic deflection of beam in skew bending tutorials
8	**Energy method**		Elastic strain energy Displacement by the energy method Castigliano theorem Reciprocal theorem Virtual work method for deflection Statically indeterminate problems

Practical Works :

Session	Title	Duration	Learning Outcomes
1	Beam deflection	6hrs	Beam deflection with various boundary conditions Verification of reciprocity theory (Maxwell Betti) Verification of superposition principle
2	**Torsion of rods**	3hrs	Shear module of different materials
3	**Tensile test**		Module of young of different materials, Yielding stress
4	**Numerical validation**		Use of RDM 6 software for numerical validation of beam deflection statically indeterminate.

1. METHODOLOGY

The contact hours consist of a power point presentation of the chapter and its objective, reminding and detailing the formulation and practice of solving the problems. The course is clarified by small applications. Problem solving is dealt with separately in the tutorial sessions or the student is obliged to prepare them in advance. For self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	45hrs
Practical work (h)	15hrs
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		**1/4**
Continuous assessment	1, 2, 3 et 4	1/4
Presentation		
Final Exam	All	1/2

4. Bibliographic references :

1) Introduction to mechanics of solids, EGOR P. POPOV
2) S.P. TIMOSHENKO, Résistance des matériaux, Tome1 : Théorie élémentaire et problème
3) W.A.NASH, Résistance des matériaux, Théorie et problème, 4°édition, Série Schaum (Sciences de l'ingénieur), McGraw-Hill International. Londres, 2000.
4) Golay F. Résistance des matériaux – Polycopiés. ISITV, Toulon et Var, 2005, 87p.
5) Case J., Chilver L., Ross C.T.F. Strength of Materials and Structures. Ed. John Wiley & Sons Inc., New York, 1999, 699p.

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester : 02

Building acoustics

Code :MGCV12.18

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		×	

Teacher:JihenMallekJallouli

Status :PhD/permanent

Mail :mallek.jihen@gmail.com

Courses	Practicalworks	Individualwork	Total volume
24	**0**	**36**	**60**

Coefficient:	ECTS credits :
1.5	2

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester : 02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

The science of sound engineering involves the production, propagation, and perception of sounds. Building sound science is a direct application of this definition. The study of acoustics is particularly focused on its effect on the buildings.

1.2 : objectives

The main objective of the science is to prevent noise, and it has become an important issue which is reflected in the regulations which set minimum acoustical performances to be achieved in buildings in order to ensure the acoustic well-being of occupants and customers.

1.3 Prerequisites :

- Physical properties
- Building materials

Uplstream modules	Taught module	Downstream modules
MGCV11.07	MGCV12.18	

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Introduction to building acoustics.	3	Sound; sound pulse; noise; acoustical well-being; mode of transmission
Chapter 2	Physical and psychological characterization of noise and sound.	6	Sound pressure; sound power, octave concepts, energy density and intensity; period; frequency; celerity; acoustic impedance; deflection and transmission coefficients; continuous sound equivalent level.
Chapter 3	Sources and modes of sound propagation in free space.	6	Direct and reverberated sound fields; duration of reverberations; sabine formula; directive factor; absorption constant; absorption area

Chapter 4	Insulation of the walls to airborne noise.	9	Absorption and insulation technologies; resilient technologies; direct and indirect transmission; transmission coefficients; damping index; gross insulation; standard insulation; mass law; frequency law

2. METHODOLOGY

The contact times provide a power point to present the chapter and its objectives, remind and detail the formulation and the practice of solving the problems. The course is clarified by small applications. Problem solving is dealt with separately in the tutorial sessions or the student is obliged to prepare them in advance. For self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	24
Practicalwork (h)	0
Project (h)	0
Visits (h)	0

3. Evaluation

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1, 2 et 3	1/3
Presentation		
Final Review	ALL	2/3

4. References

1. Building and environnemental acoustic, Christophe Cloud, IUT GC, Université de la Rochelle
2. Introduction to Building acoustics, Saint-Gobain, 2016.
3. Techniques de l'ingénieur :

Room Acoustics.

Acoustical treatments and sound insulation of buildings

Building sound control regulations

Propagation of the waves

	Module Description	Department : Civil Engineering
		Date : 11/10/2021
		Version N°: 02
		Semester : 02

Urban Hydraulics

Code : MGCV12.19

Specialty modules	Coremodule	Engineering Sciences and Techniques	Preparation for practice
x			

Teacher : MsImen AYADI

Status : Temporary (doctor)

Mail : ndocim.11@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30hrs	15hrs	45 hrs	90 hrs

Coefficient:	ECTS credits :
2.5	3

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester : 02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1. Description:

This course focuses on :

(1) the estimation of demand and need for water in a given population and for a given horizon (2) the knowledge of the constraints and the laws of evolution of urban and semi-urban localities (3) knowledge of the hydraulic components of a Drinking Water Supply System (PED) / urban sanitation (4) sizing of the hydraulic components of an urban sanitation system.

2. Objectives :

Students learn how to impart both the theoretical and practical knowledge of the hydraulics in charge that are necessary to the systems of water consumption, using continuity equation and the Bernoulli theorem for estimating the hydraulic load at a given point in the network.

Using Darcy Weisback and Williams Hazen formulas and Colbrook and Sciememi charts to estimate various linear or singular load losses on the supply and distribution system. Therefore, students will be able to calculate wastewater and rainwater flows through the application of the rational and Caquot formulas. Students will also do the hydraulic calculations of the networks by the formulas Manning Strickler or Chézy.

Finally, they will be able to manipulate simulations of the hydraulic and qualitative behaviour of water over long durations in pressurised networks by means of hydraulic software such as EPANET.

With this in mind, the students will be able to make a hydraulic modelling of dimensioning of networks of AEP/ urban sanitation both branched or meshed, through mini-projects assisted by computer.

1.3 Prerequisites :

Fluidmechanics

Upload modules	Taught module	Download modules
MGCV11.06	MGCV12.19	MGCV21.29; MGCV21.30

1.3 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Water needs in urban areas	6hrs	Urban water cycle, water services, graphical extrapolation and progressive geometric assessment of water consumption according to the type of consumption and factors affecting consumption and change in consumption
Chapter 2	General introduction to AEP systems	6hrs	Service Criteria for EPA Systems, EPA System Structures, Hydraulic Laws for Load Systems
Chapter3	Water supply network and storage facilities	6hrs	Gravity conveyance and the notion of speed and pressure constraints, specific case of backflow: study of water hammer, technical and economic functions of storage structures, classification and estimation of theoretical and practical volumes
Chapter4	Sizing a water supply network	10hrs	Distribution methods and network typology; case of road service, upstream/downstream flow calculations, sizing of meshed and branched networks, technology and pipe laying
Chapter 5	Urban sanitation and wastewater flow assessment	8 hrs	Urban drainage system, evaluation of wastewater flows: domestic, collective and parasitic water use, wastewater treatment techniques
Chapter 6	Urban sanitation and determination of rainfall flows	9hrs	Estimating methodologies: rational method and Caquot method, sizing of sewerage networks, hydraulic calculation of a sewer pipe, verification of self-cleaning conditions. Elements of a sewerage network
Practicalworks	EPANET hydraulic modelling	15 hrs	1)Dimensioning of a branched network: calculation of the pressures

			and loads in the various network nodes; calculation of the speeds, flows and loads corresponding to each arc; estimation of the characteristics of the operating point of a pump. 2)Dimensioning of a mesh network: for a simulation time of 24 hours and a modulation curve (interval of 2 hours) representation of the flows and loads of the pipes and nodes for each 6 hours, representation of evolution curves for pressures and loads at the level of the nodes under consideration.

2.METHODOLOGY :

The contact hours consist of a power point presentation of the chapter and its objective, reminding and detailing the formulation and practice of solving the problems. The course is clarified by applications and abacuses. The solution of the projects is dealt with in the computer-assisted practical sessions for the EPANET simulation. For self-study activities, students have to complete the exercises and mini-projects given as homework.

Integrated courses (h)	30 hrs
Practicalwork (h)	15 hrs
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		1/4
Practical works		
Continuous assessment	1&2&3	1/4
Presentation		
Final Review	All	2/4

4. Bibliography :

1) Bonnin, J. 1982: Aide- mémoire d'hydraulique urbaine. Edition EYROLLES Paris.
2) Bonnin, J. 1986: Hydraulique urbaine. Edition : EYORELLES Paris.

3) Chow V. T.1988:Applied Hydrology, Civil Engineering Series, *McGraw-Hill International Edition.*

4) Dupont, A. 1982: Hydraulique urbaine. Ouvrages de transport élévation et distribution des eaux. Edition : EYROLLES Paris.

5) Legrand, C. 1989: Notes de cours de géotechnique. Département de Génie Civil, Institut Universitaire de Technologie de Toulouse, France.

6) Prasuhn, A.L. 1987: Fundamentals of Hydraulic Engineering, Holt, Rinehart and Winston, New York, N.Y., USA.

7) Ayadi, I. 2020: Support du cours d'hydraulique urbaine.

	MODULE DESCRIPTION	**Department :Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 02

TOPOGRAPHY

Code : MGCV12.20

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr AbdessalemBELHASSEN

Status : Temporary Technologist

E-mail :abdessalem.belhassen@gmail.com

Courses	PracticalWork	IndividualWork	Total Volume
30 h	15 h	45h	90 h

Coefficient :	ECTS Credits :
2.5	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department :Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 02

1. DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description :

1.1 This course teaches: (1) Calculation of point heights: geometric and trigonometric levelling; (2) Measurement of angles and calculation of directional bearing; (3) Measurement of distances and calculation of distance reduced to projection; (4) Calculation of point coordinates using the survey procedures: Polygonation, Triangulation, Intersection, Bearing and Trilateration; (5) mastery of surveying techniques and calculation of coordinates of surveyed points; (6) mastery of layout work and calculation of elements necessary for the layout of a point and finally (7) mastery of methods of controlling the movements of a point belonging to a structure

Through the practical work sessions, one learns: (1) the setting up of topographic devices: (2) mastering the techniques of measuring angles and distances and calculating the coordinates of points; (3) determining the heights of points from a reference and drawing the longitudinal and cross-sections of a road; (4) determining the coordinates of a new point by surveying; (5) carrying out a detailed survey of the project area using a total station and transferring the data to drawing software; and finally (6) carrying out the layout of a foundation plan and the necessary checks.

1.2 Objectives :Students learn to measure angles and distances and to calculate the coordinates of points; the densification of the canvas and the determination of new points by the different methods of surveying (polygonation, intersection, bearing...); the realization of a topographic survey and the calculation of the coordinates of the surveyed points and finally to be able to implant a structure, to carry out the necessary controls and to calculate the parameters necessary for the implantation of a point.

1.3 Prerequisites :Mathematics

Upstream modules	Taught module	Downstream modules
MGCV11.02	MGCV12.20	MGCV21.29

1.4 : Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	**General notions of topography**	1.5hrs	Reference systems; units; geodetic grid and directions.
Chapter 2	**Measurement of angles**	4.5hrs	Horizontal angles: the calculation of the directional deposits and the average G0 of the station Vertical angles: calculation of the horizontal distance
Chapter 3	**Measurement of distances**	3hrs	Steel tape chain measurement: Dpmes , Dpmes Electronic distance measurement
Chapter 4	**Levelling: geometric and trigonometric**	6hrs	Geometric levelling: by radiation, by path, mixed, closed loop and round trip.
Chapter 5	**Survey procedures**	12hrs	Triangulation; Intersection; Bearing; Trilateration; Polygonation
Chapter 6	**Survey of details**	1.5hrs	How the survey is carried out Radiation survey
Chapter 7	**The implementation**	1.5hrs	Layout techniques: alignment layout, circular curves, height markers, etc. Layout control

Manipulations	Title	Duration	Learning outcomes
Manipulation 1	**Measuring angles and distances**	2hrs	Learn to measure angles and distances in order to calculate the coordinates of points
Manipulation 2	**Geometricallevelling**	2hrs	The creation of a longitudinal and cross-sectional profile
Manipulation 3	**Survey procedures: point survey**	2hrs	Determine the coordinates of a point on the ground, which will be used to carry out the topographic survey of the area
Manipulation 4	**The survey of details**	5hrs	Carrying out a topographical survey of the construction project area
Manipulation 5	**Implementation**	4hrs	Set up known coordinate points from a reference point. Set up a construction and carry out the necessary checks.

2.METHODOLOGY :

The contact hours consist of a PowerPoint presentation of the chapter and its objective, reminding and detailing the formulation and practice of solving the problems. The course is clarified by small applications. Problem solving is dealt with separately in the tutorial sessions or the student is obliged to prepare them in advance. For self-study activities, students have to do the exercises given as homework.

Educational support :

1. Course material

2. Practical workbook and topographic equipment (levelling devices, levelling rods, total stations, reflectors, tripods, etc.)

Integrated courses (h)	30h
Practicalwork (h)	15h
Project (h)	
Visits (h)	

2. Evaluation

Designation	Chapter(s)	Weightings
Mini-project		
Practicalworks		1/4
Continuousassessment	1, 2, 3 & 4	1/4
Presentation		
Final Exam	All	2/4

3. Bibliography

1) Ernest P. LAUZON et Roger DUQUETTE : ’Topométrie générale’’ deuxième édition : Les Editions de l’Ecole Polytechnique de Montréal (E.E.P.M.)
2) Ernest P. LAUZON et Roger DUQUETTE : ’’Topométrie générale’’ troisième édition : Les Editions de l’Ecole Polytechnique de Montréal (E.E.P.M.)
3) Lucien LAPOINTE et Gilles MEYER : ‘’Topographie appliquée aux travaux public bâtiments et levers urbains’’ : Quatrième édition 1997 EYROLLES
4) Michel Brabant : Maîtriser la topographie des observations au plan première édition :2001 EYROLLES
5) Michel Brabant, Maîtriser la topographie des observations au plan deuxième édition : 2003. EYROLLES
6) S. MILLES et J. LAGOFUN , topographie et topométrie modernes tome 1 : techniques de mesures et de représentation 1999 EYROLLES
7) S. MILLES : topographie et topométrie modernes tome 2 : Calculs : 1999 EYROLLES
8) BELHASSEN Abdessalem : Support de cours « Topographie »

	Module Description	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 2

Geographic Information System

Code : MGCV12.21

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		×	

Teacher: Hiba JEMAI

Status: Permanent

Mail : h.jemai@hotmail.fr

Courses	Practical Work	Individual work	Total volume
	30	30	60

Coefficient :	ECTS credits :
1	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	Department : Civil Engineering Date : 11/10/2021 N° version : 02 Semester: 2

1. DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description:

Develop skills to assess Geographic Information Systems (GIS) needs in a professional setting.
Provide a basic understanding of how a spatial positioning system (GPS) works.
Use GIS software (ArcMap) to create, manage and use a spatially referenced database.

1.2 Objectives:

At the end of the module, the student engineer will be able to: (1) explain the principles of GIS and a satellite positioning system; (2) use a GPS receiver in the field; (3) create a GIS model, acquire and import and structure data; (4) geo-reference a scanned map; (5) map vector data; and finally (6) perform spatial analyses of the data.

1.3 Prerequisites :

-Basic concepts of topography

Upstream modules	Taught module	Downstream modules
MGCV12.20	MGCV12.21	

1.3 Learning outcomes:

Practical Work	Title	Duration	Learning outcomes
1	Geo-referencing a scanned map	7h	- Géo-référencement
2	Mapping of vector data	8h	-Creating a vector layer -Digitising a vector layer
3	Carry out spatial analysis of data	8h	- Spatial analysis of the data
4	MNT	7h	Creation of a DTM -Generation of DTM derivatives -Creation of the 3D block and draping of ticks on DTM

2. METHODOLOGY

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	-
Practical work (h)	30
Project (h)	-
Visits (h)	-

3. Evaluation

Designation	**Chapter (s)**	**Rating**
Mini-project	-	
Practical work	1, 2, 3 & 4	100%
Continuous Asseement	-	
Presentation	-	
Final Exam		

4. Bibliographic references :

1-https://www.christian-roze.fr/for/formerise.pdf

2-Guide d’utilisation du logiciel ArcGIS

	Module Description	Department :Civil Engineering
		Date : 15/10/2021
		Version N°: 02
		Semester :03

Building electricity

Code : MGCV 12.22

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		x	

Teacher :Ms. Randa Kallel

Status : Permanant

e-mail : kallelranda@gmail.com

Courses	Practicalworks	Individualwork	Total volume
15hrs	15hrs	45hrs	75hrs

Coefficient:	ECTS credits :
1.5	2

	MODULE DESCRIPTION	Department : Civill Engineering
		Date : 15/10/2021
		versionN° : 02
		Semester :03

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description :

The first part of the course consists in presenting the interior installations of the living quarters: lighting installations, installations of the sockets, installation of the signalling schemes and the remote control, installations of the heating elements. The second part looks at ways to protect property and people.

1.2 Objectives :

- To know the different types of schematics
- To know the schematic standards to follow
- To study domestic indoor installations and correctly represent the schematics of these installations in accordance with standardization
- To identify ways to protect property and people

1.3 Prerequisites :

The student should have knowledge on the electrical quantities that characterise an electrical circuit (current, voltage, power...)

Upstream modules	Taught module	Downstream modules
	MGCV21.31	MGCV31.60

1.4 Learning outcomes:

Chapter	Title	Duration	Learning outcomes
Chapier 1	General information on schemes	5hrs	-The different modes of representation of an electrical diagram -Marking principle for terminals and contacts

Chapter 2	Domestic lighting installations	5hrs	-The developed diagrams of the electrical installations for residential use the architectural, multi-wire and single-wire diagram of lighting installations - signalling and remote control assemblies
Chapter 3	Electrical safety: Protection of people and property	5hrs	-Means of protection against direct and indirect contact -Protective equipment

Practical works	Title	Duration	Learning outcomes
PW1	Single, twin and toggle mounting	3hrs	-Use protective devices, control devices -Correctly wire the proposed assemblies -Check the operation of the assembly
PW2	Remote control and timer mounting	3hrs	-Successful wiring of assemblies -Familiarise yourself with the use of protection, control and control devices -Correctly wire the proposed assemblies -Familiarise yourself with the use of tools and the testing of wiring faults.
PW3	Installation of socket outlets and electric strikes	3hrs	Successfull wiring electrical outlets and strike
TP4	House lighting project	6hrs	Make a summary of all the set-ups made. -Successful lighting of the whole house.

2.METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	15hrs
Practicalwork (h)	15hrs
Project (h)	
Visits (h)	

3. Assessment:

Designation	Chapter(s)	Rating
Mini-project		
Practical works	1,2&3	0;25
Continuous assessment	1,2&3	0.25
Presentation		
Final Review	1,2&3	0.5

4. Bibliographicreferences :

1- Cours Installation électrique, Hassene Bedoui, Institut Supérieur des Etudes Technologiques de Ksar-Hellal,2009-2010
2- Cours schéma, normes et installations domestiques, Narjes Sghair, Mbarek Mbarek
3- Cours schémas et appareillages électriques. 1 ère année mastère « commande des systèmes électriques » .Dr Benaired Noreddine 2014.

	MODULEDESCRIPTION	**Department :Civil Engineering**
		Date : 11/10/1021
		Version N°: 02
		Semester : 02

Entrepreneurship

Code : MGCV12.23

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
	×		

Teacher : Med Achraf KAMMOUN

Status : Permanent

e-Mail : kammounmedachraf@gmail.com

Courses	Practicalworks	Individualwork	Total volume
45		15	60

Coefficient:	ECTS credits :
3	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department :Civil Engineering**
		Date : 11/10/1021
		Version N°: 02
		Semester : 02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

The course of Management of the company is a semester course intended for the students of the first year, common core, Business Administration, of the Higher Institutes of Technological Studies in Tunisia. It lasts 3 hours per week. This course is a set of knowledge, essential in a context of opening markets and globalization.

In fact, in our society, the distance between consumers and producers is sometimes very high, the needs of the clientele are constantly diversifying, the desires appear more and more precise. The company is thus inserted in a network of increasingly close relationships with its customers and suppliers. This growing interdependence means that it is necessary to go beyond a simple logic of power relations to set up cooperative systems within the customer-supplier chain. By optimising the relationships between its main partners and key functions, the company gives itself the means to offer the end customer a product in line with his expectations.

Objectives

At the end of this course, the student will be able to :

- Understand the legal rules relating to the management of a company
- Make accounting entries and construct a balance sheet
- Draw up a cost price according to several methods
- Determine profitability thresholds and calculate a solvency ratio

1.2: Pre-requisites :

None

Upstream Modules	Taught Module	Downstream Modules
	Business Administration	

1.3 :LearningOutcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter 1: The Entreprise	Introduction: I- The definition and role of the company II- The different actors within the	**6 hrs**	The student is able to: - Identify the strategic business areas of the company. - Identify and evaluate the

	company III- The different classifications of companies		company's strengths and weaknesses.
Chapter 2: The business community	Introduction: I- The macro-Community II- The meso-Community II- The micro-Community III- How to master the relationships in the Community ? IV- Characteristics of the current business Community and structural trends	**9 hrs**	The student is able to: Identify and characterise the threats and opportunities of the Community (competitors, customers, suppliers, associations, public authorities...). - Identify the nature of a company's competitive advantage (technologies, products, markets...). Identify the actions taken to acquire, preserve or develop a competitive advantage (innovation, quality improvement, cost control, etc.).
Chapter 3: Administration and the Manager	Introduction: I- Definition of management II- Nature of management: science or art? III-The management process IV- The roles of the manager V- The skills of a manager	**8 hrs**	- Describe the nature of management. - Explain the management process. - Describe the roles of the manager. - Define the necessary skills of a manager.
Chapter 4: The main management approaches	I- The classical school II- The human relations school III- The neoclassical school of management IV- The "contingent" approaches to organisations V- The modern school	**8 hrs**	At the end of this chapter the student should be able to - Explain the basic principles of the classical school, the school of human relations. - Define the concept of contingency. - Demonstrate the contributions of authors who have participated in the development of management thinking. - Explain the criticisms addressed to each author.
Chapter 5: The functions of the company	I- The supply function II- The production function II- The marketing function IV- The human resources management function V- The financialfunction	**8 hrs**	At the end of this chapter the student should be able to: - Describe the different stages of the procurement process. - Explain the methods of stock management - Identify the tools for optimising production - Explain consumer buying behaviour and describe the buying process Identify and explain the four elements of the marketing mix.
Chapter 5: Financial analysis of the company	Introduction: Section 1: Balance sheets and annual accounts;	**6hrs**	Identify, assess and use the break-even point. Measure and analyse

	Section 2: Ratio Analysis; Section 3: Cash FlowAnalysis.		profitability. Select indicators, present and disseminate them. Identify useful indicators for steering the company

2.METHODOLOGY

Writtenassignments and/or
Presentations (written and oral)

Integrated courses (h)	45hrs
Practicalwork (h)	
Project (h)	
Visits (h)	

3.Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment		30 %
Presentation		
Final Exam		70 %

4. Bibliographicreferences :

Janine Bruchet, " Objectif Entreprise", l'Editeur Hachette 1994

D.Larue et A. Caillat, " Economied'Entreprise", l'Editeur Hachette 1990

Thị Thanh Vinh, "Gestion des ressourceshumaines", Référence, 2005.

Thị Thanh Vinh, "Le Marketing", Référence, 2006.

GCV 2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester: 01**

MECANICSOFSTRUCTURES

Code :MGCV21.25

Specialty module	Basic module	Engineering Sciences and Techniques	Preparation for the profession's practice
x			

Teachers : Mr Khaled MAALLA/ Sabra BOUGOFFA

Status :PhD, temporary / PhD, Permanent

e-Mail :khaledmaalla62@gmail.com/sabrabougouffa@yahoo.fr

Courses	Practical work	Personal work	Total volume
45 h	15 h	75 h	135 h

Coefficient	ECTS credits
3.5	4.5

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester: 01**

1. COURSE DESCRIPTION AND TARGET SKILLS

1.1 Description :This lecture presents the methods of linear analysis of bar structures. We study: (1) The calculation of internal forces and displacements in the isostatic structures; (2) The forces method, principle and application; (3) The method of 3 moments and its application for continuous beams; (4) The truss structures with the method of displacements; (5) The method of rotations (slope deflection method), principle and application; (6) The influence lines for continuous beams, bending moment, shear force, support reaction, deflection; Envelope curve and finally (7) The buckling of bars, theoretical aspect, design aspect and experimental aspect. The sessions of practical works related to this course are reserved to the practice of these methods of calculation through the elaboration of sheet on Excel on the method of 3 moments and the influence lines which the engineer uses to design beams in building and bridges.

1.2 Objectives :The students learn how to calculate the internal forces and trace their diagrams in the bar structures. They also learn how to calculate a displacement that is important for the design of structures. They also learn how to calculate theoretically the length of buckling of a bar. They will be capable of drawing up the influence lines of an effect. In the end of this lecture the students are prepared to take lectures on the design methods.

1.3 Prerequisites: Strength of materials

Uplstream modules	Taught module	Downstream modules
MGCV12.17	MGCV21.25	MGCV22.41 ; MGCV22.42 ; MGCV22.43

1.4 :Learning outcomes:

Chapters	Title	Duration	Learning outcomes
1	**Linear analysis of structures :Principles and theorems**	9h	Planes structures definition; external and internaljoints; differential equations of equilibrium; principle of superposition and coefficient of influence; work of external and internal forces; Castigliano theorem, reciprocity theorem; Principle of virtual work and its application to determine an internal force or a reaction or a displacement. The exercises consist of tracing diagrams and the calculation of movements on a point in an isostatic structure.
2	**Force Method (Flexibility)**	6h	Principle of the method; Statically indeterminate structure. Equivalent statically determinate structure SIE; System to solve; Application of the method to solve the Statically indeterminate structures . Application of the method for structures under imposed displacement or a variation of temperature. Application of the method for structures with elastic joints
3	**Continuousbeam : Method of 3 moments**	6h	Determination of slope deflection (rotation)atsupportin a simplebeam AB under a loadanda moment $M_A$and M_B. Thecontinuityof rotation equationof 3 moments. Le System to solve a in caseofloadandin caseofsettlement of support. Drawdiagrams of M and T. Computereactions. Thefundamental relations ofthe slope deflection method $M_{AB}=f(\omega_A ;\omega_B ;\psi_{AB})$
4	**Truss Structures**	6h	General remarks onTrussstructures ;Statically determinate and indeterminate anddegreeof freedom Dof ; FundamentalEquations de forsolvingTruss structures (Nodal equilibrium; Foran ij barfundamental relation between Nijand thenodal displacements U and V ofiand j andthe direction αij).The displacement method applied to truss

			structures.
5	**Slope Deflection (Rotation) Method**		Introduction, Symbols, conventions et hypotheses; fundamental relations of the slope deflection method $M_{AB}=f(\omega_A ;\omega_B ;\psi_{AB})$.Degree of freedom Dof ;Fundamental Equations (Nodal equilibrium; Storey equilibrium) ;Procedure of the method to solve regular frames ; Applications and exercises : Caseof elastic joints. Caseof structureunder a variation oftemperature.
6	**Influence Line**	9h	Definition, objective ;Methodof determination (equilibrium, Principle of Virtual Work (PTV)) for simple and continuous beam; curveenvelop.
7	**ElasticBuckling of bars and systems of bars (Euler)**		Introduction to stability problem; analysis 1st orderand 2nd orderfor systemsof rigid bars + springs ;DifferentialEquation of the beam column ; Solution ofthe differential equation ; Boundary Conditions (rigid and elastic joints) ; Systemto solveand buckling condition ; buckling modes ; Applications on isolated elasticbars andsimple frames ; Design Aspect (European curves); experimentalAspect (Southwell plot).

Practical work

session	Title	Duration	Learning outcomes
1& 2	**Continuousbeam ; Method of 3 moments : two spans**	6h	Elaboration of an Excel sheet : • input data (L et EI foreachspan ; Les loadsoneachspan : 1 uniformlydistributedload+ 2 concentrated loads • Formulation and solution • Results :Bending Moment ; Shear force; reactionsand deflections • Drawingdiagrams anddeformed shape
3	**Method of the 3 moments : Three-span continuous beam**	3h	Same
4 & 5	**Line of influence: Three-span continuous beam**	6h	Elaboration of an Excel sheet : • input data (L et EI for each span) • Formulation and solution

			• Results : Bending Moment ; Shear force; reactions and deflections • Drawing lines

2. METHODOLOGY

The hours of study consist of presenting the chapter and its goal on PowerPoint, detailing the formulation and methods of solving problems. The course contains different applications and exercises to help understanding each chapter . The problem solving is studied separately in the end of all chapters so the student has to prepare them in advance. Concerning the activites of self-work , the students have to solve the exercises and the problems as a home work to prepare exam.

Integrated courses (h)	45h
Practicalwork (h)	15h
Project (h)	
Visits (h)	

3. Assessment

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practicalworks		1/4
Continuousassessment	1 &2	1/4
Presentation		
Final Exam	All	2/4

4. Bibliographic references

1) T. Iwakuma : Matrix analysis of structures (En Japonais), Tohoku Univ. Press, 1988
2) Udo Vogel ; Karlsruhe University ; Limite state design of steel structures ; Lecture notes ; Tohoku university (Japon), 1987.
3) Timoshenko and Gere ; Theory of elastic stability, 2nd edition McGraw Hill, Tokyo 1961.
4) Z.P., Bazant and L.Cedoline ; Stability of structures ; Oxford University Press ; New York 1991.

	MODULE DESCRIPTION	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester :01

Operations research

Code : MGCV21.26

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		x	

Teacher : Amina AROUSSE

Status: Permanant

Mail : Arousse.amina@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30		**45**	**75**

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semester :01**

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

The Operational Research is a tool for decision making. It allows to take the best decision in a deterministic environment. It is enough to determine the various parameters of the problem, to formulate them in the form of a linear program and to solve this last to find the solution and to take the optimal decision.

Objectives

- to acquire a thorough knowledge of some techniques considered as basic methods in Operations Research

- to apply these techniques on simple cases, application on Software.

1.2 : Prerequisites :

- linearalgebra

- Computer tools

Upstream Modules	Taught Module	Downstream Modules
MGCV12.14 ; MGCV12.15	OperationalResearch	

1.3 :Learning Outcomes

Chapter	Title	Duration	Learning Outcomes
Chapter 1	Formulation of a PL	6 hrs	Aptitude à Modéliser un problème de décision.
Chapiter 2	Graphic resolution	5.5 hrs	Ingénieur capable de résoudre graphiquement un PL à deux variables
Chapter3	Méthode de Simlpexe : description algébrique et algorithmique	7hrs	Maitriser la méthode simplexe, et les différents cas particulier associés.
Chapter 4	Dualité et Analyse Post optimal	5.5hrs	Ingénieurs apte à analyser la sensibilité de la solution optimale aux variations des différents paramètres du PL.
Practicalworks	Logiciel LINDO	6hrs	Maitrise du Logiciel, et interprétation des Sorties.

METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30hrs
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment:

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment	1, 2 & 3	
Presentation		
Final Exam	All	

4. Bibliographicreferences :

- C. Guéret, C. Prins, M. Sevaux, Programmation linéaire, Eyrolles, 2000
- R. Favre, B. Lemaire, C. Picouleau, Précis de recherche opérationnelle, 5ème éd., Dunod, 2000

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester : 01

Reinforced concrete I

Code : MGCV21.27

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
×			

Teacher :MallekJallouliJihen

Status : PhD student/ Permanent

e-Mail : Mallek.jihen@gmail.com

Courses	Practicalworks	Individualwork	Total volume
45	**15**	**60**	**120**

Coefficient:	ECTS credits :
3.5	4

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester : 01

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description :

Description du cours

This course defines the principal components of reinforced concrete as well as how they are formed and arranged. It illustrates the basic concepts of calculations of this material under stress (compression, tension, bending...), taking into account the rules of design and calculations in the limit states adopted by the regulation.

Description du TP

The aim of this practical work is to formulate a concrete using the DREUX GORISSE method. Characterize this concrete in the hardened state by compression tests and tensile tests by splitting at 28 days. To carry out a reinforcement cage for a reinforced concrete beam in order to evaluate the stress as a function of the deformation by a four-point flexure test.

1.2 :Objectives :

The students will learn how to design structural reinforced concrete elements under various stresses including simple tension, simple compression and simple flexure.

1.3 Prerequisites :

- Building materials
- Structural mechanics
- Strength of materials

Uplstream modules	Taught module	Downstream modules
MGCV11.07 MGCV21.25 MGCV12.18	MGCV21.27	MGCV22.40

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes

Chapter 1	Introduction to reinforced concrete	3 hrs	Tension; compression; beams; columns; floors; walls; foundation
Chapter 2	Concrete properties	3 hrs	coefficient of expansion; compressive strength; tensile strength; elastic modulus; poisson's ratio; stress-strain curve; ULS; SLS; shrinkage; creep; bonding; straight anchors; curved anchors
Chapter 3	Reinforcing steel properties	3 hrs	Mild steels; hot-rolled steels; hot-rolled and strain-hardened steels; and hot-rolled wired steels; three-pivot rule
Chapter 4	Assumptions for design, actions and stresses	6 hrs	Navier-Bernoulli principle; perfect bond; strain-stress diagram; HOOKE's law; fbu; fsu; low damage cracking, high damage cracking; loads; stresses; combinations of actions
Chapter 5	Constructional provisions and vertical loads on structure	3 hrs	Longitudinal reinforcement; transversalreinforcement; wrapping; distance between reinforcements; thrust in the vacuum; vertical loads on structure
Chapter 6	Reinforcement durability	3 hrs	Durability; chloride diffusion; carbonation; external sulphate reaction
Chapter 7	Simple tension: design of tie bars.	6 hrs	Straight tie rods; circular tie rods; non-weakness conditions; ULS condition; SLS condition; current zone; overlap zone
Chapter 8	Simple compression: column design	6 hrs	Central core; buckling length; slendering; reduced cross-section; Longitudinal reinforcement; transversal reinforcement; initial design of columns.
Chapter 9	General bases of bending	3 hrs	bending; elastic phase; crack formation; stable cracking; plasticization; force equilibrium; moment equilibrium; failure modes
Chapter 10	Bending	6 hrs	simple beam; beam with bracket; fundamental hypotheses; deformation states at SLS; equilibrium of a bent section; simple reinforced section; pivot A; pivot B; reduced moment; reference moment; Resistant moment; the neutral axis; design of a rectangular section; design of a T-section;
Chapter 11	Shear force	3 hrs	Shear force; Conventional shear stress; Ritter-Morsch lattice; Caquot series; Justification of a supported

			beam;

practical work

PW 1	Shuttering and reinforcement	5 hrs	Reinforcement plan; preparation of concrete blocks; formwork Shears (steel cutter); multi-purpose table; toolsbox
PW 2	Concrete composition	5 hrs	Formulation; pouring, packaging Series of sieves; electric scales; ventilated oven; 16*32 cm*cm specimen; 120*12*20 cm*cm*cm beam; concrete mixer; Abrams cone.
PW 3	Compression and tensile tests of a concrete specimen. 4-Point Flexural Test of a reinforced concrete beam	5 hrs	Fc28; Ft28; stress; deformation. Compression and tensile splitting machine; four-point flexural tensile machine; displacement indicators.

2. METHODOLOGY

The contact hours consist of a power-point providing the chapter and its purpose, a reminder and detail of the formulation and practice of problem resolution. The course is clarified by small applications. Problem solving is dealt with in separate tutorial sessions or the student is obliged to prepare them in advance. As far as self-study activities are concerned, students must do the given homework activities. The hours of the practical exercises allow the students to evaluate the mechanical properties of ordinary concrete.

Integrated courses (h)	45
Practicalwork (h)	15
Project (h)	0
Visits (h)	0

3. Evaluation

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		1/4
Continuous assessment	1 à 7	1/4
Presentation		
Final Review	All	1/2

4. References

1. Practice of BAEL 9, Jean PERCHAT and Jean ROUX
2. Expertise of BAEL 91, Jean PERCHAT and Jean ROUX

3. Specification of reinforced concrete calculations, H.RENAUD and J.LAMIRAULT

	MODULE DESCRIPTION	**Department: civil engineering**
		Date: 19/10/2021
		Version N°: 02
		Semester: 02

Civil engineering tools and software

Code : MGCV21.28

Specialty module	Basic module	Engineering Sciences and Techniques	Preparation for the profession's practice
x			

Teacher :Sabra BOUGOFFA

Status : PhD,Permanente

e-Mail :sabrabougouffa@yahoo.fr

Courses	Practical work	Personal work	Total volume
15h	30	45	90

Coefficient	ECTS credits
2	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester: 02**

1. COURSE DESCRIPTION AND TARGET SKILLS

1.1 Description: This module is taught in the form of practical work including a few hours of initialization course allowing the student to discover one of the many tools and software dedicated to civil engineering. It is a formative module; a training intended for beginners in the use of software in the field of civil engineering such as the Robot and the Arch.

1.2 Objectives:At the end of this module, the student should know the basics use of ROBOT and Arch software applied to the civil engineering field. The student should be able to manipulate this software and know the functionality of its commands used in the civil engineering field. It must be having a vision to operate these tools and software and adapt it solving modelled problems.

1.3 Prerequisites

1. Have knowledge in structural mechanics
2. Have knowledge in reinforced concrete calculation

Input modules	Current Module	Output modules
MGCV21.27, MGCV21.25,	MGCV21.28	MGCV31.54, MGCV31.50 , MGCV31.58

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
1	**Reminder on the calculation aspect of reinforced concrete structures**	5h	Reminder on the calculation of vertical loads on a structure, of the load-bearing elements, of the constitution of the slabs.
2	**surface elements modelling**	5h	The concept of modelling, the use of the finite element method, the discretization of elements (choice of elements according to the expected results), the determination of the mesh, the boundary conditions, the loading methods.
3	**Steel structures modelling**	5h	Introduction to steel constructions, definition of structural elements, loads, 2D and 3D models

PW ROBOT	Title	Duration	Learning outcomes
1	**Introduction to ROBOT software**	3h	To know the functionality of the ROBOT software, its fields of application and its commands.
2	**Robot for reinforced concrete structures modelling**	5h	Numerical modelling of real structures in reinforcement concrete, applying the estimated loads then know how to display the solicitations results, criticize, and exploit them to determine the reinforcement and execution plans
3	**Robot for steel constructions modelling**	7h	Numerical modelling of a real classical industrial building based on the Robot software, starting with a symmetrical planar gantry. Sizing of the construction bars after applying the necessary loads on the structure. Know how to apply the wind load and generate the structure in 3D. Handle the 3D commands and have the execution plans of the different elements of the construction.

PW Arche	Title	Duration	Learning outcomes
1	General Approach	2h	Be familiar with the software platform
2	Graphical input of the building structure	4h	Modelling a building through 2 different methods
3	Calculation assumptions	2h	Definition of the calculation assumptions and loads applied to the structure
4	Launching a calculation sequence	1h	launching the vertical loads

			calculation on the structure.
5	Exploitation of the results	3h	Interpretation of the vertical loadseffect on the different elements of the structure.
6	Test : Study of a multi-storey building	4h	handling of the software and provide execution plans.

2. METHODOLOGY

It is a ppt projection presenting an introduction in the form of a lecture preceding each modelling part. Then, each practical session starts with a presentation of the software and its relationship with the civil engineering domain. Thus, during the use of this software for the modelling of a certain problem, a direct projection of the software in function is ensured by the teacher, by explaining each step. At the same time the student applies the steps on his computer. This kind of module is taught in classrooms equipped with computers having the software initially installed

Integrated courses (h)	15
Practicalwork (h)	30
Project (h)	
Visits (h)	

3. Assessment

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment		
Presentation	All	100 %
Final Exam		

4. References

1) Autodesk Robot Structural Analysis

2) Graitec Arch

	MODULEDESCRIPTION	**Department : Civil Engineeering**
		Date : 11/10/2021
		N° version : 02
		Semester : 01

Road design and calculation

Code : MGCV21.29

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
X			

Teacher : M Ahmed REKIK

Status : Temporary Teacher

Mail :ahmed.rekik13@gmail.com

Courses	Practical works	Individual work	Total volume
30hrs	**15hrs**	**60hrs**	**105 hrs**

Coefficient :	ECTS credits :
2.5	3.5

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	Department : Civil Engineering Date : 11/10/2021 N° version : 02 Semester :01

1. DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED

1.1 Description :

Through this course, the student will know the basics of geometric road design while maintaining the safety and comfort of the road user, and will be able to choose the class, type and material needed to design the road project, as well as the earthworks, after a traffic and soil study.

1.2 Objectives :

Students will be able to design road projects while ensuring the safety and comfort of road users, selecting appropriate materials and minimising costs, and mastering Covadis software (geometric design and calculation of cubatures).

1.3 Prerequisites :

-Building materials

- Topography

- CAD

Upstream Modules	Taught Modules	Downstream Modules
MGCV11.07 MGCV11.09 MGCV12.20	MGCV21.29	MGCV22.42

1.4 :Learning Outcomes :

Chapters	Title	Duration	Learning outcomes
Chapter1	Generalities on roads	2hrs	History, administrative and technical classification of roads, contact between road and tyre.
Chapter 2	Pavement properties	3hrs	The different materials used in the road sector (untreated mat, treated with hydraulic binders or hydrocarbon) and the different types of roads and how they function.
Chapter 3	Soils Classification	4hrs	Road geotechnics (the tests to be carried out to classify a soil) and its classification according to the NFP11-300 and the GTR
Chapter 4	Use of soil as fill or subgrade	3hrs	According to the GTR the material, depending on the weather conditions and its class, may or may not be used as fill and/or subgrade and choose the appropriate type

			of compaction
Chapter 5	Materials and pavement types	5hrs	The different materials making up the pavement body (sub-base and base course) and the surface course (binder course and wearing course), the different types of pavement and their construction methods.
Chapter 6	Sizing of the pavement body	7hrs	Soil support and traffic study in order to dimension the pavement body according to the Tunisian catalogue 1984
Chapter 7	Traffic geometry	6hrs	To know the necessary plans for a road project (plan, longitudinal and cross-sectional profile), the basics of geometric design, connections etc.
Practical Works	Work on a road project while using Autocad and Covadis software	15hrs	The student is expected to design the geometrical part of a road section, while calculating the necessary cubatures for this project (mastery of a road design and calculation software)

2. METHODOLOGY

The contact hours consist of presenting different concepts and rules in the form of oral questions and answers and power point projections, videos in order to stimulate the students' thinking and to understand and assimilate the concepts and understand the practical side on site. The practical applications are treated separately in the practical work. For self-study activities, students are expected to make efforts in geometrical design during the practical sessions and present their own solutions and work while explaining the process.

Integrated courses (h)	30
Practical work (h)	
Project (h)	15
Visits (h)	

3. Assessment

Désignation	Chapter (s)	Rating
Mini-project	Oral Questions & Report (Video)	1/4
Practical works		
Continuons Asssement	Chapters 1, 2, 3 et 4	1/4
Presentation		
Final Exam	Chapters 5, 6 et 7	1/2

4.Bibliographic references :

NF P 11-300, Le guide de terrassement routier GTR 1992 et le catalogue tunisien de dimensionnement des chaussées 1984.

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**Module Description**	**Department :Civil Engineering**
		Date :11/10/2021
		Version N°: 02
		Semester :01

HYDROLOGY

Code : MGCV21.30

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Ms. Ahlem SDIRI

Status :Temporary

e-mail : ahlem.sdiri@yahoo.com

Courses	Practicalworks	Individualwork	Total volume
15hrs	15hrs	45 hrs	75hrs

Coefficient:	ECTS credits :
1.5	2

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :2

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

Hydrology is the earth science that deals with the water cycle, i.e. the exchange between the atmosphere, the earth's surface and the subsoil.1 In terms of the exchange between the atmosphere and the earth's surface, hydrology is concerned with precipitation (rain and snow), plant transpiration and direct evaporation from the earth's surface layer.

1.2 Objectives :

This course enables the student to understand the basic principles of hydrology, and to apply them to solve concrete problems related to civil engineering projects. The course includes the study of the main components of the hydrological cycle at the watershed scale, the examination of the relationship between precipitation and surface water flow, and the calculation of runoff rates for the design of runoff water management structures.

1.3 Prerequisites :

Knowledge of geology, soil mechanics, topography, geophysics

Upstream modules	Taught module	Downstream modules
MGCV11.05, MGCV12.20, MGCV12.16	MGCV21.30	MGCV21.29, MGCV22.42

1.4 Learning outcomes:

Chapter	Title	Duration	Learning outcomes
Chapter 1	**General introduction to the hydrological cycle**	2hrs	-Presenting the components of the hydrological cycle: atmosphere-soil - To establish the hydrological balance between the atmosphere and the soil as a function of: evapo-transpiration, precipitation, soil water stock, net radiation.

Chapter 2	**Radiation balance**	4hrs	- To illustrate the effect of solar radiation on the water stock in the soil (in the field): effect of evapo-transpiration. -To demonstrate analytically the dependence of evapo-transpiration on plant density in the geographical area studied. - Establish by Bowen's method the analytical determination of evapo-transpiration: function of atmospheric pressure, atmospheric humidity, global solar radiation (application treatment). -to define empirical laws that define potential evapo-transpiration.
Chapter 3	**Precipitationstudy**	4hrs	-Presentation of the "rainfall" study. -Characterisation of the rainfall regime. -Presentation of the analytical methods for estimating average rainfall: arithmetic method, Thiessen polygon method, isohyet method, inverse distance method. -Study of rainfall intensity: presentation of the return period.
Chapter4	**Description of the watershed**	3 hrs	-Define the watershed as a hydrological reference unit. - Geographical characteristics of the watershed (equivalent length, Gravelius coefficient, hypsometric curve). -Present the procedure for the geographical delimitation of the catchment area based on the topography and geology of the area studied.
Chapter 5	**Hydrometriccalculation**	2hrs	-Present the hydrometric measurement tools: water level height and calculation of the flow at the level of the catchment area. - Establish the analytical expressions of the instantaneous flow. Estimation of the maximum flow (rational and Caquot methods) which will be useful in the dimensioning of hydraulic and road works.

Practical work

In this part, we are interested in establishing a numerical study of a geographical site hydrologically. First, we use the Global mapper software to delimit the watershed. Once we have identified the watershed to be studied, we extract its morphological properties. Then, we must use the SWMM to determine the hydrological characteristics such as maximum flow, flow velocity of water. These characteristics must be identified from the rainfall study of the area. The flow calculation will be useful for the design of hydraulic structures

Session	Title	Duration	Learning outcomes
1	**Introduction to Global mapper software**	3h	-Represent globally the numerical tool of hydrological modeling global mapper.
2	**Watershed delineation with Global Mapper**	4h	-It consists in importing the project line from google Earth. -Numerically determine the direction of the water flow. -Delineate the elevations in the studied project site. -Delineate towards the end the outlet and the studied watershed in global. Delineate the sub-watersheds relative to the global watershed.
3	**Propriétés morphologique du bassin versant et introduction au logiciel SWIM.**	3h	-Numerically extract the morphological properties of the watershed (perimeter, area, length of Talweg etc). Perform the same work for the sub-catchments. -Introduction to the SWIM hydrological modeling software. -Download the studied watershed from Globel Mapper.
4	**Hydrological calculation by SWIMsoftware**	5 h	-Introduce the morphological properties of the watershed deduced from Google Mapper into the Swim software. -Define the studied rainfall regime and the geotechnical characteristics of the soil relative to the watershed: Define the IDF curves "Intensity Duration Frequency". Implement rainfall measurement stations. Deduce the peak flow rate relative to the studied watershed.

2.METHODOLOGY :

The contact hours consist of a power point presentation of the chapter and its objective, reminding and detailing the formulation and practice of solving the problems. The course is clarified by applications to be dealt with during the session. For self-study activities, students must complete the exercises given as homework.

The practical work requires a room with computers in which Global Mapper and SWIM are installed.

Integrated courses (h)	15
Practicalwork (h)	15
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		1/4
Continuous assessment	Chapter 1, 2	1/4
Presentation		
Final Review	Chpater 3,4,&5	1/2

4. Bibliographicreferences :

1. ZoubeidaBargaoui. (2010) , Cours d'Hydrologie, Ecole Nationale d'ingénieur de Tunis –El Manar.
2. Ambroise, B., P. J. et D. Reutenauer (1995). "Multicriterion validation of a semi-distributed conceptual model of the water cycle in the Fecht catchment (Vosges Massif, France)." Water ResourcesResearch 31(6): 1467-1481.
3. Andréassian, V. (2002).Impact de l'évolution du couvert forestier sur le comportement hydrologique des bassins versant. Thèse de Doctorat, Cemagref, Université de Pierre et Marie Curie Paris VI: 276 p.

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**DESCRIPTION DU MODULE**	**Département : Génie Civil**
		Date : 11/10/2021
		N° version : 02
		Semestre : 01

Architecture and urbanism

Code : Code : MGCV21.31

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
		X	

Teacher :Lobna Souyah

Status : Permanent

E-mail : souyahlobna@yahoo.fr

Courses	Practicalworks	Individualwork	Total volume
30		30	60h

Coefficient:	ECTS credits :
2	2

	DESCRIPTION DU MODULE	**Département : Génie Civil**
		Date : 11/10/2021
		N° version : 02
		Semestre :0 1

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 : Description

This module represents an introduction to architecture.

Students will first deal with the concept of town planning before tackling the notion of architecture in a second step.

Goals

This course aims to:

-Discover and master the architectural environment.

At the end of this module, the engineering student will be able to:

-communicate with architects and contractors.

- decipher the different details of a plan

-Study all possible cases that may be considered on site

-solve the various problems encountered on site even in the absence of an architect.

1.2 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Town planning	3h	At the end of this chapter, the engineering student recognizes the concepts of town planning.
Chapter 2	architecture	3hrs	By the end of this chapter, the engineering student knows how to recognize the different types of architecture.
Chapter3	The stages of construction	3hrs	At the end of this chapter, the engineering student recognizes the different stages of construction.
Chapter4	Building materials.	3hrs	At the end of this chapter, the engineering student recognizes the

			different building materials.
Chapter 5	The stairs	3hrs	At the end of this chapter, the engineering student knows the details of the staircase
Chapter 6	roofs	3hrs	At the end of this chapter, the engineering student knows the different types of roofs
Chapter 7	The windows	3hrs	By the end of this chapter, the engineering student will be able to know the details of the window.
Chapter 8	Calculation of stairs	6hrs	At the end of this chapter, the engineering student knows how to calculate the stairs.
Chapter 9	insulation	3hrs	At the end of this chapter, the engineering student knows the different details of insulation

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Continuous assessment	All	100%

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester : 01**

Air Conditioning and Heating

Code : MGCV21.32

Specialty module	Basic module	Engineering Sciences and Techniques	Preparation for the profession's practice
		×	

Teacher:Ahlem SDIRI

Status : temporary

e-Mail :ahlem.sdiri@yahoo.com

Courses	Practical work	Personal work	Total volume
30 hrs	**15 hrs**	**45 hrs**	**90 hrs**

Coefficient	ECTS credits
2.5	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester : 01**

1. COURSE DESCRIPTION AND TARGET COMPETENCIES

1.1 Description :

The rise in the standard of living has been accompanied by ever-greater demands for the control of thermal comfort conditions in buildings. Air conditioning has thus progressively developed over the last decades, leading to continuous progress in the various disciplines that define what is known as climate engineering.

1.2 Objectivess :

This course is established in order to dimension an air conditioning system. First of all, it is necessary the ability to evaluate the thermal loads to be brought or evacuated. These loads depend on the climate and the conditions of occupation of the premises. They vary throughout the year and the design of an air conditioning system can only be done by taking these factors into account. Finally some application within software are done.

1.3 Pre-requisites: building thermics,

Uplstream modules	Taught module	Downstream modules
MGCV11.08	MGCV21.33	

1.4 :Learning outcomes

Chapters	Title	Duration	Learning outcomes
Chapter 1	**Heating of dwellings**	9 hrs	Presentation of the laws of heat exchange: convection, conduction and radiation. Establish the expressions of the thermal resistances of the walls according to their compositions and their arrangements (horizontal and vertical). Presentation of the notion of heat loss at the level of the walls and openings of the building (nature and modes).
Chapter 2	**Sizing of central water heating**	6 hrs	-Establish the principle mechanism of a water heating system
Chapter 3	**Ventilation**	5 hrs	Detail the principle of ventilation in a building (natural and forced). -To present the dimensioning of the aeraulic networks.
Chapter 4	**Air conditioning : Study of an air conditioning installation**	10 hrs	Analytical presentation of the characteristic quantities of air (dry air and humid air). Define all the components of the air conditioning system. Define the problem of air and domestic pollution. Represent the air treatment as a solution of the pollution problem. Define and dimension the air treatment plants.
Practical work	**Applications within software**	15 hrs	Applications using software

1. METHODOLOGY

the contact hours consist of a power point presentation of the chapter and its objective, reminding and detailing the formulation and practice of solving the problems. The course is clarified by applications to be dealt with during the session. For self-study activities, students must complete the exercises given as homework.

Integrated courses (h)	30
Practical work (h)	15
Project (h)	
Visits (h)	

2. Assessment

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		1/4
Continuous assessment	1 & 2	1/4
Presentation		
Final Exam	All	1/2

3. Bibliographic References

1.Courses support Conditionnement d'Air et Chauffage : Mr Zouaghi Abderrazak (ENIG).
2. DTU : Règles th K77 : Règlement du centre scientifique et technique du bâtiment. Règles de calcul des caractéristiques thermiques utiles des parois de construction(Révision en 1980 – 1985 et septembre 1986) GCV 462.
3.AICVF Conception des installations de climatisation, et de conditionnement de l'air, Collection des guides de l'AICVF, PYC Edition, , octobre 1999, Paris.
4. R. CASARI Cahier Technique, données théoriques et technologiques, conduite de projets, mallette pédagogique Conditionnement d'air, septembre 1992, Paris, Documentation interne, École des Mines de Paris.

	MODULE DESCRIPTION	**Department :Civil Engineering**
		Date : 11/10/1021
		Version N°: 02
		Semester : 01

Creation and management of companies

Code :MGCV21.33

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
×			

Teacher :MedAchraf KAMMOUN

Status : Permanent

e-Mail :kammounmedachraf@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30		30	60 h

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department :Civil Engineering**
		Date : 11/10/1021
		Version N°: 02
		Semester : 01

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

Fundamentals of valuation (financial mathematics): the importance of the interest factor in decision making and its application in the valuation of personal loans and mortgages, common and preferred shares and bonds by learning to effectively manipulate certain functions of the calculator and software such as Excel. Financial analysis related to the establishment of a financial diagnosis using the ratio method and its decomposition according to the Dupont model by introducing the concept of risk. Concrete cases to illustrate both these techniques and the limits of these tools.Short and medium term financial planning with an introduction to working capital management: define, explain and apply the principles of forecasting financial statements, cash flow management, accounts receivable and payable and inventory management with emphasis on the risk-return-liquidity balance.Use of information technology (electronic funds transfer, electronic document exchange, etc.) in working capital management.

Objectives

The finance course is a course that provides knowledge of the company's situation in order to provide tools to help make decisions at the company level, whether in the short or long term.

The main financial decisions to be made by a company fall into two categories:

The financing choice: this is the decision concerning the sources of financing for the firm's activity, given the costs and risks.

Investment choice: this is the decision about how to allocate the resources raised in an optimal way in order to maximise the value of the firm.

1.2: Prerequisites :

General accounting.

Upstream Modules	Taught Module	Downstream Modules
	Business Finance	

1.3 :LearningOutcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter 1: Financial Reporting	Introduction: Section I: the accounting balance sheet; Section II: the limitations of accounting information;	**6hrs**	The student is able to: - Master the essential concepts of finance; - Differentiate between the

	Section III: The Financial Balance Sheet;		accounting and financial balance sheet;
Chapter 2: Financial Balance Analysis	Section I: Working Capital; Section II: Working Capital Requirements; Section III: Net Cash Flow	**7 hrs**	The student is able to: - Analyse the financial situation of a company; - Interpret the results of the financial balance and propose optimal solutions;
Chapter 3: Financial Mathematics	Section I: Simple interest; Section II: Compound interest; Section III: Constant Annuities; Section IV: Proportional Rate and Equivalent Rate;	**7hrs**	The student is able to: - Differentiate between different types of interest; - Differentiate between the situations of discounting and capitalisation; - choose the method of calculating the future value and the present value of a sum or a sequence of years.
Chapter 4: Choosing to invest in Avenir Certain	Introduction Section I: Classification of investments; Section II: Investment decision-making process; Section III: Investment appraisal; Section IV: Project Selection; Section V: Investment Selection Criteria; Section VI: Comparison of NPV and IRR criteria;	**10hrs**	The student is able to: - Define the concept of investment, - Evaluate an investment project based on the investment criteria; - Differentiate between liquidity and profitability criteria;

2.METHODOLOGY

*Written assignments and/or

*Presentations (written and oral)

Integrated courses (h)	30hrs
Practicalwork (h)	
Project (h)	
Visits (h)	

3.Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment		30 %
Presentation		
Final Exam		70 %

4. Bibliographicreferences :

Berk J., P. DeMarzo: Finance d'entreprise, Ed. Pearson

- **Harb E., Veryzhenko I., Masset A., Murat P.:** Finance (Dunod, 2014)
- **Bodie Z., R. Merton:** Finance, Ed. Pearson

	MODULEDESCRIPTION	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester :2

Communication skills

Code : MGV21.34

Specialty modules	**Main module**	**Engineering Sciences and Techniques**	**Preparation for the profession**
×			

Teacher : GHORBEL JOUDA

Status : Permanent

Mail : joudaghorbel@yahoo.fr

Courses	**Practical works**	**Individual work**	**Total volume**
30hrs		**30hrs**	**60hrs**

Coefficient:	**ECTS credits :**
2	**2**

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester :2

1. DESCRIPTION DU COURS ET COMPETENCES VISEES :

1.1 : Description

This module is a continuation of the module taught in the first year of the engineering cycle and deals with communication within the company. The course begins with a general chapter explaining the characteristics of communication within the company and the forms, types and networks of this communication.

The course then moves on to professional writing, with a detailed study of all the characteristics of the memo, the briefing note, the circular and the e-mail.

The course concludes with a chapter on oral presentation and public speaking.

The course aims to develop students' skills in oral and written communication techniques within the company.

1.2 : Prerequisites :

Upstream Modules	Taught Module	Downstream Modules
Pre-company communication	Communication in the company	

1.3 :Learning Outcomes

Chapter	Title	Duration	Learning Outcomes
Chapter 1	Communication in the company	3	The student masters the characteristics, forms, types and networks of communication within the company.
Chapter 2	The memorandum	6	The student is able to write a memo.
Chapter 3	The briefing note	6	The student is able to write a briefing note.
Chapter 4	The circular	6	The student is able to write a circular
Chapter5	The e-mail	3	The student is able to write a professional email
Chapter 6	Oral presentation	6	The student masters the techniques of public speaking.

2. METHODOLOGY

The Contact Hours consist of an introduction to the course. Practical applications are dealt with separately in the guided exercises.

Active methods, brainstorming, simulations and group exercises are used in the applications.

For self-study activities, students have to complete the exercises given as homework.

3. Assessment :

Designation	Chapter(s)	Rating
Mini-project	1-2-3	0.5
Final Exam	1-23-4-5	1.5

4. Bibliographic References :

Bouquet, Brigitte. « Diversité et enjeux des écrits professionnels », *Vie sociale*, vol. 2, no. 2, 2009, pp. 81-93.

Joly, Bruno. « La communication en entreprise », *La communication.* Sous la direction de Joly Bruno. De Boeck Supérieur, 2009, pp. 69-129.

Leibovitz, Annie. *La boîte à outils pour prendre la parole en public.* Dunod, 2020

Riffault, Jacques. « La formation aux écrits professionnels : présentation d'un dispositif pédagogique ouvert à la question du sens », *Vie sociale*, vol. 2, no. 2, 2009, pp. 71-80.

	Module Description	Department : Civil Engineering
		Date : 20/10/2021
		Version N°: 02
		Semester :02

English for Specific Purposes

Code : MGCV21.35

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession

Teacher : Mariem Feki

Status : Permanant

Mail :fekimariem@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30		30	60

Coefficient:	ECTS credits :
2	2

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 20/10/2021
		versionN° : 02
		Semester :03

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

English for Specific purposes in second year civil engineering is designed in terms of themes related to construction and building challenges.

1.2 Objectives :

The course main outcomes is to have students familiar with civil engineering problems and challenges in different contexts. That is, to be able to understand vocabulary and structures of certain texts and talks in the domain of civil engineering. Then , the course aims at training the student to read , summarize and present ideas in English to introduce a specific topic in construction and building.

Skills:

- Written: have students able to write appropriate documents with an upper intermediate to advanced level. Summarizing and paraphrasing articles and texts , and then presenting.
- Oral: have students who are able to understand talks and communicate or interact with English native speakers in specific contexts**.**

1.3 Prerequisites :

Students of second year of civil engineering should have a minimum level of B2 in English in general, and a knowledge of the vocabulary and structures in th context of building and construction and security**.**

Modules upstream	Module taught	Modules downstream

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Materials Reading and Vcabulary 1- Ordering materials 2- Properties of materials 3- Delivery problems	6hrs	**After unit 1, the student should be able to prepare an order of purchase of construction materials .** **Students are able to make conversations, phone calls on making orders and delivery problem solving.**

	Grammar : 1- Pasive voice vs active voice 2- Comparative forms Writing and speaking : 1- Aking for clarifications in phone calls 2- Talk about big projects materials		**Students are able to present famous, international big projects.**
Chapter 2	Projects Reading and Listening 1- Kicking off 2- Project meetings 3- Contracts Grammar: 1- Present perfect / simple past 2- Supperlaive forms 3- *Most* and *the most* Writing and speaking: 1- Focus and stress (highlighting key issues) 2- Collocatios related to contracts, meetings and negotiations	6hrs	The unit outcomes are mainly the student's ability to take part in meetings, and the competence of reading and negotiating contracts. The end of the unit consists of a presentation of the kicking off meeting and writing contracts.
Chapter3	Documentation Reading and Listening : 1- Document control and organization 2- Amendments 3- Specifying Grammar: 1- Obligations and necessity (have to) 2- Relative clause Writing and speaking: 1- Explaining documents and procedures 2- Talking about amendments 3- Giving specific information 4- Discussing project documentation 5- Punctuation	6hrs	The unit outcomes are arranging documents and have knowledge about organizing office works.

Chapter4	Intrduction to research methods: reading and writing activities.	6hrs	Socializing with international contexts. Reading research papers and scientific articles and publications to acquire the competences of summarizing and paraphrasing, then writing reports in their own.
Practicalworks	Additional practice : Writing cover letters Writing CV Writing reports	3hrs	

2. METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	Unit 1 and 2	10%
Presentation	All units	10%
Final Review	All units	80%

4. Bibliography :

Frendo, Evan, *English for Construction 2 Vocational English* , ed David Bonamy.

White, Allan, *English for Construction Personnel Workbook*,

http://cnx.org/content/col24879/1.3/

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester :02

Elastic second order analysisof sway frames

Code : MGCV22.36

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Enseignant : Khaled MALLA

Statut : PhD / permanent

Mail :

Courses	Practicalworks	Individualwork	Total volume
30		**30**	**60**

Coefficient:	ECTS credits :
2	2

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester : 02

1. DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description : In this lecture, only the plane structures are treated. The problem of elastic instability (P-Δeffect) is presented.
The method of Slope deflection (rotations) in second order with its detailed steps is presented. Through the numerous examples of calculation, students learn how to calculate in second order(without iteration) and how to examine the global stability of non-braced frames.

1.2 Objectives : After this lecture, the students have to be able of (1) understanding the effect P-Δ and the second order analysis (2) Mastering the calculation of second order structures (solicitations and displacement, critical load and associated modes). This lecture prepares students to understand and master calculating the structures at limit states which is always the core of research subjects in the domain of structure analysis in large displacements.

1.3 Prerequisites :
mécanicsof structures

Uplstream modules	Taught module	Downstream modules
MGCV21.25	MGCV22.46	MGCV31.47

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
1	Introduction to the analysis in second order		General remarks Instability (elastic,plastic) Imperfections Theory of second order Stable and instable equilibrium
2	Basic equations of the Slope deflection method (rotations) in second order		Symbols and conventions solution of Differential Equation of beam-column: The functions of stability S and C Relation Mij and rotations Application on isolated bar (Defined boundary conditions)

3	Method of rotations in second order applied to regular frames		Equilibrium of joints Equilibrium of the story Steps of the method for regular frames Example: Simple frame, two storiesframe, frame with elastic joints
4	Extension of the method for frame with elastic shear panels		Shear panels (physical and model) Panel stiffness Reduction of the effectP-Δ due to the incorporation of this stiffness in the system.

2. METHODOLOGY

The hours of study consist of presenting the chapter and its goal on PowerPoint, detailing the formulation and methods of solving problems. The course contains different applications and exercises to help understanding each chapter . The problem solving is studied separately in the end of all chapters so the student has to prepare them in advance. Concerning the activites of self-work , the students have to solve the exercises and the problems as a home work to prepare exam.

Integrated courses (h)	30
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Evaluation

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1 et 2	1/3
Presentation		
Final Review	All	2/3

4.References

1) T. Iwakuma : Matrix analysis of structures (En Japonais), Tohoku Univ. Press, 1988
2) Udo Vogel ; Karlsruhe University ; Limite state design of steel structures ; Lecture notes ; Tohoku university (Japon), 1987.
3) Timoshenko and Gere ; Theory of elastic stability, 2nd edition McGraw Hill, Tokyo 1961.
4) Z.P., Bazant and L.Cedoline ; Stability of structures ; Oxford University Press ; New York 1991.

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester: 02**

STRUCTURAL ANALYSISBYFINITE ELEMENTMETHOD

Code : MGCV22.37

Specialty module	Basic module	Engineering Sciences and Techniques	Preparation for the profession's practice
x			

Teacher: Mr Khaled MAALLA

Status : temporary

e-Mail : khaledmaalla62@gmail.com

Courses	Practical work	Personal work	Total volume
45 h		45 h	90 h

Coefficient	ECTS credits
3	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**DESCRIPTION DU MODULE**	**Département : Génie civil**
		Date : 11/10/2021
		N° version : 02
		Semestre : 02

1. COURSE DESCRIPTION AND TARGET SKILLS

1.1 Description : We learn in this lecture: (1) The stiffness Method; (2) How to discrete a mathematical model using the technique of interpolation with finite elements; (3) How to solve a problem in mechanic static through the use of the assembly technique and finally (4) Elaboration of a finite elements program

1.2 Objectives :The students learn how to develop and use the stiffness equation of astructural and continuum element to solve a problem of structure or plane elasticity and also how to discrete a mathematical model, transform the differential problem into a problem of algebraic equations and obtaining a discrete solution. Finally, they will be able to manipulate the finite elements programs and also elaborate their proper programs to solve classical or even complicated problems.

1.3 Prerequisites: Numerical Analysis, continuum mechanics, mechanicsof structures

Uplstream modules	Taught module	Downstream modules
MGCV11.04 ; MGCV12.13 ; MGCV21.25	MGCV22.37	MGCV31.51

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	**Stiffness Method**	9h	Systems of rigid carts and springs; derive stiffness equations of beam element withouttranslation of nodes and bar element by equilibrium and by the principle of the virtual work (PTV) . Assembly: definition and technique. Application on continuous beams, truss structures. Programming on Excel
Chapter 2	**Introduction to analysis by finite element method**	9h	MEF as a method of discretization; physical model ; mathematical model (Bar static problem: differential equation: Integral equation; Continuous solution); Discrete model (Discretisation of the integral equation; solution Galerkin; Ritz; EF)
Chapter 3	**Formulation and calculation of elements in static mechanic**	12h	The matrixes N;B and K; Bar element (Linear interpolation, Isoparametric element; Quadratic interpolation, Numerical integration : 2 Gauss points); Convergence and precision of the solution; Beam element(Cubic interpolation continuity C1); Continuum 2D elements(Plane stress, plane deformation, Element Q4 (Isoparametric), Numerical integration : 4 Gauss points The exercises are about the calculation of N, B, Jacobien, K and F (equivalent nodal load vector) using Excel for the Q4 and also the calculation of integrals of the surface.
Chapter 4	**Eigen valueProblems by FEM**	6h	Formulation of beam column (Buckling); Discretization and stiffness equation (geometric stiffness matrix); Solution of bifurcation problem (Critical load; associated mode); Application on the beams and exercises on the regular frames. Work on Excel.
Chapter 5	**Elaboration of a EF program in Excel(Plane stress, plane deformation using Q4)**	9h	Program organization Data (nodal points, boundary conditions); Calculation of K and F of each element; assembly; Discrete solution; calculation of stresses

2. METHODOLOGY

The hours of study consist of presenting the chapter and its goal on PowerPoint, detailing the formulation and methods of solving problems. The course contains different applications and exercises to help understanding each chapter. The problem solving is studied separately in the end of all chapters so the student has to prepare them in advance. Concerning the activities of self-work, the students have to solve the exercises and the problems as a homework to prepare exam. The students use the PC in the exams there fore they can solve difficult problems with many D.O.F.

Integrated courses (h)	45h
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1 & 2	1/3
Presentation		
Final Exam	All	2/3

4. References

1) K. J. Bath : Finite element procedures, Prentice Hall , Inc. 1996
2) T. Iwakuma : Matrix analysis of structures, Tohoku Univ. Press, 1988
3) ZIENKIEWICZ, O.C. :The finite elementmethod in Engineering science, McGraw-Hill, New York, 1971.

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department :Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 02

PLATES AND SHELLS

Code : MGCV22.38

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr Fahmi BEN JEMAA

Status :Temporary Teacher

Mail : fahmi.benjemaa@enis.tn

Courses	Practical works	Individual work	Total volume
30 h	**15 h**	**45 h**	**90 h**

Coefficient:	ECTS credits :
2.5	3.0

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department :Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description:

This course is divided into two parts. The first part is devoted to the development of the theory of weakly bent flat plates (Love Kirchoff) from the mechanics of continuum. Analytical solutions are proposed within the framework of this theory and are applied to thin circular and rectangular plates with various boundary conditions.

The second part of this course is devoted to the study of thin shells of revolution (domes, vaults, planetarium and cylindrical or spherical tanks) with axisymmetric loading (self-weight or pressure). The membranestheory of thin shells of revolution is developed in a first step. The bending theory of these shells is treated in a second step.

1.2 Objectives:

The students learn how to calculate the deflections and internal forces and to draw their diagrams in thin plates and shells in bending. At the end of this course the students are prepared to deal with the design methods of plates or shells encountered in structures such as floors in buildings, decks in slab bridges and silos and tanks.

1.3 Prerequisites:

Continuum mechanics, strength of materials, structural mechanics and mathematics.

Upstream Modules	Taught Module	Downstrean Modules
MGCV11.04 ; MGCV12.18 ; MGCV21.25 ; MGCV11.02 ; MGCV12.14	MGCV22.38	MGCV22.42 ; MGCV22.43 ; MGCV31.58

1.4 Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter 1	**Introduction to the general theory of thin flat plates**	2hrs	Internal forces and stresses acting within a thin plate. Differential Equilibrium equations of a plate element. Decoupling of applied loads and internal forces: - Membrane - Bending-Torsion Study of thin plates loaded in their mid-plane.
Chapter 2	**General theory of bending of weakly bent thin plates**	6hrs	Love-Kirchoff assumptions. Strain-displacement relationships Stress-strain relationships. Differential equation for deflection

			(Lagrange). Boundary conditions. Energy methods (Ritz). Applications. Tutorials at home (homework)
Chapter 3	**Symmetrical bending of circular plates**	4hrs	Basic relationships in polar coordinates. Polar coordinate formulation of displacement, strain, stress, internal force fields, differential equation for deflection and boundary conditions. Axisymmetric bending. Applications. Homework
Chapter 4	**Bending of rectangular plates**	6hrs	Navier's method: rectangular plates with simply supported edges all around. Lévy method: rectangular plates with two opposite simply supported edges. Rectangular plates on elastic foundation. Directed applications in class. Tutorials at home (homework)
Chapter 5	**Membrane theory of thin shells**	6hrs	General behaviour and different theories of thin shells. Geometry of shells in the form of a surface of revolution. Surface of revolution shells loaded symmetrically with respect to their axis. Study of particular cases of shells with a shape of revolution surface: spherical domes, conical domes (planetarium), conical tank... Displacements in symmetrically loaded shells with surfaces of revolution. Shells in the form of a surface of revolution subjected to a non-symmetrical load. Surface hulls under wind pressure. Membrane theory of cylindrical shells. Applications. Homework.
Chapter6	**Theory of thin-shell bending**	6hrs	Theory of bending of symmetrically loaded thin shells with a surface of revolution. Spherical shells subjected to uniform pressure. Theory of bending of cylindrical shells. Cylindrical tanks with uniform wall thickness. Applications. Homework.

Practical Works :

Session	Title	Duration	Learning Outcomes
Session 1& 2	Navier's method for simply supported plates	6hrs	Preparation of excel spreadsheets to implement the Navier method for plates simply supported on their entire contour and subjected to various load cases.
Session 3	**Lévy's method for simply-supported plates**	3hrs	Preparation of excel spreadsheets to implement Lévy's method for simply supported plates on their entire contour and subjected to various load cases.
Session 4	**Lévy's method for plates with two opposite edges simply supportedand the other two are arbitrarily supported**	3hrs	Preparation of excel spreadsheets to implement Lévy's method for plates with 2 simply-supported edges and the other 2 (free or clamped) and subjected to various load cases.
Session 4 & 5	**Finite Element Modelling of Rectangular Plates RDM6 (WINMEF) software and Robot Structural Analysis**	3hrs	Use of RDM6 (WINMEF) and Robot Structural Analysis software to model rectangular plates in bending under various transverse load cases using the finite element method.

1. METHODOLOGY

The contact hours consist of a power point presentation of the chapter and its objective, reminding and detailing the formulation and practice of solving the problems. The course is clarified by small applications. Problem solving is dealt with separately in the tutorial sessions or the student is obliged to prepare them in advance. For self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30hrs
Practical work (h)	15hrs
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		1/4
Continuous assessment	Chapters 1, 2, 3 et 4	1/4
Presentation		
Final Exam		

4. Bibliographic references :

1) S. TIMOSHENKO and S. WOINOWSKY-KRIEGER, « THEORYOFPLATESANDSHELLS »
2) ANSEL C. UGURAL, « STRESSES IN PLATES AND SHELLS »

	Module Description	Department :Civil Engineering
		Date : 11/10/1021
		Version N°: 02
		Semester :02

Synthesis project

Code :MGCV22.39

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teachers : M.JamelH.Taieb/M.Slim Gharieni/M.Ahmed Rekik

Status :Temporary Consulting Engineer

Mail :

Courses	Practicalworks	Individualwork	Total volume
	45 h	45 h	90 h

Coefficient:	ECTS credits :
1.5	4

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	Department : Civil Engineering Date : 11/10/2021 versionN° : 02 Semester :02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description :It is a personal work of the student to choose among three subjects. It consists of designing a mini construction project (building, industrial building, road) from the reading of the plans to the drawing of the execution plans.

1.2 Objectives :Based on their previous knowledge, students learn how to design a real mini-project and also how to present the results in the form of a report and drawings.

1.3 Prerequisites: Structural mechanics, Reinforced concrete, Steel construction, Road design and calculation, Tools and software in civil engineering

Uplstream modules	Taught module	Downstream modules
MGCV21.25 ; MGCV21.29 ; MGCV22.40 ; MGCV22.41 ; MGCV21.28	MGCV22.39	MGCV22.46 ; MGCV31.60

2. METHODOLOGY

The teacher, who is usually an experienced consulting engineer, prepares and transmits to the students the data of the mini-project and explains the work required.

The teacher follows up and supervises the students during one-on-one meetings for a period of five to seven weeks starting in April.

Integrated courses (h)	
Practicalwork (h)	
Project (h)	45
Visits (h)	

3. Evaluation

Designation	Chapter(s)	Rating
Mini-project		1/2
Practical works		
Continuous assessment	Advancement and personal contribution	1/4
Presentation		1/4
Final Review		

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semester : 02**

Reinforcement concrete 2

Code : MGCV22.40

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : BOULILA Ali

Status : temporary

e-Mail :ali.boulila21@gmail.com

Courses	Practical works	Individual work	Total volume
30 heures		**45 heures**	**75 heures**

Coefficient:	ECTS credits :
2	2.5

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semester : 02**

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

The calculation of reinforced concrete is the design of the concrete sections and those of the steel which constitutes its reinforcement. This requires a knowledge of the mechanics of continuum (stress tensor, behaviour models, calculation at failure ....), the strength of materials, and the RC structural behaviour.

Objectives

- The student should be able to calculate the transverse reinforcement of a simple beam and perform the necessary checks against shear stress of the section.
- The student must be able to calculate the longitudinal reinforcement and perform the necessary checks of a reinforced concrete section, rectangular or T-, subjected to to bi-axial bending and bending with normal force.
- The student should be able to calculate the longitudinal and transverse reinforcement of a reinforced concrete section subjected to torsion and perform the necessary checks against shear.
- The student must be able to justify, according to the BAEL code, the serviceability limit state with respect to deformations

1.2 : Prerequisites :

Structural mechanics ,reinforced concrete 1

Upstream Modules	Taught Module	Downstream Modules
MGCV21.25; MGCV21.27	MGCV22.40	MGCV22.43; MGCV31.55

1.3 :Learning Outcomes

Chapter	Title	Duration	Learning Outcomes
1	bending with normal force: calculation of a rectangular section	9h	- Review of the rules of the three pivots - considered internal forces - sectional equilibrium equations - Design of a section under bending with tension - Design of a section under bending with compression - Design of a partially compressed section - Interaction diagrams

			- Maximal reinforcement - Constructive provisions
2	bending with normal force: calculation of a T-section	6h	- sectional equilibrium equations - Design of a partially compressed section - Maximal reinforcement - Constructive provisions
3	Bi-axial bending	6h	- Simple bi-axial bending - Bi axial bending with normal force - Design method (analytical and graphical)
4	Calculation of a section under torsion	3h	- Distribution of shear stress - Verification of concrete: equivalent hollow section - Justification of concrete - Calculation of reinforcement
5	Serviceability limit state with respect to deflection	6h	- Influence of cracking on the deflection calculation - Influence of creep on deflection calculation (long term; short term) - Deflection calculation - Limit deflection

2. METHODOLOGY

The contact hours consist in:

- Describe in power point for each type of stress (shear, compound bending, deflected bending and torsion) the method of calculation and verification of a reinforced concrete section;

- Describe in power point the method of justification of the deflection in reinforced concrete;

- Assist the students, during the tutorial sessions, in the calculation of the application examples..

Integrated courses (h)	30h rs
Practical work (h)	
Project (h)	
Visits (h)	

3. Assessment

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1 & 2	1/3
Presentation		
Final Exam	All	2/3

4. Bibliographic references

- DTU BAEL 91, Règles techniques de conception et de calcul des ouvrages et constructions en béton armé suivant la méthode des états limites révisées 99;
- Maitrise du BAEL 91 et des DTU associés – Jean PERCHAT & Jean ROUX , Edition Eyrolles 2000
- Pratique du BAEL 91 cours avec exercices corrigés – Jean PERCHAT & Jean ROUX Edition Eyrolles 1997
- Traité du béton armé - Jean PERCHAT des règles BAEL à l'Eurocode 2, Le moniteur 2010

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department:civil engineering**
		Date: 19/10/2021
		Version N°: 02
		Semester: 02

Steel Construction

Code : MGCV22.41

Specialty module	Basic module	Engineering Sciences and Techniques	Preparation for the profession's practice
x			

Teacher : Mr.Fakher HAMROUNI

Status : contractual, PhD

e-Mail :fakher.hamrouni@gmail.com

Courses	Practical work	Personal work	Total volume
45 h		60 h	105 h

Coefficient	ECTS credits
3	3.5

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester: 02**

1. COURSE DESCRIPTION AND TARGET SKILLS

1.1 Description: Through this course, we learn: (1) the field of use of steel as a construction material; (2) the behaviour of steel and the different mechanical characteristics; (3) the different types of steel sections (4) the determination of climatic actions (5) the basic elements for the design and calculation of a steel structure (6) the phenomena of instability (flexural, lateral and local buckling) and the basic rules for sections classification and elementsdimensioning according to Eurocode 3 (EC3) ; (7) classification of the structure (simple or rigid and type of analysis first or second order); (8) Finally, the design and sizing of welded and bolted connections (failure modes).

1.2 Objectives: After this course, students will be able to conduct in detail the dimensioning of steel structures. The selection of appropriate sections for the structure and the verification of their strengths. Analysis of the global structure stability. Finally, the dimensioning of the connections, in particular the column base (embedding, articulation).

1.3Prerequisites: Continuum Mechanics, Strength of Materials, Structural Mechanics

Input modules	Current Module	Output modules
MGCV11.04 ; MGCV12.17 ; MGCV21.25	MGCV22.41	MGCV31.51

1.1 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
1	**Generalities and terminology of steel structures**	4h30	Introduction to steel constructions. Characteristics of steel constructions. Terminology of an industrial building: board, rail, gantry, column, crossbeam, strut, column base, roofing beam, Saint Andre Design of the roof, the frames, the bracing system: roofing beams, Saint Andre crosses and connections.
2	**Loads and combinations**	6h	Definition of climatic actions (wind and snow), permanent and operational loads, overhead cranes and seismic actions. Definition of the loads combinations of at ULS and SLS. Limit values of deflections and displacements.
3	**Strength of sections according to EC3**	12h	Classification of cross-sections of panels used in steel constructions. Strength of sections under simple stresses (N, M and V). Strength of sections under combined stresses (M+V, M+N and M+V+N). Strength of class 4 sections.
4	**Resistance of construction elements according to EC3**	10h30	Elastic instability phenomena (flexural and lateral buckling). Resistance of construction elementsunder simple compression (buckling curves of EC3) Resistance of construction elementsunder compression and bending with or without lateral buckling.
5	**Overall analysis of the structures**	3h	Type of structures: braced or unbraced, simple or rigid. P-Δ effect.
6	**Design and calculation of connections**	9h	Definition of the resistance of a weldingjoint and of an ordinary or prestressed bolt. Design and calculation of connections (welded and bolted) according to EC3. Verification of the failure modes of connections.

2. METHODOLOGY

The contact hours consist of a power point presentation of the chapter and its objective, reminding and detailing the formulation and practice of solving the problems. The course is clarified by applications. The problem solving is treated separately in the tutorial sessions or the student is obliged to prepare them in advance. For self-study activities, students are expected to make an effort to solve problems in the form of homework.

Integrated courses (h)	45h
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment	1,2,3,&4	1/3
Presentation		
Final Exam	All	2/3

4. Bibliographic references:

1) MOREL JEAN ; Conception Et Calcul Des Structures Métalliques ; Les Editions EYROLLES (troisième édition) 1995.
2) MOREL JEAN ; Structures Métalliques ; Les Editions EYRLLOS (2ème tirage) 1997.
3) MOREL JEAN ; Calcul Des Structures Métalliques Selon L'EUROCODE3 ; (troisième tirage) ; Editions EYROLLES 1997
4) GCTT : Le Groupe De Coordination Des Textes Techniques ; Règles Définissant Les Effets De La Neige Et Du Vent Sur Les Constructions (NV 65 et N 84 modifiées 95) ; Les Editions EYROLLES (Douzièmeédition) Paris 1976.

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**Module Description**	**Department :Civil Engineering**
		Date : 12/10/2021
		Version N°: 02
		Semester :02

CALCULATION AND DESIGN OF BRIDGES

Code : MGCV22.42

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr. Slim GHARIENI

Status : Temporary

E-mail : slim.gharieni@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30hrs		30hrs	60hrs

Coefficient:	ECTS credits :
2	2

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 10/10/2021
		versionN° : 02
		Semester :02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description :

In this module, we start with a general presentation of the different types of structures and the design rules for each type. Then, the actions of permanent loads and road traffic are defined according to the regulations (EC1, SETRA). Then, the bending of the deck of a typical beam bridge (TIBA) is studied through the use of transverse (Guyon-Massonnet) and longitudinal influence lines. Finally, we conclude with a pre-dimensioning and a verification of the supporting devices.

1.2 Objectives :

To put the students in the position of designing a real structure, starting with the pre-dimensioning of the various elements while considering the possible constraints that may be encountered, then by evaluating the loads applied to the structure and calculating the internal forces in the structure from which the theoretical reinforcement is determined.

1.3 Prerequisites :

- Structural mechanics
- Reinforced concrete 1 and 2
- Designed and calculation of roads

Upstream modules	Taught module	Downstream modules
- MGCV21.25 - MGCV21.27 - MGCV21.29 - MGCV22.40	MGCV22.42	MGCV31.58

1.4 Learning outcomes:

Chapter	Title	Duration	Learning outcome
1	General information on engineering structures	3hrs	Review the terms of the infrastructure regulations and the different methods of

			implementation
2	Design rules for common structures (beam bridges)	6h	Mastery of design and pre-dimensioning rules to address technical solutions
3	Load regulations and design standards for bridges	6h	Détermination des actions permanentes et d'exploitation (trafic routier). Détermination des combinaisons d'action pour le calcul du tablier et des appuis.
4	Study of the deck of a bridge with independent spans	12h	Elaborer une analyse détaillée d'un tablier à poutres en dégageant les lignes d'influence transversale (Guyon Massonnet) et longitudinale de chaque poutre, application des charges, et détermination des sollicitations de calcul
5	Etude des appareils d'appui	3h	Types d'appareils d'appui Résistances des appareils d'appui Dimensionnement et vérifications

2.METHODOLOGY :

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1, 2 & 3	1/3
Presentation		
Final Review	All	2/3

4. Bibliographicreferences :

1. Esthétique et construction des ouvrages d'art : Demart J. (Ed. Dunod 1984)
2. Conception des ponts : Grattesta G. (Ed.Eyrolles 1985)
3. Les ouvrages d'art : Galabru P. (Ed. Eyrolles 1968)

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester: 02**

Design and calculation of RC structures

Code : MGCV22.43

Specialty module	Basic module	Engineering Sciences and Techniques	Preparation for the profession's practice
x			

Teacher : BOULILA Ali

Status: temporary

e-Mail :ali.boulila21@gmail.com

Courses	Practical work	Personal work	Total volume
45 heures		45 heures	90heures

Coefficient	ECTS credits
3	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester: 02**

1. COURSE DESCRIPTION AND TARGET SKILLS

1.1 :Description

This course consists in mastering the design and calculation of the structural RC elements most frequently encountered in buildings, in accordance with the rules of calculation of reinforced concrete to limit states BAEL 91 modified 99.

1.2 Objectives

The student will have to be able to calculate and make the necessary verifications relative to structural elements such as: a hollow floor slab, a slab, a continuous beam, a superficial foundation, a bracing veil...

1.3 Prerequisites:

Soil mechanics2, mechanics of structures,reinforced concrete 1and 2.

Uplstream modules	Taught module	Downstream modules
MGCV22.44- MGCV21.25- MGCV 21.27- MGCV22.40	MGCV22.43	MGCV22.45

1.4 :Learning outcomes:

Chapters	Title	Duration	Learning outcomes
1	Calculation of a hollow slab floor (16+5) and (19+6).	6h	- Reinforced concrete calculation of a secondary beam and a main beam - Constructional provisions and presentation of reinforcement details
2	Calculation of a slab	6h	- Review of the thin plates' theory - Calculation of bending moments and shear forces of a slab subjected to uniformly distributed loads and concentrated loads - Reinforced concrete design of aslab and a continuous slab - Constructional provisions and presentation of reinforcement details
3	Calculation of a continuous beam	9h	- Reminder of the beams'theory - Combinations and load cases - Reinforced concrete" methods of

			calculation of the internal forces, Caquot method (and Caquot minor), redistribution of the moments. - Reinforced concrete calculation and stop bar design - Constructional provisions and presentation of reinforcement details
4	Calculation of a column	3h	- Reminder of the theory of columns - vertical load on structure and limit state combinations. - Approximate methods of calculation of first and second order internal forces. - Limit state checks (resistance and buckling) - Constructional arrangements and presentation of reinforcement details
5	calculation of foundation footings (pad, strip)	6h	- codes and references - Calculation assumptions - Actions transmitted to the foundation - Action combinations - strut method and bending method - Concrete design and reinforcement calculation - Verification of footing punching and soil bearing capacity - Constructional provisions and presentation of reinforcement details
6	Calculation of a building staircase	3h	- Geometry design - Equivalent mechanical model - Calculation of internal forces - Concrete design and reinforcement calculation - Constructional provisions and presentation of reinforcement details - Drawing of execution plans
7	Study of building bracing and calculation of walls.	12h	- Building bracing systems - Wall bracing (elevator and stairwell) - Origin of horizontal forces: Wind and seismic actions. - Calculation of the center of torsion (or barycenter of rigidities) - Distribution of horizontal forces on the walls: - Sizing of the bracing walls: - Justification of compression (buckling) - Load cases and stress calculation - Calculation of reinforcement

			- Constructional arrangements and presentation of reinforcement details - Modeling of the building bracing system using a calculation software.

2. METHODOLOGY

The contact hours consist of:

- Describing in power point the different structural elements, determining the applied loads, reminding the students of the B.A.E.L. rules and presenting the calculation methods of these elements.

- Assisting students, during the tutorial sessions, in solving application exercises and design problems.

Integrated courses (h)	45
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Assessment

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practicalworks		
Continuousassessment	1 & 2	1/3
Presentation		
Final Exam	All	2/3

4. Bibliographic References

- DTU BAEL 91, Règles techniques de conception et de calcul des ouvrages et constructions en béton armé suivant la méthode des états limites révisées 99;
- Maitrise du BAEL 91 et des DTU associés – Jean PERCHAT & Jean ROUX , Edition Eyrolles 2000
- Pratique du BAEL 91 cours avec exercices corrigés – Jean PERCHAT & Jean ROUX Edition Eyrolles 1997
- Fascicule n° 62 titre V : Règles techniques de conception et de calcul des fondations des ouvrages de génie civil
- Calcul pratique des tours en béton armé, action du vent bâtiment-tours, tours de section annulaire Dunod 1972
- Conception et calcul des structure de bâtiment – Henry THONIER , Presse de l'école nationale des ponts et chaussées
- Traité du béton armé - Jean PERCHAT des règles BAEL à l'Eurocode 2, Le moniteur 2010

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semester : 02**

SOIL MECHANICS 2

Code : MGCV22.44

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr Adnen GUERMAZI

Status : Temporary

Mail :adnenguermazi@gmail.com

Courses	Practical works	Individual work	Total volume
30 hrs	15 hrs	45 hrs	90 hrs

Coefficient:	ECTS credits :
2,5	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semester : 02**

1. DESCRIPTION OF THE COURSE AND COMPETENCES :

1.1 Description:

Students receive the theoretical aspects necessary for the design of various types of soil mechanics problems such as shallow foundations, retaining walls, and slope stability. They learn how to design each type of structure through a mathematical formulation appropriate to each type of structure.

1.2 Objectives:

To know the methods of soil investigation and to define the design parameters from in-situ tests. Understand the mechanical functioning of geotechnical structures and master their sizing methods.

1.3 Prerequisites:

Strength of materials / Soil mechanics 1 / Reinforced concrete I

Upstream Modules	Taught Module	DownstreamModules
MGCV12.17, MGCV12.16, MGCV21.27	MGCV22.37	MGCV31.54

1.4 Learning outcomes :

Chapter	Title	Duration	Learning outcomes
Chapter1	**Siteinvestigation and in-situ tests**	3hrs	Method of sample collection Penetration test Pressuremeter test
Chapter2	**Shallow foundation**	6hrs	Applied and reference stress Bearing capacity Settlement evaluation Tolerable differential settlement
Chapter3	Lateral earth pressure	6hrs	Active and passive earth pressure Calculation of active and passive forces due to the weight of the soil Additional active pressure due to surface loads Special case problems
Chapter4	Retaining structures	9hrs	Retaining wall : types and external stability analysis Sheet piling: types and design method at failure Diaphragm wall : stability of the

			structure / sizing of the anchors
Chapter5	**Slope stability analysis**	6hrs	Stability of an infinite slope Stability of a finite slope in a homogeneous soil Stability of a finite slope in a heterogeneous soil: Slice method
Practical work	**Laboratory Tests**	15hrs	Atterberg limits Particle size analysis Proctor compaction Oedometer test Direct shear test

2.METHODOLOGY

The course sessions consist of a power point presentation of the chapter and its objective and detail the notions relating to the behaviour and the design of the studied structure. The course is clarified by applications treated separately in the tutorial sessions. In the self-study activities, students are encouraged to design an Excel sheet that allows them to better master the external design of a geotechnical structure such as footings or retaining structures.

Integrated courses (h)	30hrs
Practical work (h)	15hrs
Project (h)	
Visits (h)	

3.Assessment :

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		1/4
Continuous assessment	1 & 2	1/4
Presentation		
Final Exam	All	1/2

4. Bibliographic References :

1) K. Terzaghi and R. B. Peck : Soil mechanics in engineering practice, 2nd Ed.,John Wiley & Sons, Inc., New York, 1967.
2) J. Kerizel et E. Absi : Table de poussée et de butée des terres, Presses de l'école nationale des ponts et chaussées, 3ème Edition, 1990.
3) J. E. Bowlles : Foundation analysis and design, 4th Edition, McGraw-Hill, Inc., 1988.
4) J. Costet et G. Sanglerat : Cours pratique de mécanique des sols, Tome 2, Edition Dunod, 1975.
5) G. Philipponnat : Fondations et ouvrages en terre, Editions Eyrolles, 1979.

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**Module Description**	**Department :Civil Engineering**
		Date : 20/10/2021
		Version N°: 02
		Semester :02

GENERAL CONSTRUCTION PROCESSES

Code : MGCV22.45

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr Mahmoud Ketata

Status : Temporary

E-mail : ketata.mahmoud@gmail.com

Courses	Practicalworks	Individualwork	Total volume
45hrs		30 hrs	75hrs

Coefficient:	ECTS credits :
3	2

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 20/10/2021
		versionN° : 02
		Semester :02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description

This course teaches: (1) how to perform road work; (2) various earthworks and dams; (3) how to perform various types of shallow or deep foundations; (4) how to perform floor work; formwork; and structures and also (5) techniques and precautions for the selection, upgrading and preparation of construction materials.

1.2 Objectives

Students will learn the various construction techniques for infrastructure and superstructure works, how to select the appropriate equipment and apply an execution process. Finally, they will be able to propose conventional or situation-specific execution methods.

1.3 Prerequisites :

Building Materials, Reinforced Concrete 1, Design and Calculation of Building Structures.

Upstream modules	Taught module	Downstream modules
MGCV11.07 ; MGCV12.27 ; MGCV22.43	MGCV22.45	MGCV31.51; MGCV31.55

1.4 Learning outcomes:

Chapter	Title	Duration	Learning outcomes
1	**Road construction**	6hrs	I. ROAD WORKS II. ROADS Multi-layer surfacing: Asphalt pavements
2	**Concrete work**	6hrs	I. GENERAL II.ON-SITE CONCRETE - Star storage power plants - Hopper storage plants - Heap storage plants III. READY-TO-USE CONCRETE
3	**Excavation work**	6hrs	I. THE WORK II. PRODUCTION EQUIPMENT

			III.TRANSPORT EQUIPMENT
4	**Dam works**	6hrs	I. INTRODUCTION II. EMBANKMENT DAMS III. CONCRETE DAMS IV. THE IMPORTANCE OF DRAINAGE V. FLOOD EVACUATION
5	**Deep Foundations and special works**	6hrs	I. DEEP FOUNDATIONS II. SUPPORTING WALLS III. SOIL IMPROVEMENT
6	**The various types of formwork**	3hrs	I. FORMWORK II. MAIN COMPONENTS III. COMMON SOLUTIONS IV.FINISHED DIMENSIONS OF THE STRUCTURE V.ADJUSTMENT OF ELEMENTS VI.FORMWORK DESIGN VII. FRESH CONCRETE SPROUT ON THE FORMWORK
7	**The various types of scaffolding and shoring**	3hrs	I. MAIN TYPES II. SERVICE SCAFFOLDS III. TECHNOLOGICAL SOLUTIONS IV. EXAMPLES OF 3-SCAFFOLDS
8	**The various types of formwork**	3hrs	INTRODUCTION II. FUNCTIONS OF FLOORS III. HOLLOW CORE FLOORS IV. BA FLOORS V. SLAB FLOORS VI. METAL FLOORS VII. reinforced concrete slabbing VIII. HOLLOW CORE FLOORS
9	**Lifting and Handling equipment**	3hrs	I. DIFFERENT TYPES OF LIFTING EQUIPMENT II. CHOICE OF TYPE OF LIFTING EQUIPMENT III. CHARACTERISTICS OF A TOWER CRANE IV. ASSEMBLY AND SAFETY DEVICES V. DETERMINATION OF THE LIFTING STATION
10	**Bridges and Structures Various construction methods**	6h	I. DIFFERENT TYPES OF bridges II. GIRDER BRIDGES III. SLAB BRIDGES IV. CAISSON BRIDGES V. CABLE-STAYED BRIDGES VI. ARCH BRIDGES VII. METAL BRIDGES

2. METHODOLOGY

The contact hours consist of a power point presentation of the chapter and its objective, a presentation of the state of the art and possible solutions to solve the problems and meet the technical requirements. The course is complemented by the projection of selected videos that detail some practical aspects. The solution of the exercises is dealt with separately in the tutorials, where the student is often asked to try them out in advance. For self-study activities, students are required to research short but relevant videos and prepare presentations on an aspect of a work chosen in advance.

Integrated courses (h)	45hrs
Practicalwork (h)	
Project (h)	
Visits (h)	15hrs

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	Chapters 1,2,3,4&5	1/3
Presentation		
Final Review	All chapters	2/3

3. Bibliographicreferences :

-Ouvrage en béton armé ; H RENAU ; F LETERTRE ; édition FOUCHER

- L’établissement d’un projet de bâtiment ; RENE BAYON; édition EYROLLES

-Les planchers dans la construction; MAURICE DIETRICH ; P. GERARD; édition DUNOD

-Technologie du bâtiment Gros œuvre ; H RENAUD ; F LETERTRE; édition FOUCHER

GCV 3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department :Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 01

ULTIMATE LIMIT STATE ANALYSIS OF STRUCTURES

Code : MGCV31.47

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr Adnen GUERMAZI

Status : Temporary

Mail :adnenguermazi@gmail.com

Courses	Practical works	Individual work	Total volume
45 h	**9**	**45 h**	**99 h**

Coefficient:	ECTS credits :
3,5	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department :Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 01

1.DESCRIPTION OF THE COURSE AND COMPETENCIES :

1.1Description:

The module starts by presenting the basic notions on the elasto-plastic behaviour of materials and giving the definitions of the plasticity criterion and the plastic flow law as a function of the components of the stress tensor. Then, to facilitate their practice in a structural calculation, these notions are presented in terms of the internal forces and the concept of plastic hinge is introduced. The analysis of the elasto-plastic behaviour of structures is then approached through the treatment of simple structural cases (truss, beams). The second part of this module is related to the presentation of the limit analysis approch. First, the general notions of the method are given and then its application to structures such as beams, frames and thin plates is developed. The course will be concluded with a chapter containing both the P-Δ effect and plastic hinges.

1.2Objectives:

Students learn how to define and deal with non-linear material behaviour and introduce these notions into a structural design. Firstly, they apply these notions through the analysis of the elasto-plastic response of a structure under the effect of a loading system in order to determine its failure load and the residuel state of strains and stresses after unloading. Secondly, the limite analysis approch is learned as a second method of computing the failure load of structures. Finally, introdusing the P-Δ effect students will learn how to determine the ultimate load, the internal forces diagrams and the corresponding failure shape mechanism.

1.3Prerequisite:

Structural Mechanics / Second order analysis of regular frames with displaceable nodes

Up Stream Modules	Taught Module	Down Stream Modules
MGCV21.25 ; MGCV22.46	MGCV31.47	

1.4 :Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter 1	**Introduction**	1h30	Safety concept and calculation methods
Chapter 2	**Basic concept of plasticity**	4h30	Laws behaviour fo solids Usual plasticity criteria Plastic flow rule

Chapter 3	**Plasticity criteria for rods**	4h30	Normal force Simple bending Plastic hinges Compound bending
Chapter 4	**Elasto-plastic analysis of structures: Step by step calculation**	6h	Truss structure: maximum load, residual internal foces and displacements Beam structure : response during loading and unloading
Chapter 5	Limit state analysis : General concepts	1h30	Principle of virtual work Statical approach Kinematical approach Combined approach
Chapter 6	Design of structures with rigid joints : Beams and frames	6h	Critical Sections Limit sate design of beams: Single span beams / Multi-span beams Limit sate design of frames : failure mechanisms (basic and combined mechanisms) Application examples
Chapter 7	**Limit state analysis of thin slabs.**	6h	Reminder of the Love-Kirchoff plate theory Failure criteria Plastic hinges and definition of the failure mechanism Application examples
Chapter 8	**Second order analysis with plastic hinges**	15hrs	Generalities European recommendations for steel structures EC3 Forces method Rotation method (with system change) Calculation examples
Practical Works (PW)	**Working on a second order structural design project with plastic hinges**	15h	Solve second-order structural design problems with plastic hinges by programming Excel sheets (simple portal frames, multi-storey portal frames).

2.METHODOLOGY

The contact hours for the first chapters consist of a power point presentation of the fundamental notions and their illustration on simple examples. For the other chapters related to the design methods, the course

takes as support different application examples. For the self-study activities, the students have to deal with other examples given as homework.

Integrated courses (h)	45
Practical work (h)	
Project (h)	9
Visits (h)	

3.Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		1/4
Continuous assessment	1 &4	1/4
Presentation		
Final Exam	All	1/2

4. Bibliographic references

1) B. Alphen et J. Salençon : Elasto-plasticité, Presse de l'école nationale des ponts et chaussées, 1987
2) J. Salençon : Calcul à la rupture et analyse limite, Presse de l'école nationale des ponts et chaussées, 1983
3) CTICM :Méthodes de calcul aux états limites des structures à barres, séminaire du 14 au 17 Novembre 1972.
4) J. Chakrabarty : Theory of plasticity, Third edition published by Elsevier Butterworth-Heinemann, 2006
5) Udo Vogel ; Karlsruhe University ; Limite state design of steel structures ; Lecture notes ; Tohoku university (Japon), 1987.
6) Rubin, H.: Das Drehwinkelverfahren zur Berechnung biegesteifer Stabwerke nach Elastizitäts- oder Fließgelenktheorie I. und II. Ordnung unter Berücksichtigung von Vorverformungen. In: Bauingenieur 55 (1980), S. 81–92.

	Module Description	Department :Civil Engineering
		Date : 13/10/2021
		Version N°: 02
		Semester :01

Composite Beams and Columns to Eurocode 4

Code : MGCV31.48

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teachers: Khaled MAALLA/ Sabra BOUGOFFA

Status : temporary / Permanent

Email : khaledmaalla62@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30		**60**	**90**

Coefficient:	ECTS credits :
2	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**DESCRIPTION DU MODULE**	Département : Génie Civil Date : 10/10/2021 N° version : 02 Semestre : 01

1. DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

This lecture contains the rules of conception, execution and design of the basic elements of composite building on the basis of Eurocode 4 (EC4). Each section includes the principles of conception and the formulae of design and their references to the clauses of EC4. The slabs used during the execution and final stages will also be studied in this lecture.

1.2 objectives

In this lecture, the students will learn the theory of strength and stiffness of composite elements, the basic rules of design and execution of composite buildings and ultimately, practicing the design methods of composite slabs, beams and columns using the basics of EC4.

1.3: Prerequities :Reinforced concrete, steel construction

Upstream modules	Taught module	Downstream modules
MGCV22.40 ; MGCV22.41	MGCV31.59	

1.4Learning outcomes:

Chapters	Title	Duration	Learning outcomes
1	**Conception rules and basic elements of a composite building**	3h	Learning the basic rules of the design of composite buildings, Learning the different types of columns, beams, slabs and shear connectors.
2	**Properties of Materials**	1h30	Defining the properties of the concrete used in composite buildings, the reinforcing steel and the steel decking for slabs. Defining the partial safetyfactor of resistance.
3	**Composite Slabs**	4h30	Defining the types of composite slabs and its initial design. Defining the influence of steel

			decking on the design of composite beams(Decking ribs parallel to the beam or transverse to the beam) Defining the shear connectors, Minimal reinforcement
4	**Ultimate limit state of composite beams**	9h	Facts about the ultimate limit state of composite beams. Resistance of a section(Bending moment>0, bending moment<0, vertical shear resistance and interaction M-V) Effective width of the concrete flange Strength and types of shear connectors P_{Rd} Spacing of shear connectors Longitudinal shear Lateral buckling (continous beam)
5	**Serviceability Limit State of composite beams**	3h	General criterias (Control of cracking of concrete; vibration) Calculating the deflection(Second moment of area of composite section; Modular ratio of Steel and concrete; Creep effect) Recommended limiting values for vertical deflection Deflection due to shrinkage Vibration check Crack control
6	**Ultimate limit state of composite columns**	9h	Types of columns (Partially or totally covered with concrete) General method of design Simplified methods of design (Resistance of cross section to axial loads,Resistance of members to axial loads,Resistance of cross section and elements due to combined compression and bending : Interaction curve) Limits of applicability of simplified methods

1. METHODOLOGY

The hours of study consist of presenting the chapter and its goal on PowerPoint, detailing the formulation and methodsof solving problems. The course contains different applications and exercises to help understanding each chapter. The problem solving is studied separately in the end of all chapters so the student has to prepare them in advance. Concerning the activites of self-work , the students have to solve the exercises and the problems as a home work to prepare exam.

Integrated course (h)	30
Practicalwork (h)	
Project (h)	
Visits (h)	

2. Assessment

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1, 2 & 3	1/3
Presentation		
Final Review	All	2/3

4.Bibliographic references

1) Eurocode 2 Design of concrete structures Part 1.1 General rules and rules for buildings, 1992
2) Eurocode 3 Design of steel structures Part 1.1 General rules and rules for buildings
3) Eurocode 4 Design of composite steel and concrete structures Part 1.1 General rules and rules for buildings

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 20/10/2021
		N° version : 02
		Semester : 02

PATHOLOGY OF CONSTRUCTIONS

Code : MGCV31.49

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher :Mr Mahmoud KETATA

Status : Temporary

e-Mail :ketata.mahmoud@gmail.com

Courses	Practical works	Individual work	Total volume
30 h		**30 h**	**60 h**

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 20/10/2021
		N° version : 02
		Semester : 02

1.COURSE DESCRIPTION AND COMPETENCES :

1.1 Description: This course teaches : (1) the generalities on pathology; (2) the pathology of reinforced concrete with the mechanisms of degradation; (3) how the defects of foundations evolve and manifest themselves; (4) how to carry out a diagnosis of a construction element in particular in reinforced concrete; (5) the techniques of repair and reinforcement of reinforced concrete structures.

1.2 Objectives : The students will learn the various processes of material degradation and the recognition of the sources of defects and disorders for various types of materials in particular Concrete, reinforced concrete and Masonry. They will also discuss the modes of Diagnosis and certain equipment and techniques of recognition. Finally they will be able to propose an adequate diagnosis for a given defect. to know the cause of a crack; the means of expertise and non-destructive or destructive control. Design a method of repairing a defect.

1.3 Prerequisites: Continuous Media Mechanics, Construction Materials

Upstream Modules	Taught Module	Downstream Modules
MGCV11.04 ; MGCV11.07 ;	MGCV31.48	

1.4 : Learning outcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter1		6hrs	**I. Introduction :** **II. Terminology:** **1. Disorders:** **2. Pathology:** **3. Damage:** **4. Ruin:** **5. Remedy:** **III. Concepts of sustainability of structures** **1. Introduction :** **2. Service life of a structure** **IV. Sources of construction pathologies** **1. Climatic and environmental factors** **2. Design and calculation faults :** **3. Execution-related defects :** **4. 4. Chemical defects:** **5. Operational disorders: 6:** **6. Disorders due to lack of maintenance** **V. Common construction defects :** **1. Defects in the surface structure of the concrete which concern its texture** **2. Defects in the appearance of the concrete due to the presence of more or less** **Adherent** **3. Cracks:** **4. Classification of pathologies according to their chronology of appearance:** **VI. Diagnosis of structures :** **VII. Repair of disorders :**
Chapter 2	**PATHOLOGY OF REINFORCED CONCRETE**	6hrs	**I. Introduction :** **II. Exposure classes :** **1. Definition of exposure classes :** **2. Synoptic for the determination of exposure classes: 3:** **3. Interest of the exposure classes :** **III. Degradation mechanisms of reinforced concrete:** **1. Degradation of chemical origin :** **2. Degradation of physico-chemical origin:** **3. Degradation of mechanical origin :** **4. Degradation due to design and calculation defects:** **5. Degradations due to execution defects:**

			6. Degradations due to operating defects: **7. Defects due to lack of maintenance:**
Chapter 3	**PATHOLOGY OF THE FOUNDATIONS**	6hrs	I. Introduction : II. The origins of foundation damage : 1. Aggression of the foundations : 2. Errors in the execution of foundations: 3. Errors in the execution of deep foundations: 4. Defects in the design or calculation of foundations: 5: 5. Defects in the design or calculation of deep foundations: 6: 6. The effect of swelling clay : 7. Water-related disorders: 8. Disorders related to neighbouring works
Chapter 4	**DIAGNOSIS OF THE CONSTRUCTIONS**	6hrs	I. Introduction : II. The diagnosis : 1. Definition of a diagnosis : 2. The main stages of a diagnosis III. Auscultation of structures : 1. Methods and non-destructive testing : 2. Destructive testing :
Chapter5	**REPAIR AND STRENGTHENING TECHNIQUES**	6hrs	**I. Introduction :** **II. The need for strengthening :** **III. The need for repair :** **IV. The repair of reinforced concrete structures :** **1. The main repair materials:** **2. Preparatory work:** **3. Application of repair products:** **4. Crack repair :** **V. Reinforcement techniques for reinforced concrete constructions:** **1. Characteristics of reinforcement products :** **2. Techniques for reinforcing reinforced concrete structures:** **3. Reinforcement at the foundation level**

1. METHODOLOGY

The contact hours consist of a power point presentation of the chapter and its objective, a presentation of the state of the art and possible solutions to solve the problems and to meet the technical requirements. The course is complemented by the projection of selected videos which detail certain practical aspects (showing faults or presenting a diagnostic device and its operating mode). The solution of the exercises is dealt with separately in the tutorials, where the student is often asked to do tests in advance. For self-study activities, students are required to research short but relevant videos and prepare presentations on one aspect of a pre-selected condition; explain the causes; name the diagnostic equipment to be used and propose a remedy with the operating procedure.

Integrated courses (h)	30hrs
Practical work (h)	
Project (h)	
Visits (h)	

2. Assessment :

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1 to 3	1/3
Presentation		
Final Exam	All	2/3

3. Bibliographic References :

1. Pathologie Générales des Constructions ; PHLIPPE PHILIPPARIE; édition EYROLLES

	MODULEDESCRIPTION	**Department :Civil Engineering**
		Date : 12/10/2021
		N° version : 02
		Semester : 01

Maritime works

Code : **MGCV31.50**

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession

Teacher : Mohamed Amine BEN CHOBBA

Status : Temporary

Mail : m.benchoba@ommp.nat.tn

Courses	Practical works	Individual work	Total volume
30	-	30	60

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department :Civil Engineering**
		Date : 12/10/2021
		N° version : 02
		Semester : 01

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

The course of maritime structures includes four main chapters which aim at giving some generalities on maritime ports and ships, the design of maritime structures and the calculation of the kinetic energy of docking of ships, the phenomena of the tides and the behaviours of the swell and the pre-dimensioning of embankment dams.

1.2 Objectives

1.To familiarise future engineers with the terminology of maritime structures (harbours, quays, wharves, dolphins, dykes, dredging, tides, swells, etc.),

2.Generalities on ships,

3.Master the design of berthing structures, the different types of fenders, the choice of fenders and mooring devices,

4.Concept of stability of quay walls,

5.Calculation of the kinetic energy of berthing of ships,

6.Understanding the phenomena of tides and wave generation,

7.Swell behaviour.

8.Pre-sizing of embankment dams.

1.3: Prerequisites:

This subject does not require any prerequisites.

Upstream Modules	Taught Module	Downstream Modules
MGCV22.41	BGCV31.50	

1.4 :Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
Chapitre 1	Generalities and definitions	5 hrs	General information on seaports, port facilities and ships
Chapter 2	Design of berths	14 hrs	See the different types of berthing structures, stability of quay walls, calculation of the kinetic energy of berthing, types of fenders and their choice and mooring devices.
Chapitre 3	Study of sea movements	5 hrs	The tides and swell.
Chapitre 4	External works: embankment dam	6 hrs	See the different types of external structures and pre-dimension the embankments.

2.METHODOLOGY

The Contact Hours consist of the presentation of different concepts, rules and diagrams. Practical applications are dealt with separately in tutorials and assignments. For the self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30hrs
Practical work (h)	
Project (h)	
Visits (h)	

3.Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project	-	-
Practical works	-	-
Continuous assessment	1 et 2	33%
Presentation	-	-
Final Exam	1, 2,3 et 4	66%

4. Bibliographic references :

Cours d'ouvrages maritimes tome 3 André Graillot.

Guide technique portuaire.

Mouvement de la mer, CETMEF.

Digue à talus, CETMEF

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester: 01

SOIL REINFORCEMENT

Code : MGCV31.50

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher :M. Adnen GUERMAZI

Status :Temporary

Mail :adnenguermazi@gmail.com

Courses	Practical works	Individual work	Total volume
30 h		30 h	60 h

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semester: 01**

1.DESCRIPTION OF THE COURSE AND COMPETENCES :

1.1 Description: The module starts by presenting the concept of soil reinforcement, the soil reinforcement techniques and their fields of application. In the second chapter, we analyse the behaviour of retaining walls and bridge abutments in reinforced earth and present the internal and external design methods. The third chapter deals with the case of soil retaining walls reinforced by various types of strip or sheet inclusions. Finally, we present the methods for analysing the stability of reinforced slopes.

1.2 Objectives: Understand the concept and know the techniques of soil reinforcement. Analyse the mechanical behaviour of retaining structures, bridge abutments and reinforced soil slopes and to master their design methods.

1.3 Prerequisites:

- Soil Mechanics 2.

Upstream Modules	Taught Module	Downstream Modules
MGCV22.44	MGCV31.50	

1.4 :<u>Learning Outcomes :</u>

Chapitre	Title	Duration	Learning Outcomes
Chapter 1	**Soil reinforcement techniques**	4hrs30	Reinforcement soil concepts Reinforcement techniques of backfill soil In-situ soil reinforcement techniques Design methods
Chapter 2	**Design of structures usingsteel stip reinforcement**	15hrs	Description of the technique Performance of the structure Soil-inclusion friction Design of structures: retaining walls / bridge abutments Durability of the structure
Chapter 3	**Design of geosynthetic reinforced structures**	10hrs30	Mechanically Stabilized Earth Wall Reinforced Soil Slopes

1. METHODOLOGY :

The course sessions consist of a power point presentation of the chapter and its objective and detail the notions relating to the behaviour and design of the structure studied. The course is clarified by applications treated separately in the tutorial sessions. As far as the self-study activities are concerned, the students are encouraged to design an Excel sheet that allows them to better master the internal and external sizing of a reinforced soil wall.

Integrated courses (h)	30hrs
Practical work (h)	
Project (h)	
Visits (h)	

2. Assessment :

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1	1/3
Presentation		
Final Exam	2&3	2/3

3. Bibliographic references :

1) F. Schlosser et P. Unterreiner : Renforcement des sols par inclusions, C 245 : Technique de l'ingénieur, traité Construction.
2) LCPC-SETRA : Les ouvrages en terre armée, recommandations et règles de l'art, 1979
3) NF P 94 220: Renforcement des sols - Ouvrages en sols rapportés renforcés par armatures ou nappes peusouples- dimensionnement, 1995.
4) FHWA-NHI-00-043 : Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines, National Highway Institute Office of Bridge Technology, 2001

	MODULE DESCRIPTION	**Department: civil engineering**
		Date: 19/10/2021
		Version N°: 02
		Semester: 01

Steel Construction Design Office

Code : MGCV31.51

Specialty module	Basic module	Engineering Sciences and Techniques	Preparation for the profession's practice
x			

Teacher :Sabra BOUGOFFA

Status : Permanent

e-Mail :sabrabougouffa@yahoo.fr

Courses	Practical work	Personal work	Total volume
15 h	30	45 h	90 h

Coefficient	ECTS credits
2	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department: civil engineering** **Date: 19/10/2021** **Version N°: 02** **Semester: 01**

1. COURSE DESCRIPTION AND TARGET SKILLS

1.1 Description :This module is set up to allow the student engineer applying his knowledge in structural design and steel construction. The module admits an applicative character which is based on the complete study (from the conception to the execution plans) of a real project having data coming from the company.

1.2 Objectives :The student learns how to apply his knowledge in a real project and the spirit of working in a group, discussing and exchanging information and knowledge. In this module it is aimed to form a student able to design an industrial building, so to know how to evaluate the loads applied on each element to be able to design the constructive elements. It is targeted to put the student in front of instability phenomena such as flexural, lateral, and local or global buckling. The student must know the verification methods. At the same time, the student should mix tools and software with manual calculation to verify his estimates calculations and have the spirit to model numerically his problems.

1.3 Prerequisites:

1. Having knowledge in calculation of steel constructions
2. Haveing knowledge of tools and software in civil engineering

Input modules	Current Module	Output modules
MGCV22.41; MGCV21.28	MGCV31.50	

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
1	**Generalities**	3h	General information on steel construction Design of an industrial building as a common example of a steel construction project
2	**Determination of wind loads**	6h	Calculate the wind loads on a steel structure
3	**Review of the basis of structural elements calculation**	6h	Having the calculation basics of structural steel elements; roofing elements, columns, trusses, purlins, column bases, connections.

Practical work

PW	Title	Duration	Learning outcomes
3	**Design of the roof elements: purlins, battens, and compression elements**	5h	Design of the roof elements and checking against lateral and flexural buckling
4	**design of the truss bars**	5h	Design of the truss elements and checking against compression or traction
5	**Column design**	4h	Design of elements subjected to compression and checking against lateral and flexural buckling.
6	**Study of the bracing elements**	3h	design of the elements subjected to bending and verification of the deflection.
7	**Connection Calculation**	5h	Calculation of the welded connection at the nodes of the truss elements.
8	**Elementary and global modelling within ROBOT software**	5h	Modelling of the different structural elements separately and then global modelling of theconstruction.
9	**Preparation of execution plans**	3h	Get the execution plans out. Know how to read and criticize them.

2. METHODOLOGY

This is a ppt presentation containing the essentials of the course with a presentation of the application project. This presentation contains videos explaining the steps of the construction of a steel frame building in order to show to the student the load bearing elements of such a structure. The students are grouped by two or three members to have a specific project given to them. Each group solves the problem of design and modelling by following the steps. The teacher supervises the groups, giving instructions for completing each step.

Integrated courses (h)	15
Practicalwork (h)	30
Project (h)	
Visits (h)	

3. Assessment

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment		
Presentation	All	100%
Final Exam		

1. Bibliographic references:

2. MOREL JEAN ; Conception Et Calcul Des Structures Métalliques ; Les Editions EYROLLES (troisième édition) 1995.
3. MOREL JEAN ; Structures Métalliques ; Les Editions EYRLLOS (2ème tirage) 1997.
4. MOREL JEAN ; Calcul Des Structures Métalliques Selon L'EUROCODE3 ; (troisième tirage) ; Editions EYROLLES 1997.
5. GCTT : Le Groupe De Coordination Des Textes Techniques ; Règles Définissant Les Effets De La Neige Et Du Vent Sur Les Constructions (NV 65 et N 84 modifiées 95) ; Les Editions EYROLLES (Douzième édition) Paris 1976.
6. Robot Structural Analysis.
7. Microsoft Excel.

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :01

DYNAMIC AND SEISMIC ANALYSIS OF STRUCTURES

Code : MGCV31.52

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher : Mr FahmiBEN JEMAA

Status : temporary

e-Mail :fahmi.benjemaa@enis.tn

Courses	Practicalworks	Individualwork	Total volume
45 h		45 h	90 h

Coefficient:	ECTS credits :
3	3

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :01

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 Description :This course « Dynamic and seismicanalysis of structures » is organizedinto three parts : (I) Single-Degree-of-Freedom Systems (SDF) ; (II) Multi-Degree-of-Freedom Systems (MDF) ; and (III) Introduction to Earthquake response. Part I includes4 chapters.In the opening chapter, the structural dynamics problemis formulatedfor simple elastic structures which can beidealizedas Single-Degree-of-Freedom systems (SDF)andthe differential equation of motionisobtained. Wethen studythe dynamic responseof linearly elastic systems in free vibration (chapter 2), to harmonicand periodic excitations (chapter 3) andtostepand pulse excitations (chapter 4). The chapter 4 exposes alsonumerical methods in order to obtainthe dynamic response toarbitrary excitations. Part IIincludes 3 chapters (5 à 7) on the dynamic analysisofmulti-degree-of-freedom (MDF) systems. In the opening chapterof part II (chapter 5), the structural dynamics problemis formulated for structures idealized as systems with finite number of degrees of freedom (FEM) in order to obtain the differential equation of motion.This is illustratedby the dynamic analysisof discrete systems composedof beams.The chapter6is concerned with free vibration of MDF systems with calculation ofnatural vibration frequencies and modes of the structure.The chapter7focuses on the dynamics of linear systems usingthe classical modal analysis procedure. Part III of this course includes 3 chapters (8 à 10).The chapter8 presentsgeneral notions about earthquake and their manifestations.The chapter9deals withthe caseofthe simple oscillator subjected to an earthquake,whichallows introducingthe conceptof response spectrum. Indeed,it arouses the intuition of the behaviour of structures under the action of earthquake.The last chapter (10) is devoted to the study of seismic response of MDF linear structures usingthe classical methodof modal decomposition. Seismic analysis methods are applied to multi-storey buildings modeled as lumped-mass system (shear building).The caseof asymmetrical buildingsis studied. A particular interest is given to the type and the importance of the modesof vibrationand the problems involved in calculating them for 3D modelled buildings.

Objectives :This course of structural dynamics constitutes an essential basic knowledge for the engineer in civil engineering. Indeed, it aims at acquiring a sufficient mastery of the analytical and numerical methods for the calculation of the dynamic response of structures in order to dimension civil engineering structures under dynamic loading. In addition, this course has an evident application to Earthquake Engineering. Particular interest is given to the study of the response of civil engineering structures to seismic excitation. The objective of this study is to introduce the methods of seismic analysis of linear structures which can be used as a basis for earthquake resistant building.

1.2 Prerequisites :

Structural mechanics andAnalysis of structures by FEM.

Uplstream modules	Taught module	Downstream modules
MGCV21.25 ; MGCV22.37	MGCV31.51	

1.3 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
PART I : Single-Degree-of-Freedom (SDF)			
Chapter 1	**Single-Degree-of-Freedom (SDF) Systems** **Formulation of Differential Equation of Motion**	6h	Introduction of the course. Characteristics of the Single-Degree-of-Freedom system (SDF). Formulation of the differential equation of motion. Influence of gravity forces. Influence of support excitation. Systems with distributed mass but localized stiffness (rigid-body assemblages). Systems with localized mass but distributed stiffness. Systems with distributed stiffness and distributed mass idealized by SDF. Tutorials and homework.
Chapter 2	**Free Vibration of SDF Systems**	3h	Solving the differential equation of motion : undamped free vibrations and viscously free vibrations. Decayof motionfor underdamped systems. Tutorials and homework.
Chapter 3	**Response to Harmonic and Periodic Excitations**	6h	Response to harmonic excitation : Solving the differential equation of motion : harmonic vibration of undamped systems and harmonic vibration with viscous damping. Dynamic response factor. Resonant frequencies and resonant responses. Response to vibration generator (unbalance in machines). Force transmission and vibration isolation. Response to ground motion and vibration isolation. Measurement of damping : half-power bandwidth. Vibration-measuring instruments.

			Tutorials and homework. <u>Response to periodic excitation</u> : Fourier series representation. Responseto periodic force. Exponential formof the response. Tutorials and homework.
Chapter4	**Response to Arbitrary, Step, and Pulse Excitations**	6h	Response to unit impulse. Response to arbitrary force(Duhamel's integral). Response to pulse excitations. Concept of shock spectrum. Numerical evaluation of dynamic response. Tutorials and homework.
PART II : Multi-Degree-of-Freedom (MDF)			
Chapter5	**Dynamic Analysis of Mult-Degree-of-Freedom (MDF) discrete systems**	6h	Notion of degree of freedom. Differential equation of motion for MDF systems. MDF Systems with distributed mass but localized stiffness (rigid-body assemblages). MDF Systems with localized mass but distributed stiffness. Discrete systems modeled with finit element method (FEM). Application to beam structures. Static condensation. Tutorials and homework.
Chapter6	**Free vibration of MDF systems**	3h	Natural vibration frequencies and modes. Orthogonality of modes. Normalization of modes. Computation of vibration properties (example with Robot). Tutorials and homework.
Chapter7	**Dynamic analysis and response of linear systems**	3h	Coordonnées principales. Decoupled modal equations for undamped systems. Decoupled modalequations for damped systems. Combination of the contributions of modes to obtain the total response (modal superposition). Tutorials and homework.
PART III : Introduction to Earthquake response			
Chapter8	**General notions about earthquakes and typical seismic damage**	3h	Origin of earthquakes and seismic waves. Intensity of an earthquake. Earthquake magnitude. Behaviour of soils under the effect of earthquakes.

			Typical seismic damage (illustrated by photos and videos. Tutorials and homework.
Chapter9	**Seismic response of the simple oscillator (SDF systems)**	3h	Equation of motion. Response history. Response spectrum concept(deformation, pseudo-velocityand pseudo-acceleration spectrum). Response spectrum characteristics. Elastic design spectrum(Eurocode 8). Tutorials and homework.
Chapter 10	**Seismic Response of MDF Structures**	6h	<u>Response history analysis using modal analysis</u> : Equations of motion, modal equations, modal responses, total response by combining the response contributions of all the modes. <u>Response spectrum analysis</u> : Peak modal responses and modal combination rule (SRSS and CQC method). Advantages and disadvantages. Multistory buildings modeled as lumped-mass system (shear building). Multistory building with symmetric plan andmultistory building with asymmetric plan. Tutorials and homework.

2. METHODOLOGY

The teaching sessions consist of a PowerPoint slide show to explain the objective and concepts of each chapter. Good questions are asked to the students to test their degree of assimilation of each concept and to correct their mistakes if necessary. In addition, the course is clarified by small applications to check their understanding. Tutorial sessions are organized to allow the student to deepen and apply the knowledge acquired during the theoretical courses. The problems to be solved during these sessions must be prepared by the students in advance at home. For self-study activities, students should consult the course handout provided by the teacher for more details on the developments presented in the course sessions. They should also complete the exercises given as homework.

Integrated courses (h)	45h
Practicalwork (h)	
Project (h)	
Visits (h)	

3. Evaluation

Designation	Chapter(s)	Rating
Mini-project		
Practical works		1/4
Continuous assessment	1 & 2	1/4
Presentation		
Final Review	All	2/4

4. References

1) Anil K. CHOPRA : DYNAMICS OF STRUCTURES
   Theory and applications to earthquake engineering.
2) J.L. HUMAR : DYNAMICS OF STRUCTURES.
3) Ian SMITH, Pierino LESTUZZI : Dynamique des structures
   Bases et applications pour le genie civil.
4) Pierino LESTUZZI : Génie civil - Analyse et dimensionnement sismiques
   Comportement sismique, dimensionnement en capacité, construction parasismique.
5) Alain PECKER : DYNAMIQUE DES STRUCTURES
   Ecole des ponts et chausses.
6) VictorDAVIDOVICI, Dominique CORVEZ and all : Pratique du calcul sismique
   Guide d'application de l'Eurocode 8.
7) ClaudeSAINTJEAN : Introduction aux règles de construction parasismique
   Applications courantes de l'EC 8 à la conception des bâtiments.

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :01

Pre stressed concrete

Code : MGCV31.53

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
×			

Teacher : Mallek Jallouli Jihen

Status :permanent

e-Mail : Mallek.jihen@gmail.com

Courses	Practicalworks	Individualwork	Total volume
30	**0**	**30**	**60**

Coefficient:	ECTS credits :
2	2

	MODULE DESCRIPTION	Department : Civil Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :01

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

This module provides an overview of the principle of prestressed concrete and the modes of prestressing. Then, it helps to estimate the post-tensioned concrete loss. Finally, it is able to design isostatic structures in prestressed concrete.

1.2 : objectives

The student must be able to:

- know the various modes of pretensioning

- know how to evaluate the instant and differed losses of prestressed concrete

- design prestressed concrete statically determinate structures

1.3 Prerequisites :

- Structural mechanics

Uplstream modules	Taught module	Downstream modules
MGCV21.25	MGCV31.53	

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Introduction to prestressed concrete	4.5 hrs	Bonding; tie; pre-tensioning and post-tensioning; prestressing inside and outside concrete; classes of prestressing
Chapter 2	materials proprieties	4.5 hrs	Mechanical strengths; instantaneous deformations; delayed deformations; yield strength; Young's modulus; stress-strain diagram; relaxation; sheathing; anchorage devices; grouting; jacks

Chapter 3	Actions - combinations of actions - stresses	6 hrs	Concept of safety; boundary conditions; Action combinations
Chapter 4	Evaluation of post-tensioned concrete losses	7.5 hrs	Friction loss; Anchorage re-entry loss; Concrete shortening loss; Concrete shrinkage loss; Concrete flow loss; Reinforcing bars relaxation loss;
Chapter 5	Design of prestressed concrete of statically determinatestructures	7.5 hrs	Internal strength principle; geometrical performance of a section; central core of a section; boundary spindle; through spindle; design of a simple beam.

2. METHODOLOGY

The contact times provide a power point to present the chapter and its objectives, remind and detail the formulation and the practice of solving the problems. The course is clarified by small applications. Problem solving is dealt with separately in the tutorial sessions or the student is obliged to prepare them in advance. For self-study activities, students have to do the exercises given as homework.

Integrated courses (h)	30
Practicalwork (h)	0
Project (h)	0
Visits (h)	0

3. Assessment

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1, 2, 3, 4 & 5	1/3
Presentation		
Final Review	All	2/3

4. References

1. Henry THONIER, Prestressed concrete in the limit states

	MODULEDESCRIPTION	**Department :Civil Engineering**
		Date : 12/10/2021
		N° version : 02
		Semester :02

SILOS AND CONTAINERS

Code : MGCV31.54

Specialty modules	**Main module**	**Engineering Sciences and Techniques**	**Preparation for the profession**
x			

Teacher :Slim GHARIENI

Status : Temporary

e-Mail :: slim.gharieni@gmail.com

Courses	**Practical works**	**Individual work**	**Total volume**
30 hrs		**30 hrs**	**60 hrs**

Coefficient:	**ECTS credits :**
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department :Civil Engineering**
		Date : 12/10/2021
		N° version : 02
		Semester :02

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

The main objective of the Silos and Tanks course is to train in the design, calculation and construction of silos and tanks. The course proposes a method of analysis of the project allowing the design of a work around key principles: insertion, durability, robustness, and approaches the problems of structural analyses requiring the control of the resistance of materials and the theory of plates and shells.

This course teaches the structural study of the different elements constituting silos and tanks, having different shapes (rectangular and circular), through several methods.

We start with the study of a rectangular tank (pool) placed on the ground through the theory of plates.

Then the study of the walls of a circular tank placed on the ground by releasing the internal forces through the methods of Lebelle and Hangan-Soare, then the study of the dome with the methods of membranes (Method of Timoshenko for a shell loaded symmetrically) and finally the study of the raft considering it as a semi-infinite beam on an elastic support.

In the second part we study the walls and bunkers of a silo (cylindrical, regular polygonal and rectangular) supported by columns through the Reimbert method.

In the third part of this course we learn how to model the different elements of a structure (silo or tank), separately and respecting the boundary conditions, with bar elements through the RSA software and by comparing the results of the modelling with the analytical methods already encountered.

We finish with a shell type (3D) finite element modelling of the whole structure.

1.2 Objectives

To put the students in the situation of designing a storage structure. They will first learn the analytical methods for determining the design loads of each element from an Excel sheet. Then a quick modelling of the structure with bar elements respecting the boundary conditions and finally the 3D modelling of the whole structure.

1.3: Prerequisites :

- Theory of plates and shells

- Soil mechanics

Upstram Modules	Taught Module	Downstream Modules
- MGCV22.38 - MGCV22.44	MGCV31.54	

1.4Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
1	General information on silos and tanks	3hrs	Know the classifications and technical requirements in the construction of silos and tanks
2	Reservoirs	7hrs	Mastery of the different analytical methods of calculation of tanks and silos from the fundamental relations of the theory of beams.
3	Containers	6hrs	
4	Reinforced concrete provisions	7hrs	To master the constructive provisions of the different elements (Wall, Radius, Hopper and Dome)
5	Automatic calculation- Modelling of silos and ground tanks	7hrs	Model a structure (silos or tank) using two different models (2D bar model and 3D shell model), interpret the results (forces and displacements) and calculate the necessary reinforcement

2.METHODOLOGY

The course consists of at least 10 sessions (5 sessions of 4 hours of class, 4 sessions of 4 hours of project study and one session of defence). Each group of 2 or 3 students studies a specific project.

The course is divided into academic and practical classes on the study of silos and tanks, supplemented by project study sessions.

The process is similar to the study process in professional life. The collaborative approach to the work is encouraged by the formation of groups and by the project monitoring sessions where the problems encountered are shared.

In this phase students are encouraged to do literature research and to put into practice general design courses they may have already had.

The second phase of studies is the most energy-intensive and time-consuming phase in order to develop a detailed analysis of the structure proving its feasibility and stability. This phase is on the one hand very calculating but also very pragmatic as it involves graphically representing the object of the calculations with its technical constraints. The students can make manual calculations or use some dedicated programs.

Integrated courses (h)	30
Practical work (h)	
Project (h)	
Visits (h)	

3.Assessment:

Designation	Chapter(s)	Rating
Mini-project		
Practical works		
Continuous assessment	1&2	1/3
Presentation		
Final Exam	All	2/3

4. Bibliographic references :

- Traité de béton armé Réservoirs, châteaux d'eau, piscine – A.GUERRIN

- Règles Professionnelles de Conception et de Calcul des Silos en Béton Armé et Béton Précontraint, I.T.B.D.P, 1986

-LEBÈGUE (Y.) et BOUDAKIAN (A.). – Bases des règles « Silos » du SNBATI -Essais surles produits et principes des formules « Silos ». Ann. ITBTP, août sept. 1989.

-Technique de l'ingénieur - Béton armé : Règles BAEL - Ouvrages particuliers

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 1

Safety and fire resistance of reinforced concrete constructions

Code : MGCV31.54

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
			x

Teacher : HAJD TAIEB Jamel

Status : Temporary

Mail : jamelhadjtaieb@gmail.com

Courses	Practical works	Individual work	Total volume
30 hrs		30 hrs	60 hrs

Coefficient:	ECTS credits :
2	2

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 1

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

This course presents a general description of the problems of protection of buildings against fire. It is a fire calculation of the elements of the supporting structure of a reinforced concrete building.

Objectives

The objective of this course is to understand the purpose of the regulations and the different terminologies of fire safety, the human behaviour towards fire as well as the behaviour of steel and concrete in the presence of fire, in order to know how to verify the fire resistance of a reinforced concrete structure during a well defined period.

1.2: Prerequisites :

Reinforced concrete 2 and C.C.S.B.A.

Upstream Modules	Taught Module	Downstream Modules
MGCV22.40 , MGCV22.43	MGCV31.53	

1.1 : <u>Learning Outcomes :</u>

Chapter	Title	Duration	Learning outcomes
Chapter 1	**General information on fire safety**	6 hrs	Fire safety terminology ; - Active Protection ; - Passive Protection ; - Reaction to fire ; - Resistance to fire ; - Mechanical stability ; - Flame-tightness; - Thermal insulation; - Fire Stable (FS) ; - Flame-retardant (PF); - Fire stop (CF); Classification of materials : - Combustibility ; - Flammability Regulatory examples : - Load-bearing walls ; - Solid slab ;

			- Stairs; Human behaviour : Fire behaviour of concrete and steel: - Behaviour of concrete towards fire: - Behaviour of steel in fire :
Chapitre 2	**Fire design of reinforced concrete structures** **A - Column**	8 hrs	Conventional curve law : Useful distance : Evolution of the mechanical characteristics of materials as a function of temperature: - Steel : - Concrete : Stability check: - Stress-strain diagrams for steel at temperature θ : - Stress-strain diagrams for concrete at temperature θ : Fire verification of columns for standard construction: - Determination of the average temperature of concrete θmb : - Determination of the average temperature of steel θms : Normal resisting force :
	B - Beam:	8 hrs	Fire check of a beam : - Temperature distribution in the beam : - Ultimate hot resistance moment in span : - Ultimate hot resistance moment in span: : - Ultimate hot resistance moment at support: * Reduced width of concrete Ultimate hot resistance moment at support: * Reduced width of concrete: * Ultimate resistance moment at support - Fire check of the beam :

			Consideration of bursting phenomenon:
	C - Solid slabs	8 hrs	Hot resisting moment in span : Moment on hot support : Checks : Some simple rules for checking the stability of a slab: - Useful distance - Minimum slab height :

2. METHODOLOGY

The contact hours consist of presenting the different rules of the DTU FEU, in order to verify the fire stability of a reinforced concrete building structure. The practical applications are treated separately in the tutorials. The students have to do the exercises given as homework.

Integrated courses (h)	30hrs
Practical work (h)	
Project (h)	
Visits (h)	

3. Assessment :

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	Chapter I	1/3
Presentation		
Final Exam	Chapter I , Chapter II	2/3

4. Bibliographic References :

- DTU BAEL 91, Règles techniques de conception et de calcul des ouvrages et constructions en béton armé suivant la méthode des états limites révisées 99;
- DTU FEU, Règles techniques de calcul de la stabilité au feu des ouvrages et constructions en béton armé.

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semeter : 1**

Reinforced concrete design office

Code : MGCV31.55

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teachers :BOULILA Ali, HAJDTAIEB Jamel

Status : Temporary

Mail :ali.boulila21@gmail.com / jamelhadjtaieb@yahoo.fr

Courses	Practicalworks	Individualwork	Total volume
15 heures	30 heures	45 heures	90 heures

Coefficient:	ECTS credits :
2	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semeter : 1**

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1: Description

The reinforced concrete design course represents an application on a real case of the knowledge acquired during the training of the engineering student.

It allows the student to use his knowledge on material properties, structural and reinforced concrete calculation and construction techniques to design and calculate (manually and with CAD software) a building and at the end to draw up the execution plans related to the results obtained.

1.2 Objectives

The student should be able to design, calculate and draw up the plans of a load-bearing structure of a reinforced concrete construction in accordance with the specifications and the rules and standards of dimensioning.

1.3: Prerequisites :

structural mechanics, soil mechanics1 and 2, reinforced concrete 1 and 2, C.C.S.B.A and general construction processes.

Upstream Modules	Taught Module	Downstream Modules
MGCV 21.25- MGCV22.44- MGCV21.27- MGCV22.40- MGCV22.43- MGCV22.45	MGCV31.54	MGCV31.60

1.1 :Learning Outcomes :

Chapter	Title	Duration	Learning Outcomes
Chapter 1	Reading and analysis of architectural plans	3hrs	- Determination of the various architectural constraints - Adaptation to the ground and the environment - Regulations (presence of expansion joints, break joints, differences in levels, slopes, etc.)
Chapitre 2	Choice of the support system and design of the model (the support structure)	12hrs	- Adaptation of the chosen system to the proposed project Manual design (on paper)
Chapter 3	Creation of the digital model using a CAD tool	6hrs	- Introduction of the model - Calculation assumptions and introduction of loads
Chapter4	Reinforced concrete calculation of	9hrs	- Pre-dimensioning and load

	some structural elements		descent calculation Manual calculation of some structural elements: footings, columns, beams, slabs, stairs, walls, rafters...
Chapter5	Formwork drawings and reinforcement details	9hrs	- Foundation plans - Formwork drawings Reinforcement details
Chapter6	Preparation of the report (a debriefing)	6hrs	Presentation of the project - Regulatory and calculation assumptions - Design approach - Calculation results Conclusion

2. METHODOLOGY

The contact hours consist of :

- Presenting in power point the stages of design, reminding the students of the pre-dimensioning formulas, the calculation methods of reinforced concrete elements and the use of CAD software.
- Assisting students in understanding architectural plans, the design of the load-bearing structure and reinforced concrete calculations.

Integrated courses (h)	15hrs
Practicalwork (h)	
Project (h)	30hrs
Visits (h)	

1. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		1/2
Practical works		
Continuous assessment		
Presentation		1/2
Final Exam		

4. Bibliographicreferences :

DTU BAEL 91, Règles techniques de conception et de calcul des ouvrages et constructions en béton armé suivant la méthode des états limites révisées 99;

- Maitrise du BAEL 91 et des DTU associés – Jean PERCHAT & Jean ROUX , Edition Eyrolles 2000
- Pratique du BAEL 91 cours avec exercices corrigés – Jean PERCHAT & Jean ROUX Edition Eyrolles 1997
- Fascicule n° 62 titre V : Règles techniques de conception et de calcul des fondations des ouvrages de génie civil
- Traité du béton armé - Jean PERCHAT des règles BAEL à l'Eurocode 2, Le moniteur 2010

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department : Civil Engineering**
		Date : 20/10/2021
		N° version : 02
		Semester : 02

ORGANISATION AND MANAGEMENT OF CONSTRUCTION PROJECTS

Code : MGCV31.56

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher :Mr Mahmoud KETATA

Status : Temporary

Mail :ketata.mahmoud@gmail.com

Courses	Practical works	Individual work	Total volume
45 h		45 h	90 h

Coefficient:	ECTS credits :
3	3

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULEDESCRIPTION**	**Department : Civil Engineering**
		Date : 20/10/2021
		N° version : 02
		Semester : 02

1.COURSE DESCRIPTION AND COMPETENCES :

1.1 Description: This course teaches : (1) the various definitions of the project, the organization and the participants; (2) the installation of the building site and how to organize a company; (3) how to make a sub-detail of the prices of the works and to establish an estimate; (4) the documents necessary to the course of a construction project; (5) the planning of the works and the resources; (6) the quantity survey and the calculation of the quantities of the works.

1.2 Objectives : The students learn the organisation of the construction project and the process of development and management of construction products. The construction operation set-up, project owner and investor, the strategy of a project owner. Economic content of the architectural project and project management. Cost price of the building site and sub-details of the prices. Construction equipment, planning and management of works; main management indicators.

1.3 Prerequisites: Architecture and Urban Planning, General Construction Processes

Upstream Modules	Taught Module	Downstream Modules
MGCV21.32 ; MGCV22.45 ;	MGCV31.55	

1.4 : Learning Outcomes

Chapter	Tilte	Duration	Learning Outcomes
Chapter 1	**ORGANISATION OF CONSTRUCTION PROJECTS**	3hrs	1.INTRODUCTKION 2.DESIGN OF A CONSTRUCTION OPERATION AND INTERNAL ORGANISATION OF THE COMPANY 3.CONSTRUCTION PROGRESS SCHEDULE 4.SITE INSTALLATION 5.STUDY OF THE SITE LAYOUT PLAN 6.IMPORTANCE OF SITE FACILITIES 7.SITE FACILITIES DIAGRAM 8.EQUIPMENT AND CONSTRUCTION METHODS 9.CONSTRUCTION PROCESS 10.CLASSIFICATION OF CONSTRUCTION PROJECTS 11.PHASES OF PROJECT DEVELOPMENT 12.ASSISTANCE AND CONSTRUCTION MANAGEMENT 13.SITE PREPARATION CONTROL OF WORKS
Chapter 2	**A CONSTRUCTION SITE IN AN URBAN AREA AND ITS PREPARATION IN THE COMPANY**	3hrs	1.INTRODUCTION (MARKET DOCUMENTS 2.PREPARATION, EXECUTION STUDY AND SITE PLANNING 3.ORGANISATION OF THE COMPANY PREPARATION FUNCTIONS 4.DEFINITION OF THE PROJECT BEFORE EXECUTION 5.COHERENCE BETWEEN PROJECT AND PRICE 6.DETAILED PROJECT CHOICES 7.MEANS OF EXECUTION 8.WORKSTATIONS 9.INSTALLATIONS 10.PHASES OF A PROJECT 11. KEY PLAYERS IN THE CONSTRUCTION PROCESS 12.SOME DEFINITIONS OF CONTRACT TYPES PREPARATORY STUDY FOR THE OPENING OF A BUILDING SITE
Chapter 3	**THE SUBDIVISION OF THE PRICES**	9hrs	1.A library of prices 2.Cost of materials 3.Cost of materials 4.Cost of labour Overheads and profit
Chapter4	**PLANNING PRACTICE AND GENERAL METHODS OF RESOLUTION**	12hrs	1.INTRODUCTION 2.OBJECTIVES 3.DEFINITION 4.DOCUMENTS NEEDED FOR PLANNING 5.MODE OF PRESENTATION OF THE SCHEDULE 6.GANTT PLANNING 7.REPRESENTATION OF THE PERT GRAPH 8.EXAMPLE OF RAILWAY PLANNING 9.DETERMINATION OF TASKS 10.DETERMINATION OF THE QUANTITY OF A TASK 11. DETERMINATION OF THE DURATION OF A TASK SEQUENCE OF TASKS
Chapter5	MANPOWER RECRUITMENT PLANNING	3hrs	1.I HOURLY LABOUR COST ESTIMATE 2.USEFULNESS OF THE HOURLY ESTIMATE 3.LABOUR COSTS

			DETERMINATION OF MANPOWER AND ITS DISTRIBUTION
Chapter 6	MATERIAL SUPPLY SCHEDULE	3hrs	1.MATERIAL QUANTITY SURVEY 2.USEFULNESS OF THE BILL OF QUANTITIES SUPPLY SCHEDULE
Chapter 7	METERING	12hrs	A- PRE-METER AND METER - INTRODUCTION - DEFINITION - QUANTITY SURVEYING - WHO NEEDS TO KNOW ABOUT IT? - QUANTITY SURVEYING - DIFFERENT BUILDING TRADES - GEOMETRY PRESENTATION - CALCULATION TECHNIQUE B- REMINDER OF THE SYSTEMS OF UNITS AND FORMULAS OF LINEAR ELEMENTS - THE INTERNATIONAL SYSTEM OF UNITS - PERIMETERS AND DEVELOPED LENGTHS - SLOPES AND FRUITS C- REMINDER OF THE FORMULAS OF THE ELEMENTS OF SIMPLE AND COMPOUND AREAS - SIMPLE AREAS - COMPOUND AREAS D- REMINDER OF THE FORMULAS OF SIMPLE AND COMPOUND VOLUMES - SIMPLE VOLUMES COMPOUND VOLUMES

1. METHODOLOGY

The contact hours consist of a power point presentation of the chapter and its objective, the state of the art and the recommendations for complying with administrative and technical requirements. The course is completed by a large number of application exercises and examples. The solution of the exercises is dealt with in the tutorial sessions, where the student is often asked to do tests in advance. For self-study activities, students are required to research short but relevant videos on site installations; planning methods and prepare presentations; digital sessions are provided for price sub-detailing; quantity surveying exercises and planning on MS PROJECT.

Integrated courses (h)	45h
Practical work (h)	
Project (h)	
Visits (h)	

3.Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment	1 to4	1/3
Presentation		
Final Exam	All	2/3

4. Bibliographic references

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering** **Date : 11/10/2021** **N° version : 02** **Semester : 01**

DESIGN OFFICE FOR SPECIAL FOUNDATIONS

Code : MGCV31.57

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher :M. Adnen GUERMAZI

Status :Temporary

Mail :adnenguermazi@gmail.com

Courses	Practical works	Individual work	Total volume
15 hrs	**15 hrs**	**45 hrs**	**75 hrs**

Coefficient:	ECTS credits :
1,5	2,5

Université Privée Du Sud POLYTECHNIQUE DES SCIENCES AVANCÉES SFAX - TUNISIE	**MODULE DESCRIPTION**	**Department : Civil Engineering**
		Date : 11/10/2021
		N° version : 02
		Semester : 01

1.DESCRIPTION OF THE COURSE AND SKILLS TO BE ACQUIRED :

1.1Description:

In the first part of this module, the methods of execution of piles and their effects on the state of stresses in the soil are presented. Secondly, the analysis and design of a single pile subjected to the action of a vertical force at the head is considered. Subsequently, the behaviour and design of a single pile subjected to a horizontal force and/or moment at the head is analysed. Finally, the effect of a pile group is studied. The second part of this module applies this knowledge to a practical example.

1.2 Objectives :

The first part of this module is dedicated to give a complementary course on deep foundations. In the second part, students learn how to design pile foundations through a practical example.

1.3 Prerequisites:

Soil Mechanics 2 / Reinforced Concrete 2 / Design and calculation of RC structures

Upstream Modules	Taught Module	Downstream Modules
MGCV22.44 ; MGCV22.40 ; MGCV22.43	MGCV22.37	

1.4 :Learning Outcomes

Chapters	Title	Duration	Learning Outcomes
Part I	Theoritical aspects : Deep foundations	15 hrs	Classification and types of piles Installation effects of piles Single pile subjected to axial load: Pile capacity load / negative skin friction Single pile subjected to a horizontal force : calculation with soil subgrade reaction modulus Group of piles: distribution of forces between the piles / settlement
Part II	**Practical application:** **Design of bridge foundations**	60 hrs	Development of an Excel sheet for design purpise Draw formwork and reinforcement plan

2.METHODOLOGY :

The course sessions consist of a power point presentation of the practical and the fundamentals theoretical aspects,and the current regulations. In the practical sessions, the students are led to carry out the design of the foundations of a bridgesupports. They are assisted to develop an Excell sheet to deal with their application example. In the self-study activities, students have to write the calculation notes and draw the reinforcement plans.

Integrated courses (h)	15hrs
Practical work (h)	15hrs
Project (h)	
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project	Report	
Practical works		
Continuous assessment		
Presentation		
Final Exam		

4. Bibliographic references :

1) Règles techniques de conception et de calcul des fondations des ouvrages de génie civil, Fascicule N° 62 Titre V, Textes Officiels N° 93-3 182 p., 1993
2) R. Frank : Fondations profondes, technique de l'ingénieur, traité construction, 1990
3) J. Perchat et J. Roux : Maitrise du BAEL 91 et DTU associés, Edition Eyrolles, 1999

	Module Description	**Department :Civil Engineering**
		Date : 13/10/2021
		Version N°: 02
		Semester :01

Design Officeof Bridges

Code : MGCV31.58

Specialty modules	Main module	Engineering Sciences and Techniques	Preparation for the profession
x			

Teacher :Sabra Bougoffa

Status : Permanant

E-mail :sabrabougouffa@yahoo.fr

Courses	Practicalworks	Individualwork	Total volume
15hrs	30 hrs	45 hrs	90hrs

Coefficient:	ECTS credits :
2	3

	MODULE DESCRIPTION	Department : Civill Engineering
		Date : 11/10/2021
		versionN° : 02
		Semester :01

1.DESCRIPTION OF THE COURSE AND COMPETENCES TO BE ACHIEVED :

1.1 :Description

This module is set up to allow the student engineer to apply his knowledge of structural design and engineering structures. The module has a practical character and is based on the complete study (from design to execution and reinforcement drawings) of a real project with data from the company.

1.2 Objectives :

The student learns both how to apply their knowledge in a real project and the spirit of working in a group, discussing and exchanging information and knowledge. In this module it is aimed to train a student to be able to design a bridge, to know how to evaluate the applied loads, both permanent and operational, according to the EN standard (LM1 system and others) in order to be able to dimension the constructive elements of which the most important is the deck. It is aimed to push the student towards the spirit of modelling real problems in simple mathematical models to be solved with structural calculation tools such as the use of the method of forces and lines of influence. This method is to be programmed on excel sheets to perform a stress calculation of a (1D) beam model of the bridge taking the data as input. In parallel, the aim is to mix tools and software with the theoretical hand calculation that allows to calibrate the 2D numerical model. The student will be able to deal with a real-life topic concerning the design, calculation and dimensioning of bridges at the end of this module.

1.3 Prerequities :

Have knowledge of design and calculation of engineering structures

Knowledge of the principles of structural mechanics
Knowledge of the use of reinforced concrete

Upstream modules	Taught module	Downstream modules
MGCV22, MGCV21.25 , MGCV21.27 , MGCV22.40	MGCV31.58	MGCV31.60

1.4 Learning outcomes:

Chapters	Title	Duration	Learning outcomes
Chapter 1	Reminder on bridges	5hrs	Design and regulation
Chapter 2	**Introduction to the project**	5hrs	Project data Plans (longitudinal and cross sections, plan layout) Geotechnical data
Chapter3	**Longitudinal and transverse design of the bridge and introduction to modelling**	5hrs	Longitudinal and transverse design of a symmetrical four-span slab bridge (selected on a highway) according to the requirements of the Setra standard. Then evaluation of the loads estimated to be applied on the bridge (permanent loads and LM1 loads) Introduction to 1D and 2D deck modeling and 3D for supports (stacks and abutments)

PW	Title	Duration	Learning outcomes
1	**1D modelling of the bridge**	12hrs	Assimilation of the structure to a one-dimensional model (1D model), "continuous beam". - Use of the force method to solve the hyperstatic system - Programming of an Excel sheet to determine the influence lines of the moving loads on the bridge. - Evaluation of the applied permanent and road loads. - Determination of the loads based on the action combinations. - Determination of the envelope curves - - Determination of the longitudinal reinforcement of the deck (top layer, bottom layer) and of the transverse steel (stirrups, frames).
2	**2D modelling of the bridge**	12h	Assimilation of the structure to a two-dimensional model (2D model), "Plate model" on the Robot Structural Analysis software. - Loading of the deck and definition of the action combinations - Exploitation of the results (stresses, deflection, etc.) - Interpretation and comparison of the two models studied Determination of the transverse reinforcement and the necessary checks.

3	**Modélisation 3D des appuis**	6h	Estimation of horizontal actions by a spring carriage model, plane stresses Study of the support devices Study and modelling of the abutment on ROBOT Study and modelling of the pier on ROBOT

2.METHODOLOGY :

It is a presentation in ppt containing the essence of the course with a presentation of the application project. Students group in two or three to have a specific project in data. Each group solves the dimensioning problem by determining a calculation in 1D producing programmable Excel sheets. Then it makes sense to help them model the problem in 2D using the ROBOT software. This will allow the students to compare the results of the two solicited models to validate their numerical models.A 3D modeling on the ROBT software is also performed to size the supports (piles and abutments).
Teacher coaches groups with instructions to complete each step.

Integrated course (h)	15hrs
Practicalwork (h)	
Project (h)	30hrs
Visits (h)	

3. Assessment:

Designation	**Chapter(s)**	**Rating**
Mini-project		
Practical works		
Continuous assessment		
Presentation	All	100%
Final Review		

4. Bibliographicreferences :

1. Esthétique et construction des ouvrages d'art : Demart J. (Ed. Dunod 1984)
2. Conception des ponts : Grattesta G. (Ed.Eyrolles 1985)
3. Les ouvrages d'art : Galabru P. (Ed. Eyrolles 1968)
4. Autodesk Robot Structural Analysis
5. Microsoft Excel

10. Regulations

Annex 9

Exams regulations

IPSAS EXAMS REGULATION BOOK

Preface

The purpose of this document is tointroducethe framework of regulatory provisions, the organization and validation of examinations within the Private Polytechnic Institute of Advanced Sciences of Sfax, here in after referred to as IPSAS. It applies to all IPSAS training courses. This document sets out the exam charter established in October 2018 and the general exam regulations.

1- PREPARATION AND ORGANIZATION OF EXAMINATIONS

1-1 Summons of student to pass exams:

Every student regularly registered with IPSAS and have paid his tuition fees is automatically registered for the exams.

The exam schedules are communicated to students by posting on the institution's notice boards and by email at least 07 days before the scheduled date to sit for the exams.

Every student whohave accumulated more than three absences in a module is subject to the non-authorization to sit for the exam relating to this module in the main- session exam.

Instead, he will be able to sit for the exam in the re- sit exam session. The lists of eliminations by module are displayed at least 7 days before the scheduled exam start dates.

1-2 Exam schedules:

The exam calendars including the date, time and place of each exam are brought to the attention of students by publishing on closed panels reserved for this purpose, at least 10 days before the outset of the exams and should no longer be modified, except in cases of force majeure duly noted.

The publishing of the written and oral exam calendars constitutes an individual invitation to the exams except for students eliminated for various reasons.

1-3 Special conditions for students with disabilities:

Students recognized as having temporary or permanent disabilities, who have previously obtained specific authorization from the competent service, benefit from special conditions within the framework of the examinations.

These conditions are as follows:

- The one third (1/3) of the overtime organized by the service in charge of examinations, in compliance with regulatory texts;

- It is urgently needed to get applicable, a special examination room and educational assistance (a person having been authorized by the administration to help him in composing andwriting in his place).

1-4 Exam subjects:

Each teacher has, alone and personally, the educational responsibility for the subject he delivers and its confidentiality until it is sent to the service responsible for the duplication. Indeed, he ensures the duplication in the strictest confidence with the printing service and ensures that a sufficient number of sealed envelopes are placed with the service in charge of examinations. Exceptionally, in case of impediment, he designates a replacement (necessarily a teacher) and gives his contact details in order to be reachable in case of emergency or need.

The subject must necessarily be proportional to the provided content and correspondent with the duration of the test.

The subject must recall the title and duration of the test and specify the scale of questions according to the test and the list of authorized documents or materials. In the absence of an intentional indication to the contrary, no document or material is authorized throughout the duration of the event.

The procedure for duplicating and submitting subjects to the service in charge of examinations is determined by each component according to its specialty, while respecting strict confidentiality.

The submission and printing of the subject must be made at least one week in advance, the date of the test or exam.

The teacher can propose an additional subject which will be adopted in the absence of confidentiality of the main subject as a substitute.

1-5 Materialpreparation for exams :

Administrative and / or personal services involved in the organization of exams:

- Prepare, in conjunction with teachers, the exam schedule.
- Convenestudents and supervisors .
- Plan and prepare the examination rooms and equipment necessary for the running of the tests.

- Receive the envelopes containing the examination papers and keep them in a safe and arrangethem to be sent to the site (s) of the test.
- Prepare the enrollment lists and examination inspection reports.
- Distribute the envelopes containing the tests on the day of the exam.
- Implement the logistical means necessary for the smooth running of the exams (according to the capacities and resources of the institution).
- Implement the necessary and adapted provisions for students with disabilities and inform supervisors of the special conditions from which these students would benefit from.
- Providestudentswith:
    - The number of perfectly legible copies of the subject.
    - Anonymous copies.
    - Easily identifiable draft papers (color, and stamp)
- Implement the means guaranteeing the anonymity of the copies to ascertain that it is anonymous.
- Ensure that material not used at the end of a test is recovered and returned to the service in charge of the exams.
- Keep the copies as well as the jury observations after the deliberations.

1-6 Anonymity of copies :

Anonymity of copies is mandatory regardless of the medium used. If necessary, the competent pedagogical secretariat is empowered to hand over anonymity when entering grades which will be validated by the responsible lecturer throughout a well-defined platform.

2- Examination process and realization :

2-1 Conditions of access for candidates to the examination room :

The student must be present in front of the examination room at least 15 minutes before the outset of the examination. First to remember, access to the examination room is prohibited before the arrival of supervising teachers.

It must be remembered, if a candidate presents himself after opening the envelopes containing the subject, the supervisor responsible for the examination room may, exceptionally (when the delay is due to a case of force majeure) subject to an entry authorization issued by the

examination center, authorize him to compose provided that the delay does not exceed 15 minutes after the outset of the test. In particular, no additional time will be given to this candidate, the indication of the delay and its reasons will be entered in the examination report.

2-2 Student's rights and duties regarding the exam :

The student must:

- Be present in front of the examination room at least a quarter of an hour before the outset of the test.
- Do not disturb the tranquil running of the exams, including in the immediate environment of the examination room.
- Respect all of the supervisor's instructions and commands and do not disturb the smooth running of the exam, in particular the change of seat and to stop writing instructionsby the end of the exam.
- Be provided with all the necessary documents for identification (the student card and the invitation to the exam are obligatory to bring with).
- Sign the entry and exit list.
- Sit in the seat reserved for him when a numbered assignment has been notified.
- Use the stamped exam papers and drafts made available by the administration.
- Each student is not allowed to possess any documents not expressly authorized for the test (course, manual, dictionary, etc.);
- Submit your copy at the time indicated for the end of the tests, even if it is a white copy, in which case do not forget to write your name.
- Be equipped with the school supplies authorized to sit for their exam and cannot exchange it between peers throughout the course of the exam.
- Not be in possession of any gadgets for storing and transmitting information such as electronic diary and mobile phone (even for clock use) which must be turned off and placed on the supervising teacher's table.
- Do not smoke in the examination room and it will under no circumstances be allowed to leave the examination room except in cases of absolute necessity.

2-3 Identification:

Another key to realize, to be admitted to the test, students must be in possession of their student cards and their invitation to the exams. In the hope that, they must be able to present an identity document with a photo (national identity card, passport, driving license).

When place numbers have been assigned, the student must first check his place number, by consulting the exhibited lists in the schooling data.

2-4 The instructions:

The student must under no circumstances be in possession of documents not expressly authorized for the examination.

Equally important, the student's personal belongings, including mobile phones and devices for storing and distributing information that must be turned off, must be left at the entrance to the examination room or at the place indicated by the supervisors.

2-5 Regulation of entry and exit to examination rooms:

Access to the examination rooms remains possible for any unpunctual student for a maximum of 30 minutes following the outset of the exams. After 30 minutes the late student will no longer have the right to enter the examination room and he would automatically be deprived to sit for the exam and maybe he would recapitulate it in the re-sit exam if not validated.

It is immediate that students make sure before entering the examination room that they take the necessary steps to remain in the examination room without leaving until after they have finished their composition work. Certainly, except for justified medical reasons or for urgent cases that student can leave the examination room to go to the toilet.

Equally important, no candidate may temporarily or definitively leave the examination room (even in the event that a white copy is handed over) before the elapse of 45 minutes from the outset of the examination.

Correspondingly, candidates who wish to temporarily leave the examination room will be allowed only for an emergency and those for one time only and must be accompanied, if

possible, by one of the supervisors. They must necessarily give their copies to the supervisor, who will give back copies to them on their return.

In any case, the student must not leave the examination room before having checked the identity and without having signed in front of his name for the delivery of a copy even if it is a unwritten copy (white copy: without wording). An unwritten copy must be identified by the student by writing his name and last name.

Once he left the examination room he is no longer authorized to go back to it once his copy has been delivered. Surely, the student must then even leave the environment of the examination rooms.

2-6 The monitoring mission:

The supervision of the examinations constitutes an educational act which constitutes part of the statutory obligations of the lecturers in the same way as the preparation of the subjects and the correction of the exams.

The lecturer responsible for the subject, even if he is not a proctor of his test, is required to be present at the examination room for assistance or to be reachable throughout the duration of the test. In the event of major impediment, he appoints a qualified representative and indicates to the service in charge of examinations the contact details allowing him to be reached.

The supervisors go before the start of the exams to the schooling service, which specifies their supervisory tasks and gives them all the documents necessary for maintaining of the exam.

Students have indeed the right to ask the supervisor to call on their course teachers for clarification whenever a crucial problem arises. By all means, the course teacher has the right to a single entry into the examination room and must clarify unclear points without, however, directing the student to the solution.

Supervisors will clearly be informed of the special examination conditions from which certain candidates benefit (1/3 additional composition time and / or any special provision in favor of students with disabilities).

Supervisors must be present at least 15 minutes before the outset of the exam and ensure that the material preparation of the examination room (places, copies, drafts ...) are properly organized and arranged in advance. They have full authority to determine the place of the students.

Add to this, supervisors verify obligatorily the identity of candidates. Only students who are concerned for the exams' call have the right to compose after their legal enrollment. With attention to, any candidate who cannot prove his identity will not be authorized to compose or deliver his copy.

Before the outset of the exam, the supervisors remind the candidates of the conditions under which they must compose.

Any candidate has sat to compose an exam must necessarily return a copy, even a blank one.

2-7 Exam report :

For eachexam , an examination report is drawn up including the date, nature and times of the exam , the name and signature of the supervisors.

At the end of the exam, the candidate hands on his copy to the supervisor by signing on the attendance list. By the same token, the responsible supervisor completes the examination report specifying:

- The number of students who attended the exam and notified as present, the number of absent ones, the identity of those present not appearing on the call list and authorized to dial subject to effective registration for the exam.
- The number of copies which were submitted.
- The observations or incidents observed during the test.

The responsible supervisor takes into charge for retrieving the copies, the attendance list, the exam report and their submission to the pedagogical secretariat concerned.

3- EXAM FRAUD

Any fraudster will be subject to the provisions of the already setregulations. And then, the finding of fraud can be made during or outside the exams. As a preventive measure, active and continuous surveillance constitutes an effective means of deterrence.

Any fraud committed during an examination may lead to a disciplinary sanction for the culprit, which may go as far as a definitive ban on taking any registration and undergoing any examination leading to a diploma or title issued by IPSAS.

In the event of fraud or attempted fraud, the responsiblesupervisor for the examination room must:

- Take all necessary measures to put an end to the fraud without interrupting the student's participation in the test (except in special cases: in the presence of substitution of person or disturbances affecting the course of the test, expulsion from the examination room may be spoken by the responsible supervisor)
- Seize immediately the document (s) or material used to subsequently establish the reality of the facts.
- Draw up a report about the fraud's type or way (precise and detailed report).
- Report the fraud to the attention of the Examinations Coordinator, the Secretary General and the Director of the Institution who may submit it to the disciplinary section of the Institution's Disciplinary Board.

In the most frequent cases where the candidate is not excluded from the examination room, the jury will deliberate on his grades and results under the same conditions as for any other ordinary candidate. Equally important, no certificate of achievement or transcript may be handed to him before the scientific Council delivers its sanction and punishment.

The disciplinary decision may touch the annul disputed test, the subject, the teaching unit, the semester or even the academic year if the trickery is of great significance.

Note: Any blatant distinguishing marks appearing on the student's copy will be considered an attempt at fraud and will be reported to the exams department.

4- CORRECTIONS, DELIBERATIONS AND COMMUNICATION OF RESULTS

4-1 The correction:

For the purpose to guarantee equity between the students a sufficient correction period which does not exceed 10 days is left to the correctors, taking into account the type of examination and the number of copies to be corrected.

Copies are corrected markedly under the authority of the teacher responsible for the teaching of the unit being examined. Specifically, in case of multiple correctors, the person in charge ensures the unity of the correction and the compliance of the marks while respecting the

principle of egalitarianism between the students. Again, the issue of correction respects compulsorily the anonymity of the copies.

The deadlines and modalities for the transmission of marks are fixed in advance by each department.

The General secretary of IPSAS is charged of transmitting the information about: online platform of marks, deadlines, regulations and dates of deliberations for each department where attendance is obligatory for all the tutors concerned by each department by forwarding an informative e-mail for all the responsible teachers who would ultimately respond to his instructions and commands promptly.

4-2 The Jury's Deliberation:

The jury is made up of teachers concerned by the teaching units evaluated. It includes the teachers of the Teaching Units and the qualified personalities who have contributed to the teachings. The composition of the juries as well as the name of the President of the jury are displayed before the start of deliberations. Participation in juries constitutes for the teaching staff an educational act included in the service. Therefore, attendance at deliberations is an obligation for lecturers.The jury deliberates sovereignly on the basis of all the results obtained by the student, in compliance with the procedures for checking knowledge.

It is highlyrecommended that students bring to the attention of the exam coordinator and / or director of the establishment, within 48 hours of the end of the exams, any information or event likely to have had an impact on the progress of their studies or exams results.

The juries remain sovereign in their decisions.

The various elements (copies, reports, briefs, etc.) used for the ratings must be made available to the jury during the deliberation as well as the attendance lists.

The jury ensures that the anonymity of copies is quietly respected and that anonymity is lifted and that the entry of marks and the validation of teaching units are checked.

The President of the jury ensures the regularity of the deliberation (presence of half of the members). At the end of the deliberation, the present members of the jury sign the minute the document where results are already displayed.

4-3 Communication of results:

At the end of the jury's deliberation, no further modification can be made to the meeting minutes except in the event of a material error in the postponement or calculation duly noted by the Chairman of the jury. In this case, the latter must immediately inform the other members of the jury. The marks and the “admitted” or “adjourned” results are communicated to the students by posting and the application of IPSAS intended to communicate with students.

4-4 Consultation of copies or works:

Students have the right, on their request and within 3 days of the results being displayed, to the communication of their copies and / or to an interview with the teacher (or teachers) responsible for teaching.

The teachers responsible for the examinations must organize a consultation session for the copies which will be clearly indicated by posting.

4-5 Issuance of certificates and diplomas:

The issuance of transcripts, certificates of achievement and diplomas can only be made to the concernedstudent, on presentation of an official identity document (national identity card, passport) or to a representative provided with a power of attorney given for this purpose, his own official identity document, and a photocopy of both sides of an identity document of the student giving the power of attorney.

The diploma is issued after deliberation by the jury.

5- General notes:

5-1 For lecturers :

The convening of teachers for exam supervision sessions includes the following instructions:

"In the event of a planned absence, you are requested to notify the Head of the Education Department in good time and inform him of the name of the colleague who will substitute you.

On the one hand, in order to optimize the course of exams:

• An "exam papers office" has been set up to accommodate supervising teachers.

• You are kindly requested to report to the exams office 15 minutes before the scheduled time for the exam.

• The exam papers will be given to you on your arrival by one of the members of the Examinations Committee who will indicate to you the examination room where the surveillance will take place.

• Any incident occurring during the exams must be reported to the members of the Examinations Committee present and will appear in the examination report.

On the other hand, the following instructions are worth remembering and must be scrupulously applied:

Before the start of the event:

• In the event of the absence of one or more students at the time scheduled for the exam, respect the regulatory 10 minutes granted to latecomers before opening the envelopes containing the exam papers.

• No student is allowed to enter the examination room after opening the envelopes containing the examinations, without being authorized by the examination committee.

• Remind students before the outset of the test of the need to respect the place number assigned to them.

• Remind students before the outset of the test of the regulatory points, concerning penalties in the event of fraud.

5-2 For students:

The general examination regulations are made known to all students and are posted on the boards and in front of all examination rooms. It comprises 12 articles :

- Article 1: Students must comply with the provisions of these regulations as well as the measures and decisions taken by the teacher responsible for the examination room.
- Article 2: Each student must, upon entering the examination room, bring his student card and / or his national identity card and his individual summons.

- Article 3: The candidate must deposit at the entrance to the examination room all documents and objects such as handbags and suitcase and especially duly closed cell phones.
- Article 4: The candidate is not authorized to carry any document with him.
- Article 5: The candidate must equip himself with everything necessary to face the exam.
- Article 6: The candidate is required to sign the enrollment list at the beginning and at the end of the examination session. The second signature must take place after the examination copy has been handed over directly to the teacher in charge of the examination room.
- Article 7: No student will be admitted to the examination room after the start of the test if he is not authorized by the examination committee.
- Article 8: No student will be allowed to leave the examination room before the end of the first half hour of each session and during the last quarter of an hour of said session.
- Article 9: No student is allowed to temporarily leave the examination room for any reason. In the event of force majeure, he must be accompanied by an administrative officer, in this case the liaison officer placed in front of the examination rooms.
- Article 10: Any fraud or attempted fraud exposes its perpetrator (s) to regulatory sanctions, the following acts are considered as such: possession of an unauthorized document, discussion or exchange of objects with another student whatever either the pattern, the throwing of documents, scrap paper or other on the ground or elsewhere.
- Article 11: When a student commits fraud or attempted fraud or any breach of the discipline of exams, he may be excluded from the examination room by the teacher in charge.
- Article 12: The use of the mobile phone during the examination session is considered an act of fraud which results in the immediate exclusion of the candidate.
- Important: Students must take the tests in their examination room and at their assigned place. Otherwise, they will be considered absent and will be assigned a grade of zero.

6- Conditions for success and passage from one level to another:

6-1 For licenses and bachelor degree:

During the deliberation of the main session, is declared admitted, any student with an overall average of at least 10/20 and having validated a minimum of 45 credits.

Any student who has not met these two conditions is declared adjourned. The adjourned student has the right to take the tests of all modules in which he or she has not obtained the general average of the subject.

6-2 For preparatory cycles:

During the deliberation of the main session, is declared admitted, any student with an overall average of at least 10/20.

Students who have been postponed will retake the exams for the subjects they have not passed.

The bar is set at a minimum average of 09/20.

6-3 For engineering cycles programs:

Examination regulation for engineering programs is summarized on the table below:

Main Session	OverallAverage	Average of the groups of modules
Passed	≥ 10/20	≥ 08/20
Control Session .Situation (1)	≥ 10/20	1G.M. or more have an average of less than 08/20. In this situation, the student can only take the exams of the non-validated subjects of this (these) group(s) of modules.
Control session .Situation (2)	≤ 10/20	The student can sit for the exams of all non-validated subjects.
Control session		
Admitted	≥ 10/20	≥ 08/20
Redemption (1)	9.5≥Average <10	≥ 08/20
Redemption (2)	≥ 10/20	A single group of modules averaging between 7.5 and 7.99
Admittedwithcredit	≥ 10/20	Only one group of modules averaging between 7 and 7.49

6-4 Redundancy and Granted Credits:

Any repeating student, whether he or she is an IPSAS student or from another institution, retains his or her validated credits. In other words, he retains the grades for subjects with an average of 10/20 or higher. They must attend classes in non-validated subjects and pass all tests (Continuous Assessment and Examination)

6-5 Average calculation:

PrivatePolytechnic Institute of Advanced Sciences of Sfax (IPSAS)

Direction of Studies on 02/09/2020

Calculation of Averages, for the Engineering Specialties :

- **Main Session**

  oSubject Mixed system (Continuousassessment (DCC)+Examination (E) : Average = ((0.5 x DCC)+(1 x E)) / 1.5

  oSubject Mixed system (Continuousassessment +Practicalwork(PW) +Examination (E) : Average = ((0.5xDCC)+(0.5xPW)+(1xE)) / 2

  o Workshop or Mini Project (PW, practicalwork) : Average = score of PW

- **Control Session**

  oSubject Mixed regime (DCC+E) : Average = ((0.5xDS)+ (1 x Superior score(E of main or control session)) / 1.5

  o Subject Mixed regime (DCC+PW+E) : Average = ((0.5xDCC)+(0.5xTP)+ (1 x Superior score(E of main or control session)) /2

  o Workshop or Mini Project (TP) : Average = Score PW

Calculation of Averages, Preparatory Cycle :

- **Main Session**

  oSubject Mixed system (Continuousassessment +E) :Average = ((0.5 x DCC)+(1 x E)) /1.5

  oSubject Mixed system (Continuousassessment +Practicalwork +Examination) :Average = ((0.5xDCC)+ (0.5xTP)+ (1xExamen)) /2

- **Control Session**

  oSubject Mixed regime (DCC+Exam) :Average = ((0.5xDS)+ (1 x superior score (E of main or control session)) /1.5

  oSubject Mixed regime (DCC+TP+Exam) : Average= ((0.5xDCC) +(0.5xTP) +(1x superior score (E of main or control session)) /2

Overall average: OV

OV= ∑ ((Each module average x correspondent module coefficient)) / (∑ Coefficients)

11. The student`s chart

CHARTER

of the IPSAS students

Article 1: Purpose

The CHARTER presents the internal regulations for the students of IPSAS. It determines the fundamental rules that are strictly obligatory to be respected by each student during his/her administrative membership of this university institution. It presents a personal contract of the student with the IPSAS Administration, which aims at the good progress of the education and mutual respect between all

Article 2: Commitment of the student:

I, the undersigned, ... …….

CIN (Passport) ..... Tel: .....

E-mail : .....

Student in the following course: ..... A.U.: .....

(to be specified)

I undertake and confirm by signing this CHARTER that :

2.1. I accept and will comply fully and correctly with all the rules described in this CHARTER during the period of my administrative membership of the ULS (IPSAS),

2.2 In case of non-compliance or violation of my commitments described in this CHARTER I will suffer all the administrative, financial and legal consequences provided for.

Article 3: Registration of students:

Training at IPSAS is not free of charge and enrolment is compulsory within the stipulated deadlines. The tuition fees are fixed by the Administration and are payable in instalments as follows: the first instalment is required at registration, the second instalment must be paid before the end of December and the third instalment is to be paid at the latest before the end of April during the academic year.

Article 4: Organisation of teaching

4.1 Teaching

Teaching at IPSAS is carried out according to the study plans approved by the Tunisian Ministry of Higher Education and specific for each speciality. The organisation of the curricula and the annual calendar are ensured by the IPSAS Administration. An academic year is divided into two semesters, each of which lasts 15 weeks of teaching plus one week reserved for examinations.

Students are required to attend all courses (lectures, practical work, seminars and company visits). It is controlled by the teachers and the Administration. When absences in a unit or element exceed 20% of the module's hourly volume, the student concerned is not allowed to attend the main examination session.

Attendance at all examinations (tests, assignments, examinations, viva voce, etc.) is compulsory. Any absence from a test will result in a zero mark.

It should be noted that medical certificates do not necessarily constitute a justification for absences.

Students are obliged to keep themselves informed through the IPSAS websites (www.uls-ens.net or www.ipsas-ens.net) about all announcements concerning the organisation of studies, timetables, assignments and exams, internships and cultural and social life. For students in their final year of study, the course includes the preparation of a professional final year project.

Article 5: Internships

During their university education at IPSAS, each student must complete two internships:

a) An internship in the 1st year (working internship) lasting one month, the host structure of which may be a company, an association or .....

b) An internship in the 2nd year (technician internship) lasting one month, which must be carried out in a company.

At the end of each internship, the student must present an internship diary and a report which are evaluated by a jury. The host organisation gives an assessment of the trainee at the end of the placement.

If a traineeship is declared inconclusive by the jury, a replacement traineeship must be carried out and evaluated under the same conditions.

Article 6: Final projects

Upon successful completion of the final year exams, each student must prepare a 5-month Final Year Project (FWP).

The PFE is defended before a Jury appointed by IPSAS.

Students are allowed to defend the FDP in the following cases:

* all validated GM,
* all internships validated,
* compliance with all conditions required by the IPSAS Administration (payment of tuition fees, etc.)
* submission of the necessary documents (dissertation, technical file, postcard, CD, written authorisation for the defence, ...) within the deadlines set by the IPSAS Administration.

Note: All documents presented by students for the PFE defence must be checked and signed by the academic supervisor.

Article 7: Students' rights :

The student registered at IPSAS and signatory of this CHARTER has the right to :

a) All information from the IPSAS Administration that concerns him/her,
b) Access to classrooms and practical training rooms according to the posted timetable,
c) Access to rooms authorised for preparation during revision periods.
d) Pedagogical consultations with the teachers,
e) For any problem concerning courses or practical work, the student must contact the Coordinator of the speciality,
f) Participation in IPSAS clubs according to the rules of the desired club,
g) Participation in the sports and cultural life of IPSAS students,
h) Participation in applied industrial research teams within IPSAS for the development of industrial projects
i) Participation in the different training courses and/or events provided for in the Conventions between IPSAS and its national and international partners.

Article 8: Obligations of the student :

The student, registered at IPSAS, undertakes to respect the following rules:

a) Attendance during the course and practical sessions:

Late arrivals at the beginning of the sessions are to be avoided. In case of repeated lateness, the IPSAS Disciplinary In case of repeated lateness, the IPSAS Disciplinary Board will take action. Absences are counted and are taken into account for the continuous assessment grade,

b) Telephone calls and cigarette breaks are strictly forbidden during class sessions and exams.

c) Entrance and exit from the rooms are signalled by a bell that must be respected.

d)The duration of breaks must be respected and teachers will be asked not to accept latecomers,

e) The student is obliged to have for each session of class, practical work, homework or exam

f) The student is obliged to have the material required by the teacher (course notes, calculators, etc.). In case of non-compliance with these obligations the teacher has the right to take appropriate measures.

g) The use of unauthorised equipment and documents by students during tests is the use of unauthorised equipment and documents by students during tests is forbidden,

h) The student's participation in the course, his/her attendance, the execution of personal work required by the teacher, arerequired by the teacher are taken into account in the marking of the continuous assessment.

i) Attempts to cheat in any test will be severely punished.

Article 9: Appearance before the Disciplinary Board:

The IPSAS Disciplinary Board is chaired by the Director of the institution. A student is summoned to appear before the IPSAS Disciplinary Board in the following cases

a) Having been the subject of a report of disrespect towards a teacher or an agent of the Administration,

b) After an attempt to cheat during the tests (exam, homework or continuous assessment). This situation leads to the exclusion of the student from the examination room. A mark of zero is automatically awarded and the student's file is submitted to the Disciplinary Board. The student is called to appear before the Discipline Council in writing and must be informed of the facts of which he or she is accused. The student has the right to defend himself.

The Discipline Council deliberates on one of the following sanctions:

- Warning,

- Ban on taking examinations for one or two sessions,
- Exclusion from the institution for a maximum period of one academic year,
- Permanent exclusion from the institution.

Note: In the last two cases, the student is not entitled to a refund of tuition fees.

Article 10: Validity of the Charter

10.1. This CHARTER is valid after its signature by the Director of IPSAS and the student, until the student's final departure.

10.2. The CHARTER is made in two signed copies: one for the IPSAS Administration one for the IPSAS Administration and one for the student.

Done in Sfax, on .....

Student: Director of IPSAS:

....