



الجمهورية الجزائرية الديمقراطية الشعبية
Democratic and Popular Republic of Algeria
وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education and Scientific Research
اللجنة البيداغوجية الوطنية لميدان العلوم والتكنولوجيا
National Educational Committee for the Science and Technology sector



TRAINING OFFER
L.M.D.
ACADEMIC BACHELOR'S DEGREE
NATIONAL PROGRAM
2025- 2026

Establishment	Faculty / Institute	Department
<i>University of Médéa</i>	<i>Technology</i>	<i>Civil Engineering</i>

Domain	Sector	Speciality
<i>Science and Technology</i>	<i>Civil Engineering</i>	<i>Civil Engineering</i>

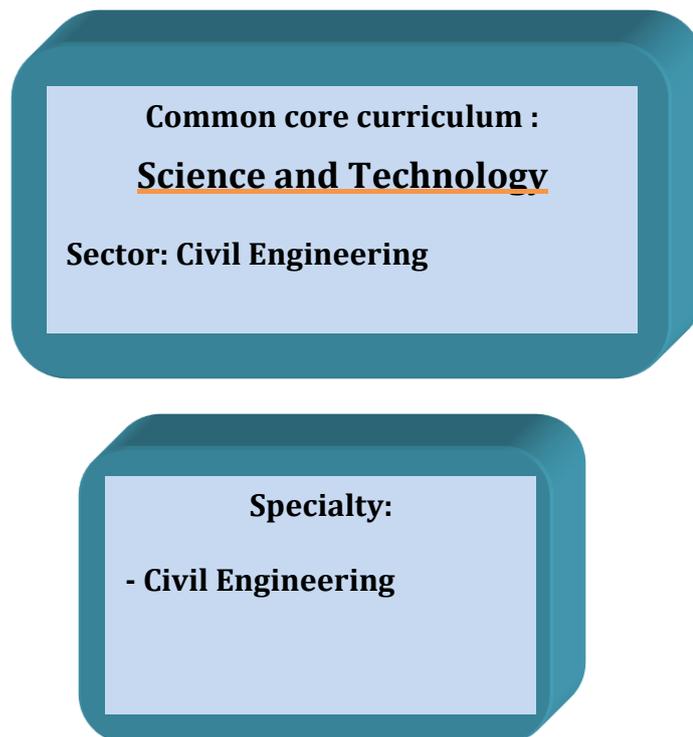
Summary	Page
I - License Identity card	
1 - Location of the training	
2 - External partners	
3 - Context and objectives of the training	
A - General organization of the training: position of the project	
B - Training objectives	
C – Targeted profiles and skills	
D - Regional and national employability potential	
E - Gateways to other specialties	
F - Expected performance indicators of the training	
G- Student assessment through continuous control and personal work	
4 - Available Human resources	
A - Supervisory capacity	
B - Internal teaching team mobilized for the specialty	
C - External teaching team mobilized for the specialty	
D - Overall summary of human resources mobilized for the specialty	
5 - Material resources specific to the specialty	
A - Educational Laboratories and Equipment	
B - Internships and in-company training	
C – Documentation available at the establishment level specific to the training offered	
D - Personal work and ICT spaces available at the department, institute and faculty level	
II - Half-yearly organization sheets for the specialty courses	
- Semesters	
- Overall summary of the training	
III - Detailed program by subject	
IV- Agreements / conventions	
V- Opinions and Visas of administrative and advisory bodies	
VI- Notice and Visa of the Regional Conference	
VII- Opinion and Visa of the National Educational Committee of the Domain (CPND)	

I - License Identity Card

3- Training Context and Objectives

A – General Organization of the Training: Project Position

Enter in the following diagram the License that is the subject of this framework as well as all the approved licenses (functional or not) at the establishment level and belonging to the same Group of sectors. Specify with an asterisk any other license whose supervision is also provided by a large part of the teachers involved in this current license. Indicate with a double asterisk the frozen licenses. Also mark with (P) any professional type license.



B - Training objectives:

The Civil Engineering Bachelor's degree course aims to provide students with a scientific and technological foundation ensuring mastery of academic and practical knowledge in the various fields of construction. In addition to providing professional skills leading to successful integration into supervisory and management roles within construction companies, as well as project monitoring and control, this Bachelor's degree provides students with basic scientific and specific training that provides them with the ability to assimilate knowledge, enabling them to access higher degrees: the Master's degree and the possibility of preparing for a Doctorate in the various specialties of Civil Engineering.

C - Targeted profiles and skills:

This training aims to train managers for the Civil Engineering, Construction and Public Works sector in general, and more specifically, companies, design offices and expert firms.

Furthermore, we are witnessing the emergence of a field, promising in terms of employability and research, which is undergoing rapid technological development: the development of new materials. These require the introduction of new technologies, new production methods, and new commercial techniques, and consequently a boost in the demand for specialized personnel.

D - Regional and national employability potential:

Professional opportunities at the management level are important in all phases of a construction operation:

- Work scheduling: public sector (local authorities, construction companies).
- Calculation of structures: design offices, engineering firms.
- Work management and monitoring, and quality control of structures: structural and secondary construction companies, inspection offices.
- Maintenance and asset management: technical management, rehabilitation, and development.
- Site monitoring: medium- and large-scale construction projects.

E – Gateways to other specialties:

Semesters 1 and 2 common	
Sector	Specialties
Civil engineering	Civil engineering

This degree offers multidisciplinary and cross-disciplinary teaching programs:

Multidisciplinary, in the sense that the courses in this specialty are 100% identical for semesters 1 and 2 with all the specialties in the Science and Technology field. On the other hand, the courses in semester 3 for all the specialties in the same group of sectors are also 100% identical.

Semester	Group of sectors	Common lessons
Semester 1	A - B - C	(30 / 30) Credits
Semestre 2	A - B - C	(30 / 30) Credits
Semester 3	A – B	(18 / 30) Credits
	A – C	(18 / 30) Credits
	B – C	(24 / 30) Credits

In a transversal manner, this Licence offers the student the choice of joining, if he expresses the desire and depending on the teaching places available:

- All other specialties in the ST field at the end of semester 2.
- All specialties in the same group of courses at the end of semester 3.
- All specialties from another group of courses at the end of semester 3 (Subject to conditions of equivalence and opinion of the training team).
- All specialties in the same group of courses at the end of semester 4 (Subject to conditions of equivalence and opinion of the training team).

F – Expected performance indicators of the training:

All training must meet the quality requirements of today and tomorrow. As such, to better assess the expected performance of the training offered on the one hand and by exploiting the flexibility and adaptability of the LMD system on the other hand, a number of mechanisms are proposed, for information purposes, for this degree to evaluate and monitor the progress of teaching, the training programs, student/teacher and student/administration relationships, the future of graduates of this degree as well as the assessments of the university's partners regarding the quality of the graduates recruited and/or the teaching provided. It is up to the training team to enrich this list with other criteria according to its own means and objectives.

The evaluation methods can be implemented through surveys, on-site monitoring of students in training, and surveys of recruited graduates and their employers. To achieve this, a report must be prepared, archived, and widely disseminated.

1. Evaluation of the training progress:

In addition to the regular meetings of the teaching committee, a meeting is held at the end of each semester. It brings together teachers and students from the class to discuss any problems encountered, possible improvements to teaching methods in particular, and the quality of training in general.

To this end, a more or less exhaustive list of indicators and methods envisaged for the evaluation and monitoring of this training project by the educational committee is proposed below:

Before the training:

- Change in the rate of students choosing this degree (supply/demand ratio).
- Rate and quality of students choosing this degree.

During training:

- Regularity of teaching committee meetings.
- Alignment of end-of-cycle project themes with the nature of the program.
- Quality of the relationship between students and the administration.
- Support provided to students experiencing difficulties.
- Student satisfaction rate with teaching and teaching methods.

Downstream of the training:

- Student success rate per semester in this degree program.
- Student dropout rate (failure and withdrawal).
- Identification of the causes of student failure.
- Reorientation alternatives are offered to students who fail.
- Percentage of students who graduate on time.
- Percentage of students who continue their studies after completing their degree.

2. Evaluation of the progress of the lessons:

The teaching in this course is subject to regular evaluation (once a year) by the training team which will be made available, upon request, to the various institutions: National Educational Committee for the Field of Sciences and Technologies, Regional Conferences, Vice-rectorate responsible for education, Faculty, etc.

Therefore, a system for evaluating programs and teaching methods can be established based on the following indicators:

- Equipping classrooms and teaching laboratories with the materials and supports needed to improve teaching (projection systems (data shows), Wi-Fi connection, etc.).
- Existence of a communication and teaching platform where lectures, tutorials, and practical work are accessible to students and their questions are addressed.
- Equipping teaching laboratories with materials and equipment appropriate to the course content.
- Number of actual teaching weeks provided during a semester.
- Completion rate of teaching programs.
- Digitization and preservation of final dissertations and/or final year dissertations.

- Number of practical work sessions completed and the number of practical work sessions per subject (diversity of practical work sessions).
- Quality of the institution's documentary collection related to the specialty and its accessibility. ☒ Support from the socio-economic sector for training (company visits, company internships, courses and seminars given by professionals, etc.).

3. Integration of graduates:

A coordination committee, composed of training managers and members of the Administration, is hereby established. Its primary responsibilities are: monitoring the professional integration of graduates from the program, creating a graduate tracking database, identifying and/or updating existing economic and industrial opportunities at the regional and national levels, anticipating and developing new careers related to the program in association with the Chamber of Commerce, various employment support agencies, public and private operators, etc., and participating in any action related to the professional integration of graduates (organizing events with socio-economic stakeholders).

To carry out these missions, this committee has the discretion to conduct or commission any study or survey on the employment and post-employment outcomes of graduates. Below is a list of indicators and methods that could be considered for evaluating and monitoring this operation:

- Graduate recruitment rate in the socio-economic sector in positions directly related to the program.
- Type of jobs held by graduates.
- Diversity of opportunities.
- Establishment of an alumni association.
- Creation of small businesses by graduates of the specialty.
- Employer satisfaction level.

G- Student assessment through continuous assessment and personal work :

G1- Evaluation by Continuous Assessment:

The importance of continuous assessment methods on student learning in terms of educational outcomes is well established. In this regard, Articles 20, 21, and 22 of Order 712 of November 3, 2011, define and specify the methods and organization of continuous assessment for students according to the training program. The calculation of continuous assessment averages (tutorials and practical work) is based on a weighting of all the elements that make up this assessment. These articles specify that this weighting is left to the discretion of the teaching team.

A survey conducted by the CPND-ST among all teachers in the various universities revealed heterogeneity in the implementation of continuous assessment for students. We are therefore forced to acknowledge a real deficit in the effective management of this educational activity, which has required serious reflection on this matter. Combined with proposals from several institutions, this has led to the recommendations below.

Analysis of the various proposals from these institutions has shown that Articles 21 and 22 of Order 712 of November 3, 2011, are indeed insufficiently explicit and deserve further clarification. These articles could be enhanced by taking into account the following points, which represent a summary of the proposals received.

1. Subject-related suggestions with tutorials:

1.1. Preparation of exercise series:

The instructor in charge of the subject must organize the assignments by proposing a series of exercises for each chapter of the course. This series must be comprehensive, with exercises to help students understand the course and sample exercises to be completed during tutorial sessions.

These exercises must be prepared by the student before attending the tutorial session. This preparation may be assessed. The assessment method is left to the discretion of the instructor in charge of the tutorial.

Exercises not completed during the tutorial session may be the subject of individual work to be completed by groups of 3 to 4 students and submitted for assessment (deadline: 1 week).

1.3. Student participation in tutorials:

Student participation must be assessed. The assessment method is left to the discretion of the instructor in charge of the tutorial.

1.4. Student attendance:

Student attendance is mandatory for tutorials and practical work. In lectures, it is difficult to monitor attendance for undergraduate students, where class sizes are very large (lectures in lecture halls). For master's students, where class sizes are small, attendance must be mandatory in lectures and tutorials.

2. Case of methodological units (Practical work):

Just like tutorials, practical exercises must be prepared by the student. The instructor must organize a test to monitor this preparation before each practical session (in the form of short comprehension questions, multiple-choice questions, a diagram of the practical session, etc.). A report (per working group) must be submitted at the end of the practical session. To this end, the instructor must prepare a standard report (outline) to facilitate the students' work so that they can effectively submit it at the end of the practical session.

At the end of the semester, the instructor organizes a practical test that summarizes all the practical work completed by the student.

3. Regarding cross-curricular and discovery subjects that do not have tutorials or practical work:

It is very difficult to conduct continuous assessments in these subjects due to the absence of tutorial sessions and the very large number of students in most cases, particularly for universities with very large enrollments.

Nevertheless, the instructor in charge of this subject may, if they wish, inform students that they may be able to assess them (continuously) by asking them to prepare presentations, write reports, research course supplements, use free software, ask students to watch a popular science film related to the subject at home (after providing them with either the film electronically or providing them with an internet link to it) and then ask them to submit a written report or give an oral presentation summarizing the film, etc. The credits for these activities are left to the discretion of the instructor and the training team, who alone are qualified to determine the best way to factor this personal work into the overall grade for the final exam.

Along the same lines, and if the number of students in this subject is reasonable (20 to 30 students), which may be the case for many master's programs, the head of the subject may consider ongoing student assessments similar to those used in tutorial-based subjects. The only requirement is that students be informed of this procedure and validated during the first Academic Council meeting.

In any case, the instructor and teaching staff are free to include any type of assessment they deem appropriate to encourage students to take better charge of their studies and, at the same time, combat student absenteeism from classes.

4. Harmonization of continuous monitoring:

Using a common assessment grid would promote the harmonization of these practices from one instructor to another, from one department to another, and from one institution to another. It would also provide a structuring and reassuring benchmark for students. To this end, we propose below an indicative assessment grid that presents the various continuous assessments used to evaluate the degree of student skill acquisition, whether in terms of knowledge, analytical skills, or synthesis abilities.

It should be noted that these assessments are not intended to "trap" students by imposing very difficult continuous assessments. On the contrary, the aim is to "honestly" assess the degree to which the student has assimilated the various skills and knowledge taught to them, in complete objectivity. In the same spirit, we would gain by promoting the contractualization of learning assessment by specifying, for example, the success criteria and good practices that would lead to correct and precise answers to questions. Thus, the assessment would focus mainly on the acquired knowledge that was the subject of training by giving exercises related to what was prepared in TD without forgetting, however, to evaluate the students' ability to mobilize their skills in more complex situations.

4-1 Directed work:

Preparation of series of exercises and personal work (homework to be submitted, presentations, etc.)	30%	06 points
Written questions (minimum 2 questions including one proposed by the subject manager)	50%	10 points
Student participation in TD	20%	04 points
Total	100%	20 points

4.2 Practical work:

Practical work preparation tests	20%	04 points
Report (must be submitted at the end of the practical session)	40%	08 points
Practical test at the end of the semester on all the manipulations carried out by the student.	40%	08 points
Total	100%	20 points

G2- Student's personal work:

The student's personal work is part of the LMD's ethos. A very substantial amount of time has been allocated to it each week: approximately 50% of the total course time (see the "Overall Training Summary" table in this course offering).

A survey conducted by the CPND-ST among training teams across all university institutions indicated that time spent on student personal work could be used judiciously, under good instructor supervision, rationally, and in a variety of ways. The tasks completed by volunteer students would be assessed and counted (as a bonus) in their overall continuous assessment grade. The rate of this bonus is left to the discretion of the teaching teams.

The synthesis of the different proposals can be summarized in the following points:

1. Homework:

In order to enrich the knowledge and strengthen the training of students, they will be asked to carry out additional homework guided by their course or tutorial teachers. This type of work will involve, for example, encouraging students to do research to answer specific and/or conflicting questions raised during the course, solving a difficult exercise, reviewing in detail the demonstration of a theorem, researching the complement to a course, using free software or a CAD-CAM tool to make applications and simulations related to the course, etc. These activities can be evaluated, graded and registered as a bonus for the students who complete them.

2. Mini course project:

The mini-course project (1 to 3 weeks) is an effective way to prepare students for the methodology of expression, writing, and documentary research. It allows them to put into practice the techniques learned in cross-curricular subjects. It also allows them to develop a sense of group work.

The theme of the mini-course project must be clearly defined and determined by the instructor for a group of students (maximum 2 to 5). The project culminates in a single report (maximum 10 pages) and a short collective oral presentation (preferably with audiovisual support). A common grade for the group is awarded according to an evaluation grid (presentation of the document and use of bibliographic resources, oral presentation, adherence to time, responses to questions, etc.) and will then be included as a bonus in the continuous assessment grade.

3. Report of a visit, an educational outing or a discovery and/or immersion course:

Visits, field trips, and discovery and/or immersion internships are opportunities for students that can help them better understand the reality of the working world and ultimately help them achieve better professional integration.

Administrative managers and instructors should encourage, as much as possible, this very important aspect of the training and ensure the organization of visits and field trips throughout the program.

They should also help/encourage students to conduct research in economic institutions with the aim of finding (in L3 and M1) discovery and/or immersion internships of one to two weeks in the industrial environment during the winter and spring breaks.

In this context, instructors should ensure that students take notes during these trips and require reports (reports of a few pages). This activity can be evaluated, graded, and credited as a bonus for the student who completes it. Students can be provided with templates to help them present their internship reports effectively.

4. Participation in scientific events:

In order to instill a scientific mindset in students (especially for higher education students), they should be guided and encouraged to participate in round tables, laboratory seminars and conferences organized within their faculty and/or institution. It is even advisable to encourage these students to attend conferences related to their specialty outside their university at exhibitions, fairs and other events. This activity can be evaluated, graded and recorded as a bonus for the student who completes it.

5. Use of New Information and Communication Technologies:

ICTs are very attractive to students. Teachers should encourage them to use these technologies to create spaces for exchange among themselves (promotion pages, discussion forums on a specific course issue, etc.). The teacher can also participate in the group as an online evaluator. This activity can be evaluated, graded, and recorded as a bonus for students who participate.

Conclusion :

Student autonomy, considered a key to success, relies largely on the personal work students undertake, utilizing the resources and tools made available to them. All of this must, of course, be supervised and formalized within the framework of the educational and support programs provided jointly by the university instructor and the administrative manager throughout their training program.

This autonomy will allow them to build their professional identity based on their aspirations, abilities, and prior learning, and to further their academic path as they pursue higher education.

II – Half-yearly organization sheets for the specialty courses

Semester 1

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Additional Work in Consultation (15 weeks)	Evaluation mode	
	Title			Course	DW	PW			Continuous control	Exam
Fundamental Unit Code : UEF 1.1.1 Credits: 10 Coefficients : 5	Analysis 1	6	3	1h30	3h00		67h30	82h30	40%	60%
	Algebra 1	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental Unit Code : UEF 1.1.2 Credits: 12 Coefficients : 6	Elements of Mechanics	6	3	1h30	3h00		67h30	82h30	40%	60%
	Structure of Matter	6	3	1h30	3h00		67h30	82h30	40%	60%
Methodological Unit Code : UEM 1.1 Credits: 6 Coefficients : 4	PW Elements of Mechanics	2	1			1h30	22h30	22h30	100%	
	P/W Structure of Matter	2	1			1h30	22h30	22h30	100%	
	Computer Structure and Applications	2	2	1h30		1h00	37h30	22h30	40%	60%
Transversal Unit Code : UET 1.1 Credits: 2 Coefficients : 2	Ethical and deontological dimension (the foundations)	1	1	1h30			22h30	02h30		100%
	Careers in science and technology	1	1	1h30			22h30	02h30		100%
Total Semester 1		30	17	9h00	12h00	4h00	375h00	375h00		

Semester 2

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Additional Work in Consultation (15 weeks)	Evaluation mode	
	Title			Course	DW	PW			Continuous control	Exam
Fundamental Unit Code : UEF 1.2.1 Credits: 10 Coefficients : 5	Analysis 2	6	3	1h30	3h00		67h30	82h30	40%	60%
	Algebra 2	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental Unit Code : UEF 1.2.2 Credits: 12 Coefficients : 6	Electricity and magnetism	6	3	1h30	3h00		67h30	82h30	40%	60%
	Thermodynamics	6	3	1h30	3h00		67h30	82h30	40%	60%
Methodological Unit Code : UEM 1.2 Credits: 6 Coefficients : 4	PW Electricity and magnetism	2	1			1h30	22h30	22h30	100%	
	PW Thermodynamics	2	1			1h30	22h30	22h30	100%	
	Introduction to programming	2	2	1h30		1h00	37h30	22h30	40%	60%
Transversal Unit Code : UET 1.2 Credits: 2 Coefficients : 2	Free and open source software	2	2	1h30	1h30		45h00	05h00	40%	60%
Total Semester 2		30	17	9h00	10h30	5h30	375h00	375h00		

Semester 3

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Additional Work in Consultation (15 weeks)	Evaluation mode	
	Title			Course	DW	PW			Continuous control	Exam
Fundamental Unit Code : UEF 2.1.1 Credits: 10 Coefficients : 5	Analysis 3	6	3	1h30	3h00		67h30	82h30	40%	60%
	Waves and vibrations	4	2	1h30	1h30		45h00	45h00	40%	60%
Fundamental Unit Code : UEF 2.1.2 Credits: 9 Coefficients : 5	Fluid mechanics	5	3	1h30	1h30	1h30	67h30	82h30	40% (20%TD+20%TP)	60%
	Rational mechanics	4	2	1h30	1h30		45h00	45h00	40%	60%
Methodological Unit Code : UEM 2.1 Credits: 10 Coefficients : 6	Probability and statistics	4	2	1h30	1h30		45h00	45h00	40%	60%
	Python programming	2	2	1h30		1h30	45h00	27h30	40%	60%
	Technical drawing	2	1			1h30	22h30	27h30	100%	
	PW Waves and vibrations	2	1			1h00	22h30	17h50	100%	
UE Découverte Code : UED 2.1 Credits: 1 Coefficients : 1	Metrology	1	1	1h30			22h30	02h30		100%
Total Semester 3		30	17	10h30	9h00	5h30	375h00	375h00		

Semester 4

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Additional Work in Consultation (15 weeks)	Evaluation mode	
	Title			Course	DW	PW			Continuous control	Exam
Fundamental Unit Code : UEF 2.2.1 Credits: 6 Coefficients : 3	Soil mechanics	4	2	1h30	1h30		45h00	55h00	40%	60%
	Construction materials	2	1	1h30			22h30	22h30		100%
Fundamental Unit Code : UEF 2.2.2 Credits: 10 Coefficients : 5	Complex analysis	4	2	1h30	1h30		45h00	55h00	40%	60%
	Materials strength	4	2	1h30	1h30		45h00	55h00	40%	60%
	Geology	2	1	1h30			22h30	22h30		100%
Methodological Unit Code : UEM 2.2. Credits: 12 Coefficients : 7	Numerical methods	5	3	1h30	1h30	1h30	67h30	82h30	40% (20%TD+20%TP)	60%
	PW - Soil mechanics / Construction materials	3	2			2h30	37h30	37h50	100%	
	CAD (Computer-Aided Design)	2	1			1h30	22h30	20h00	100%	
	PW - Materials strength/ Fluid Mechanics	2	1			1h30	22h30	20h00	100%	
Transversal Unit Code : UET 2.2 Credits: 2 Coefficients : 2	Information and communication technologies	2	2	1h30	1h30 Atelier		45h00	05h00	40%	60%
Total Semester 4		30	17	10h30	6h00	9h00	375h00	375h00		

Semester 5

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Additional Work in Consultation (15 weeks)	Evaluation mode	
	Title			Course	DW	PW			Continuous control	Exam
Fundamental Unit Code : UEF 3.1.1 Credits: 12 Coefficients : 6	Strength of Materials 2	4	2	1h30	1h30		45h00	55h00	40%	60%
	Reinforced Concrete 1	4	2	1h30	1h30		45h00	55h00	40%	60%
	Metal Framework	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental Unit Code : UEF 3.1.2 Credits: 6 Coefficients : 3	Soil Mechanics 2	4	2	1h30	1h30		45h00	55h00	40%	60%
	Construction materials 2	2	1	1h30			22h30	27h30		100%
Methodological Unit Code : UEM 3.1 Credits: 10 Coefficients : 6	Topography	3	2	1h30		1h30	45h00	30h00	40%	60%
	PW- Soil Mechanics 2	2	1			1h30	22h30	22h30	100%	
	PW- Construction materials 2	2	1			1h30	22h30	22h30	100%	
	Construction drawing	3	2			2h30	37h30	47h30	100%	
UE Découverte Code : UED 3.1 Credits: 1 Coefficients : 1	General Hydraulics	1	1	1h30			22h30	02h30		100%
Transversal Unit Code : UET 3.1 Credits: 1 Coefficients : 1	Construction techniques and rules	1	1	1h30			22h30	02h30		100%
Total Semester 5		30	17	12h00	6h00	7h00	375h00	375h00		

Semester 6

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Additional Work in Consultation (15 weeks)	Evaluation mode	
	Title			Course	DW	PW			Continuous control	Exam
Fundamental Unit Code : UEF 3.2.1 Credits: 8 Coefficients : 4	Structural Analysis	4	2	1h30	1h30		45h00	55h00	40%	60%
	Metal Constructions	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental Unit Code : UEF 3.2.2 Credits: 10 Coefficients : 5	Reinforced Concrete 2	6	3	3h00	1h30		67h30	82h30	40%	60%
	Foundations and Geotechnical Works	4	2	1h30	1h30		45h00	55h00	40%	60%
Methodological Unit Code : UEM 3.2 Credits: 9 Coefficients : 5	End-of-Degree Project	4	2			2h30	37h30	42h30	100%	
	Computer-aided calculation	3	2			3h00	45h00	55h00	100%	
	Quantity Surveying and Cost Estimation	2	1	1h30			22h30	22h30		100%
UE Découverte Code : UED 3.2 Credits: 2 Coefficients : 2	Roads and Utility Networks	1	1	1h30			22h30	02h30		100%
	Construction Site Management	1	1	1h30			22h30	02h30		100%
Transversal Unit Code : UET 3.2 Credits: 1 Coefficients : 1	Entrepreneurship and start-ups	1	1	1h30			22h30	02h30		100%
Total Semester 6		30	17	13h30	6h00	5h30	375h00	375h00		

III - Detailed Program by Subject

Detailed Program by Subject for Semester 1 (S1)

Semester: 1

Teaching Unit: UEF 1.1.1

Subject 3: Analysis 1

TWH: 67h30 (Lecture: 1h30, Tutorial: 3h00)

Credits: 6

Coefficient: 3

Prerequisites:

Basic mathematics concepts from secondary school final year (sets, functions, equations, ...).

Teaching Objectives

This first Analysis I course is primarily dedicated to homogenizing the knowledge of students entering university. The first new concepts are taught progressively in order to lead students toward more advanced mathematics. The notions covered in this course are fundamental and among the most widely used in the field of Science and Technology.

Course Content:

Chapter 1 : Properties of the set \mathbb{R}

Chapter 2: Real Number Sequences

Chapter 3: Real Functions of a Single Variable

Chapter 4: Taylor Series Expansion

Chapter 5: Simple Integrals

Assessment Method: CC: 40%, Final Exam: 60%

Semester: 1**Teaching Unit: UEF 1.1.2****Subject 3: Algebra 1****TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)****Credits: 4****Coefficient: 2****Prerequisites:**

Basic mathematics concepts from secondary school final year (sets, functions, equations, ...).

Teaching Objectives

This first Algebra I course is primarily dedicated to homogenizing the knowledge of students entering university. The first new concepts are taught progressively in order to lead students toward more advanced mathematics. The notions covered in this course are fundamental and among the most widely used in the field of Science and Technology.

Course Content:**Chapter 1. Sets, Relations, and Functions****(5 weeks)****Chapter 2: Complex Numbers****(5 weeks)****Chapter 3: Vector Space****(5 weeks)****Assessment Method:**

CC: 40%, Final Exam: 60%

Semester: 1
Teaching Unit: UEF 1.1.3
Subject: Elements of Mechanics
TWH: 67h30 (Lecture: 1h30, Tutorial: 3h00)
Credits: 6
Coefficient: 3

Prerequisites:

It is recommended to have a solid mastery of physics and basic mathematics at the secondary school level.

Objectives:

This course enables the student to acquire the fundamental concepts of classical mechanics related to the particle, through:

- kinematics
- dynamics
- and the concepts of work and energy.

Course Content : Physique 1 (Mécanique)

Chapter I: Review

Chapter II: Kinematics

Chapter III: Dynamics

Chapter IV: Rotational Motion

Chapter V: Work, Power, Energy

Assessment Method:

CC: 40%, Final Exam: 60

Semester: 1
Teaching Unit: UEF 1.1.4
Subject 3: Structure of Matter
TWH: 67h00 (Lecture: 1h30, Tutorial: 3h00)
Credits: 6
Coefficient: 3

Teaching Objectives

This course enables the student to acquire the basic formalisms in chemistry, particularly regarding atomic structure, chemical bonding, chemical elements, the periodic table, and energy quantification. To develop students' ability to solve chemistry problems.

Recommended Prior Knowledge

Basic concepts in mathematics and general chemistry.

Course Content:

Chapter 1 : Fundamental Concepts	(2 weeks)
Chapter 2 : Main Constituents of Matter	(3 weeks)
Chapter 3: Radioactivity – Nuclear Reactions	(2 weeks)
Chapter 4 : Electronic Structure of the Atom	(2 weeks)
Chapter 5 : Periodic Classification of Elements	(3 weeks)
Chapter 6 : Chemical Bonds	(3 weeks)

Assessment Method:

Continuous Assessment: 40%; Exam: 60%.

Semester: 1
Teaching Unit: UEM 1.1.1
Subject: PW/ Elements of Mechanics
TWH: 22H30 (Lab: 3h00)
Credits: 2
Coefficient: 1

Prerequisites:

It is recommended to have a solid mastery of physics and basic mathematics at the secondary school level.

Objectives:

This course enables the student to acquire the fundamental concepts of classical mechanics related to the particle, through:

- kinematics
- dynamics
- and the concepts of work and energy.

Practical Work de physique 1 :

- Measurement and calculation of uncertainties
- Free fall
- Inclined plane
- Circular motion
- Simple pendulum
- Oscillating pendulum
- Solid-solid friction

Assessment Method:

Continuous Assessment: 100%;

Semester: 1
Teaching Unit: UEM 1.1.2
Subject 3: P/W Structure of Matter
TWH: 22h30 (Lab: 1h30)
Credits: 2
Coefficient: 1

Teaching Objectives

This course enables the student to acquire the basic formalisms in chemistry, particularly regarding atomic structure, chemical bonding, chemical elements, the periodic table, and energy quantification. To develop students' ability to solve chemistry problems.

Recommended Prior Knowledge

Basic concepts in mathematics and general chemistry.

Practical Work « Structure of Matter »

Lab Session No. 1: Preliminary Lab: Safety in the chemistry laboratory and description of equipment and glassware.

Lab Session No. 2: Changes of state of water: Transition from liquid to solid state and from liquid to vapor state.

Lab Session No. 3: Determination of the amount of substance.

Lab Session No. 4: Determination of molecular mass.

Lab Session No. 5: Uncertainty calculation - Determination of ionic radius

Lab Session No. 6: Determination of partial molar volumes in a binary solution.

Lab Session No. 7: Qualitative analysis of Cations (1st, 2nd, 3rd and 4th group).

Lab Session No. 8: Qualitative analysis of Anions.

Lab Session No. 9: Identification of metal ions by the flame method

Lab Session No. 10: Separation and recrystallization of benzoic acid.

Lab Session No. 11: Construction and study of some compact structures.

Lab Session No. 12: Study of ionic structures

Assessment Method:

Continuous Assessment: 100%;

Semester: 1

Teaching Unit: UEM 1.1.3

Subject 3: Computer Structure and Applications

TWH: 45h00 (Lecture: 1h30, Lab: 1h30)

Credits: 2

Coefficient: 2

Objective and Recommendations:

The objective of this course is to enable students to learn programming using a high-level language (Fortran, Pascal, or C). The choice of language is left to the discretion of each institution. The concept of algorithms should be addressed implicitly during language learning.

Recommended Prior Knowledge

Elementary concepts of Web technology.

Course Content:

Partie 1. Introduction to Computer Science (5 weeks)

Partie 2. Concepts of Algorithm and Program (10 weeks)

Computer Science Lab 1:

The lab sessions aim to illustrate the concepts taught during the lectures. They should begin in parallel with the lectures according to the following schedule:

- Introductory lab session for familiarization with computer hardware and operating systems (exploring the various OS functionalities)
- Introductory lab session on using a programming environment (Editing, Assembling, Compiling, etc.)
- Lab session applying programming techniques covered in lectures.

Assessment Method:

Continuous Assessment: 40%; Exam: 60%.

Semester: 1
Teaching Unit : UET 1.1.1
Subject : Ethical and Deontological Dimension (Foundations)
TWH: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Teaching Objectives:

The main objective of this course is to facilitate the immersion of an individual into student life and their transition into a responsible adult. It aims to develop students' awareness of ethical principles. To introduce them to the rules governing university life (their rights and obligations toward the university community) and in the professional world, to raise awareness of respect for and the value of intellectual property, and to explain the risks of moral misconduct such as corruption and how to combat it.

Recommended Prior Knowledge:

None

Course Content:

- | | |
|--|------------------|
| I. Fundamental Concepts – Basic Concepts | (2 weeks) |
| II. Reference Frameworks – Reference Frameworks | (2 weeks) |
| III. Academic Freedom – University Campus | (3 weeks) |
| IV. University Values – University Values | (2 weeks) |
| V. Rights and Duties | (2 weeks) |
| VI. University Relations | (2 weeks) |
| VII. Practices | (2 weeks) |

Assessment Method:

Exam: 100%.

Semester: 1
Teaching Unit: UED 1.1.1
Subject 3: Careers in Science and Technology
TWH: 22H30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Prerequisites: Néant

Objectives:

To introduce students, in a first step, to all the fields covered by the Science and Technology domain, and in a second step to the range of careers to which these fields lead. In the same context, this course introduces the new challenges of sustainable development and the new careers that may emerge from it.

Course Content :

1. What are engineering sciences?

The engineering profession, history and challenges of the 21st century,, Search for a job/recruitment posting by keyword, develop a simple job description (job title, company, main activities, required skills (knowledge, know-how, interpersonal skills)

2. Fields of Electronics, Telecommunications, Biomedical Engineering, Electrical Engineering, Electromechanics, Optics & Precision Mechanics:

- Definitions, areas of application (Home Automation, embedded automotive applications, Video Surveillance, Mobile Telephony, Optical Fiber, Advanced Scientific Instrumentation, Imaging and Medical Instrumentation, Giant Mirrors, Contact Lenses, Electrical Energy Transport and Distribution, Power Plants, Energy Efficiency, Industrial Equipment Maintenance, Elevators, Wind Turbines, ...
- Role of the specialist in these fields.

3. Fields of Automation and Industrial Engineering:

- Définitions, areas of application (Chaînes automatisées industrielles, Machines outils à Commande Numérique, Robotique, Gestion des stocks, Gestion du trafic des marchandises, la Qualité, - Role of the specialist in these fields.

4. Fields of Process Engineering, Hydrocarbons, and Petrochemical Industries:

- Definitions, Pharmaceutical Industry, Food Industry, Leather and Textile Industry, Biotechnologies, Chemical and Petrochemical Industry, Plastics Industry, Energy Sector (oil, gas), ...
- Role of the specialist in these fields.

1. Fields of Industrial Hygiene and Safety (IHS) and of Mining Engineering :

- Definitions and areas of application (Safety of property and persons, Environmental Issues, Exploration and Exploitation of Mineral Resources, ...)
- Role of the specialist in these fields.

2. Fields of HVAC Engineering and Transportation Engineering - Definitions, areas of application (Air conditioning, Smart buildings, Transport security, Traffic management and road, air, and sea transport, etc.)

- Role of the specialist in these fields.

3. Fields of Civil Engineering, Hydraulics, and Public Works: (2 weeks)

- Definitions and areas of application (Construction Materials, Major Road and Rail Infrastructure, Bridges, Airports, Dams, Drinking Water Supply and Sanitation, Hydraulic Flows, Water Resource Management, Public Works and Land Development, Smart Cities, ...)
- Role of the specialist in these fields.

4. Fields of Aeronautics, Mechanical Engineering, Maritime Engineering, and Metallurgy:

- Definitions and areas of application (Aeronautics, Avionics, Automotive industry, Ports, Dikes, Industrial equipment production, Steel industry, Metal processing, ...)
- Role of the specialist in these fields.

Group Work : Preparation of job descriptions for each field based on recruitment postings found on job search websites (e.g., <http://www.onisep.fr/Decouvrir-les-metiers>, www.indeed.fr, www.pole-emploi.fr) (1 filière / group).

Depending on institutional capacity, it is recommended to involve doctoral students and alumni of the institution in a tutoring/mentoring framework where each group can work with its tutor/mentor to develop the job description and discover the various careers in Science and Technology.

Student Personal Work for this Course:

The instructor in charge of this course may inform students that they can always be assessed by preparing career profile sheets. Students should be asked to watch a popular science film related to their chosen career at home (after being provided either the film electronically or a link to it online) and to then submit a written report or deliver an oral presentation summarizing the film, etc. The grading of these activities is left to the discretion of the instructor and the teaching team, who are alone in determining the best way to account for this personal work in the overall final exam grade.

Assessment Method: Exam: 100%.

Detailed Program by Subject for Semester 2 (S2)

Semester: 2
Teaching Unit: UEF 1.2.1
Subject: Analysis 2
TWH: 67h30 (Lecture: 1h30, Tutorial: 3h00)
Credits: 6
Coefficient: 2

Prerequisites:

It is recommended to master the fundamental bases of integral calculus and antiderivatives, and the mathematics taught in S1.

Objectives:

Of primary importance for a scientist, this course enables the student to acquire:

- the methods for solving differential equations necessary for problems encountered in engineering and physics
- the methods for computing differentiability and integrals of multivariable functions (surfaces, volumes), and the various forms of Taylor series expansion

Course Content :

Chapter 1: Ordinary Differential Equations

1. First-Order Ordinary Differential Equations
2. Second-Order Differential Equations

Chapter 2: Functions of Several Variables. Concepts of Limit, Continuity, Partial Derivatives, Differentiability

Chapter 3

1. Double Integrals
2. Triple Integrals

Assessment Method:

Continuous Assessment: 40%; Exam: 60%.

Semester: 2
Teaching Unit: UEF 1.2.2
Subject: Algebra 2
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Prerequisites:

- Algebra 1

Objectifs :

- Consolidate the knowledge acquired in the 1^{er} st semester.
- Study new concepts: sum of several vector subspaces, stable subspaces, trace.
- Transition between geometric and matrix representations and vice versa.

Teaching Content:

Chapter 1 : Vector Spaces

Chapter 2 : Linear Maps

Chapter 3 : Matrices, Associated Matrices and Determinants

Chapter 4 : Systems of Linear Equations

Chapter 5 : Matrix Reduction.

Assessment Method:

Continuous Assessment: 40%; Exam: 60%.

Semester: 2
Teaching Unit: UEF 1.2.3
Subject Electricity and Magnetism
TWH: 67h30 (Lecture: 1h30 – Tutorial: 3h00)
Credits: 6
Coefficient: 3

Prerequisites:

- Concepts of vector field and scalar field.
- Concepts of vector calculus.
- Electric charges.

Objectives:

- Identify the sources of electric and magnetic fields.
- Calculate and differentiate vector and scalar fields.
- Calculate the electric field and potential produced by a charge distribution.
- Calculate the magnetic field produced by an electric current.

Course Content :

Chapter 1: Electrostatic Field and Potential

Chapter 2: Conductors

Chapter 3: Electric Current

Chapter 4: Magnetostatics

Assessment Method: Continuous Assessment: 40%; Exam: 60%.

Semester: 2
Teaching Unit: UEF 1.2.4
Subject: Thermodynamics
TWH: 67h30 (Lecture: 1h30, Tutorial: 3h00)
Credits: 6
Coefficient: 3

Objectives:

The knowledge acquired allows the characterization of the behavior of liquid, solid, and gaseous substances and the evaluation of their thermodynamic properties under different conditions (temperature, pressure, simple pure substances, ideal mixtures, and phase changes).

Course Content

Chapter I: Basic Concepts in Thermodynamics

Chapter II: Thermodynamic Properties of Pure Substances

Chapter III: Fundamental Concepts of Thermodynamics

Chapter IV: Equilibria of Physical Processes

IV.1 Phase Equilibria of a Pure Substance

IV.2 Thermodynamic Properties of Phase Transitions

IV.3 Ideal Behavior of Gaseous, Liquid, and Solid Mixtures

IV.4 Phase Equilibria of a Compound in an Ideal Mixture

IV.5 Ideal Solubility and Partition Coefficient

Assessment Method:

Continuous Assessment: 40%; Exam: 60%.

Semester: 2
Teaching Unit: UEM 1.2.1
Subject 1: TP Electricity and Magnetism
TWH: 45h00 (Lab: 1h30)
Credits: 2
Coefficient: 1

Teaching Objectives

To reinforce, through practical lab sessions, the theoretical concepts addressed in the Physics 2 course.

Recommended Prior Knowledge

Mathematics 1, Physics 1.

Course Content:

Minimum 5 experiments (3h00 / 15 jours)

- Presentation of measuring instruments and tools (Voltmeter, Ammeter, Rheostat, Oscilloscopes, Generator, etc.).
- Kirchhoff's Laws (mesh law, node law).
- Thévenin's Theorem.
- Connection and Measurement of Inductors and Capacitors
- Charging and Discharging a Capacitor
- Oscilloscope
- Lab on Magnetism

Assessment Method:

Continuous Assessment: 100%

Semester: 2
Teaching Unit: UEM 1.2.2
Subject: TP Thermodynamics
TWH: 22h30 (Lab: 3h00)
Credits: 2
Coefficient: 1

Prerequisites: Néant

Objectives:

The knowledge acquired allows the characterization of the behavior of liquid, solid, and gaseous substances and the evaluation of their thermodynamic properties under different conditions (temperature, pressure, simple pure substances, ideal mixtures, and phase changes).

Practical Work de Thermodynamics :

Lab Session No. 1: Study of the equation of state of an ideal gas.

Lab Session No. 2: Water equivalent of the calorimeter.

Lab Session No. 3: Specific heat: specific heat of liquid and solid bodies.

Lab Session No. 4: Study of the solidification of pure water.

Lab Session No. 5: Latent heat: Latent heat of fusion of ice.

Lab Session No. 6: Determination of the latent heat of vaporization.

Lab Session No. 7: Heat of reaction: Determination of the energy released by a chemical reaction (HCl/NaOH).

Lab Session No. 8: Thermodynamic functions of an Acid-Base equilibrium.

Lab Session No. 9: Study of the variation of pressure as a function of temperature at equilibrium (l-g) for a pure system: water.

TP N° 10 : Vapor pressure of a solution.

Lab Session No. 11: Equilibrium diagram for a binary system.

Lab Session No. 12: Equilibrium diagram for a ternary system.

Assessment Method:

Continuous Assessment: 100%;

Semester: 2
Teaching Unit: UEM 1.2.3
Subject 3: Introduction to Programming
TWH: 45h00 (Lecture: 1h30, Lab: 1h30)
Credits: 2
Coefficient: 2

Teaching Objectives

- Acquire the fundamental bases of programming
- Master the syntax and structures of the C language
- Understand basic algorithmic concepts
- Develop problem-solving skills through programming
- Implement functional programs in the C language
- Acquire good programming practices and code documentation

Recommended Prior Knowledge

- None expérience préalable en programmation n'est requise
- Elementary mathematics concepts (secondary school level)
- Basic computer skills
- Basic knowledge of an operating system

Course Content :

Chapter 1 : Introduction to Computer Science and Programming	(1 week)
Chapter 2 : Structure of a C Program and Data Types	(2 weeks)
Chapter 3 : Inputs/Outputs and Expressions	(2 weeks)
Chapter 4 : Conditional and Iterative Control Structures	(3 weeks)
Chapter 5 : Functions, Arrays, and Character Strings	(3 weeks)
Chapter 6 : Pointers and Dynamic Allocation	(2 weeks)
Chapter 7 : Structures and Enumerations	(2 weeks)

Detailed Content of Lab Sessions

Lab 1: Getting Started with the Environment

- Installation of the IDE (Code::Blocks, Visual Studio Code with C extensions)
- Premier programme "Hello World"
- Compilation and execution
- Simple error correction

Lab 2: Variables and Expressions

- Declaration and initialization of variables
- Arithmetic operators
- Simple calculations and display of results

Lab 3: Conditional Structures and Iterative Structures

- Implementation of programs with if-else
- Use of switch-case
- Comparison and logical operators
- Implementation of while, do-while, and for loops
- Creation of counters and accumulators
- User input validation

Lab 4: Fonctions

- Creation and calling of functions

- Parameter passing by value
- Organizing code into functions

Lab 5: One-dimensional and multidimensional arrays

- Array manipulation
- Search and sort (simple algorithms)
- Passing arrays to functions
- Creation and manipulation of matrices
- Matrix operations

Lab 6: Character Strings

- String manipulation with the string.h library functions
- Text processing

Lab 7: Pointers and Dynamic Allocation

- Use of pointers
- Memory allocation and deallocation
- Dynamic arrays

Lab 8: Fichiers

Assessment Method: Continuous Assessment: 40%; Exam: 60%.

Semester: 2**Teaching Unit: UET 1.2****Subject 1: Free and Open Source Software****VHS:45h00 (Cours: 1h30 & Workshop : 1h30)****Credits: 2****Coefficient: 2****Teaching Objectives:**

This course aims to familiarize students with the ecosystem of free and open source software, their philosophical and technical foundations, and their practical application to replace proprietary solutions. Upon completion of this training, students will be able to:

- Understand the fundamental concepts of free and open source software
- Master the main free licenses and their legal implications
- Identify and use free alternatives to common proprietary software
- Install and configure free solutions adapted to the Algerian context
- Adopt an ethical and collaborative approach to software development

Course Content :**Chapter 1: Foundations of Free Software (2 weeks)****Chapter 2: Legal Framework and Licenses (2 weeks)****Chapter 3 : Free Operating Systems (3 weeks)****Chapter 5 : Creative Solutions and Development (3 weeks)****Chapter 6 : Perspectives and Future of Free Software (2 weeks)****Workshops****Workshop 1 : Linux Discovery****Workshop 2 : Software Management under Linux****Workshop 3 : Migration to LibreOffice**

- Installation and configuration of LibreOffice
- Creating and editing documents with Writer
- Converting from proprietary formats to open formats
- Creating templates adapted to the student's needs

Workshop 4 : Free Spreadsheets and Presentations

- Advanced use of Calc (formulas, graphs)
- Creating presentations with Impress
- Compatibility with existing formats
- Collaborative work on documents

Workshop 5 : Image Processing and Graphics

- Using GIMP for image editing
- Graphic creation with Inkscape
- Comparison with corresponding proprietary tools
- Completion of a simple graphic project

Atl. 6 : Web and Free Databases

- Installation and configuration of an open source CMS (WordPress, Joomla)
- Configuration of a MariaDB database
- Creation of a simple website
- Basic security

Atl. 7 : Collaborative Development

- Using Git for version control
- Configuration of a free development environment
- Participation in a mini collaborative project
- Using a software forge (GitHub, GitLab)
- **Assessment Method:** examen 100%

Detailed Program by Subject for Semester 3 (S3)

Semester: 3
Teaching Unit: UEF 2.1.1
Subject: Applied Mathematics
TWH: 67h30 (Lecture: 1h30, Tutorial: 3h00)
Credits: 6
Coefficient: 3

Prerequisites:

A good knowledge of the analysis of functions of a real variable and the basics of matrix calculus.

Practical Work :

- Introduction to Matlab
- Solving Nonlinear Equations
- Solving linear systems: Direct methods
- Solving linear systems: Iterative methods

Objectives:

This course provides an introduction to scientific computing. Its objectives are to:

- Present basic numerical methods for solving real-world engineering problems using a computer.
- Identify the challenges associated with solving real-world problems numerically on a computer.
- Understand how to develop and implement discretization methods for continuous problems.
- Master and be able to implement the basic techniques of numerical matrix analysis.
- Understand how to implement the basic techniques of numerical computation.

Course Content :

Chapter 1 Introduction to Numerical Analysis (Lecture: 6 hours)

Chapter 2 Solving Nonlinear Equations (Lecture: 6 hours, Tutorial: 4.5 hours)

Chapter 3 Solving Linear Systems (Lecture: 9 hours, Tutorial: 6 hours)

Evaluation methods:

Quiz, Supervised Assignment, Practical Work, Final Exam

Semester: 3
Teaching Unit: UEF 2.1.1
Subject: Waves and Vibrations
VHS: 45h00 (Cours: 1h30, TD: 1h30, TP :1h30)
Credits: 5
Coefficient: 3

Teaching Objectives

This course introduces students to the phenomena of mechanical vibrations restricted to low-amplitude oscillations with one or two degrees of freedom, as well as to the study of mechanical wave propagation.

The practical sessions allow students to apply the knowledge acquired regarding mechanical vibration phenomena restricted to low-amplitude oscillations with one or two degrees of freedom, and the propagation of mechanical waves.

Recommended Prior Knowledge

Mathematics, Physics

Course Content :

Preamble: This subject is divided into two parts: Waves and Vibrations, which can be studied independently. Given the substantial nature of the subject matter, it is recommended that students in Electrical Engineering (Group A) begin with Waves, then Vibrations. Students in Groups B and C (Civil Engineering, Mechanical Engineering, and Process Engineering) should start with Vibrations. In any case, the instructor is expected to do their best to cover both parts. We remind you that this subject is intended for engineering careers in the Science and Technology field. Therefore, the instructor is asked to skim over any sections of the course that require demonstrations or theoretical explanations and focus solely on the applied aspects. Furthermore, the demonstrations may be assigned as supplementary work for students as part of their independent study. See section "G - Student Evaluation through Continuous Assessment and Independent Study" in this course outline for more details.

Part A: Vibrations

- Chapter 1: Introduction to Lagrange's Equations (2 weeks)
- Chapter 2: Free Oscillations of Systems with One Degree of Freedom (2 weeks)
- Chapter 3: Forced Oscillations of Systems with One Degree of Freedom (1 week)
- Chapter 4: Free Oscillations of Systems with Two Degrees of Freedom (1 week)
- Chapter 5: Forced Oscillations of Systems with Two Degrees of Freedom (2 weeks)

Part B: Waves

- Chapter 1: One-Dimensional Propagation Phenomena (2 weeks)
- Chapter 2: Vibrating Strings (2 weeks)
- Chapter 3: Acoustic Waves in Fluids (1 week)
- Chapter 4: Electromagnetic Waves (2 weeks)

Semester: 3
Teaching Unit: UEM 2.1
Subject: Lab: Waves and Vibrations TWH: 22h30 (Lab: 1h30)
Credits: 2
Coefficient: 1

TP1 :Mass-spring system
TP2 :Simple pendulum
TP3 :Torsion pendulum
TP4 :Oscillating electric circuit in free and forced mode
TP5 :Coupled pendulums
TP6 :Transverse oscillations in vibrating strings
TP7 :Hoffmann's grooved pulley
TP8 :Electromechanical systems (The electrodynamic loudspeaker)
TP9 :Pohl's pendulum
TP10 : Propagation of longitudinal waves in a fluid.

Note: It is recommended to choose at least 5 practical exercises from the 10 offered. Assessment Method :
Continuous Assessment: 40%; Final Exam: 60%.

Semester: 3
Teaching Unit: UEF 2.1.2
Subject 1: Fluid Mechanics
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Teaching Objective:

The first part introduces the student to the field of fluid mechanics; fluid statics will be detailed. The second part will then consider the study of the motion of inviscid fluids, and finally, the motion of real fluids will be studied.

Recommended Prior Knowledge:

Course Content:

Chapter 1: Properties of Fluids (3 weeks)

Chapter 2: Fluid Statics (4 weeks)

Chapter 3: Dynamics of Perfect Incompressible Fluids (4 weeks)

Chapter 4: Dynamics of Real Incompressible Fluids

(4 weeks)

Assessment Method:

Continuous Assessment: 40%; Final Exam: 60%.

Semester: 3
Teaching Unit: UEF 2.1.2
Subject 2: Rational Mechanics
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Teaching Objectives :

The student will be able to understand the nature of a problem (static, kinematic, or dynamic) in solid mechanics, and will possess the tools to solve the problem within the framework of classical mechanics. This course is a prerequisite for the courses: Strength of Materials and Analytical Mechanics.

Recommended Prior Knowledge

Physics 1 and Mathematics 2

Course Content:

Chapter 1. Mathematical Review (Elements of Vector Calculus)	(1 week)
Chapter 2. Generalities and Basic Definitions	(2 weeks)
Chapter 3. Statics	(3 weeks)
Chapter 4. Kinematics of Rigid Bodies	(3 weeks)
Chapter 5. Mass Geometry	(3 weeks)
Chapter 6. Dynamics of Rigid Bodies	(3 weeks)

Assessment Method:

Continuous Assessment: 40%; Final Exam: 60%.

Semester: 3
Teaching Unit: UEM 2.1
Subject 1: Probability & Statistics
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Course Objectives

This module allows students to explore the essential concepts of probability and statistics, namely: statistical series with one and two variables, probability on a finite universe, and random variables.

Recommended Prior Knowledge

Mathematics 1 and Mathematics 2

Course Content:

Part A: Statistics

Chapter 1: Basic Definitions	(1 week)
Chapter 2: Statistical Series with One Variable	(3 weeks)
Chapter 3: Statistical Series with Two Variables	(3 weeks)

Part B: Probability

Chapter 1: Combinatorial Analysis	(1 week)
Chapter 2: Introduction to Probability	(2 weeks)
Chapter 3: Conditioning and Independence	(1 week)
Chapter 4: Random Variables	(1 week)
Chapter 5: Common Discrete and Continuous Probability Distributions	(3 weeks)

Assessment Method:

Continuous Assessment: 40%; Final Exam: 60%.

Semester: 3
Teaching Unit: UEM2.1.2
Subject 2: Python Programming
TWH: 45h00 (Tutorial: 1h30, Lab: 1h30)
Credits: 2
Coefficient: 2

Course Objectives :

- Acquire practical programming skills with Python
- Develop algorithmic logic to solve simple problems
- Learn to manipulate fundamental data structures
- Know how to write, test, and debug basic Python programs
- Apply programming concepts to practical cases

Recommended Prior Knowledge :

- No prior programming experience is required
- Basic knowledge in mathematics (secondary school level)
- Know how to use a computer (file navigation, text editor)

Course Content :

Chapter 1. Installing and Using Python

Chapter 2. Basic Concepts

2-A. Interactive Mode and Scripting Mode

2-B. Variables and Data Types

2-C. Predefined Functions

2-D. Source code

Chapter 3. Conditional structures

Chapter 4. Loops

Chapter 5. Functions

Chapter 6: Lists and Tuples

Chapter 7: Dictionaries

Chapter 8: Objects and Classes

Chapter 9: Files

Practical Work:

TP 1: Getting Started with the Environment Python (1 week)

1. Installation of Python and a code editor (VS Code, PyCharm)
2. First steps with the Python interpreter
 - Executing simple commands in interactive mode
 - Using Python as a calculator
3. Creating and executing a first Python script

Lab 2: Variables, Data Types, and Operations (1 week)

1. Manipulation of fundamental data types
 - Integers, floats, character strings, booleans
 - Conversion between data types
2. Arithmetic operations and priorities

TP 3: Conditional and Repetitive Structures (1 week)

1. Conditional statements (if, elif, else)
2. Loops (for, while)

TP 4: Functions and Modularity (1 week)

1. Definition and calling of functions
2. Parameters and return values

TP 5: Data Structures (1 week)

1. List manipulation
2. Dictionaries and tuples
3. Traversal and manipulation of data structures

Lab 6: File Manipulation and Final Project (1 week)

1. Reading and writing text files
2. Final project of your choice:
3. Command-line task manager
4. Hangman game
5. Data analysis from a CSV file
6. Interactive quiz with score saving

Assessment Method:

Contrôle continu =40% , Examen final = 60%

Semester: 3
Teaching Unit: UEM 2.1
Subject 3: Technical Drawing
TWH: 22h30 (Lab: 1h30)
Credits: 2
Coefficient: 1

Teaching Objectives

This course will enable students to acquire the principles of representing parts in technical drawing. Furthermore, this subject will allow students to represent and read blueprints.

Recommended Prior Knowledge

Course Content

Chapter 1. General Concepts.	(2 weeks)
Chapter 2. Elements of Descriptive Geometry	(6 weeks)
Chapter 3. Perspectives	(2 weeks)
Chapter 4. Sections and Cross-Sections	(2 weeks)
Chapter 5. Dimensioning	(2 weeks)
Chapter 6. Concepts of Detail and Assembly Drawings and Nomenclature.	(1 week)

Assessment Method: Continuous Assessment: 100%.

Semester: 3
Teaching Unit: UED 2.1
Subject 2: Metrology
TWH: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Teaching Objectives

To teach the student the precision criteria for manufacturing and assembling parts; to know and be able to choose, in various cases, the methods and means for controlling and measuring the dimensions and manufacturing defects of mechanical parts.

Recommended Prior Knowledge

Trigonometry, optics, and other subjects.

Course Content

Chapter 1. General information on metrology	(2 weeks)
Chapter 2. The International System of Measurement (SI)	(3 weeks)
Chapter 3. Metrological Characteristics of Measuring Instruments	(6 weeks)
Chapter 4. Measurement and Control	(4 weeks)

Assessment Method:

Examen final: 100 %.

Detailed Program by Subject for Semester 4 (S4)

Semester: 4

Teaching Unit: UEF 2.2.1

Subject 1: Soil Mechanics

TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)

Credits: 4

Coefficient: 2

Teaching Objectives:

The student will be able to characterize the physical parameters of soils, classify them from laboratory and in-situ identification tests, and become familiar with flows in soils.

Recommended Prior Knowledge:

Fundamental Subjects of Semesters 1 and 2

Course Content:

Chapter 1. Introduction to Soil Mechanics (2 weeks)

Chapter 2. Soil Identification and Classification (4 weeks)

Chapter 3. Soil Compaction (4 weeks)

Chapter 4: Water in the Soil (5 weeks)

Assessment Method:

Continuous Assessment: 40%; Exam: 60%.

Semestre :4

Teaching Unit: UEF 2.2.1

Subject 2: Construction Materials

TWH: 22h30 (Lecture: 1h30)

Credits: 2

Coefficient: 1

Teaching Objectives :

The student will be able to characterize the physico-mechanical parameters of construction materials.

Recommended Prior Knowledge:

All fundamental subjects of the common core S1 and S2.

Course Content:

Chapter 1: General Concepts	(2 weeks)
Chapter 2: Aggregates	(4 weeks)
Chapter 3: Binders	(6 weeks)
Chapter 4: Mortars	(3 weeks)

Assessment Method:

Examen : 100%.

Semestre : 4

Teaching Unit: UEF 2.2.2

Subject 3: Differential and Integral Calculus (Mathematics 4)

TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)

Credits: 4

Coefficient: 2

Teaching Objectives :

This course focuses on the differential and integral calculus of complex functions of a complex variable. Students must master the various techniques for solving functions and integrals of complex and special variables.

Recommended Prior Knowledge :

Mathematics 1, Mathematics 2, and Mathematics 3.

Course Content :

Functions of Complex Variables and Special Functions

Chapter 1: Holomorphic Functions. Cauchy-Riemann Conditions (3 weeks)

Chapter 2: Power Series (3 weeks)

Chapter 3: Cauchy Theory (3 weeks)

Chapter 4: Applications (4 weeks)

Chapter 5: Special Functions (2 weeks)

Assessment Method :

Contrôle continu : 40%; Examen: 60%.

Semester: 4

Teaching Unit: UEF 2.2.

Subject: Strength of Materials (SoM)

TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)

Credits: 4

Coefficient: 2

Teaching Objectives:

Learn the basic concepts of strength of materials, the goals and hypotheses of SoM, the concept of internal forces, geometric characteristics of cross-sections, the material constitutive law, the concept of allowable stresses, and the sizing of components under simple loads.

Recommended Prior Knowledge :

Rational mechanics and function analysis.

Course Content :

Chapter 1. Introduction and Generalities	(2 weeks)
Chapter 2. Geometric Characteristics of Cross Sections	(2 weeks)
Chapter 3. Simple Tension and Compression	(3 weeks)
Chapter 4. Simple Bending	(4 weeks)
Chapter 5. Shear	(2 weeks)
Chapter 6. Torsion	(2 weeks)

Assessment Method:

Continuous Assessment: 40%; Examination: 60%.

Semester: 4

Teaching Unit: UEF2.2.3

Subject 1: Geology

TWH: 22H30 (Lecture: 1h30)

Credits: 2

Coefficient: 1

Teaching Objectives :

The student will be able to read and interpret a geological map and to fully understand geotechnical problems. Knowledge of the geophysical methods used.

Recommended Prior Knowledge :

Fundamental subjects of S1, S2 and S3

Course Content :

Chapter 1: Introduction to Geology	(2 weeks)
Chapter 2: Minerals and Rocks	(4 weeks)
Chapter 3: Action of Different Elements on Rocks	(3 weeks)
Chapter 4: Concepts of Geodynamics	(3 weeks)
Chapter 5: Adapting Geological Techniques to the Needs of Civil Engineering	(3 weeks)

Assessment Method:

Exam: 100%.

Semester: S4
Teaching Unit: UEF 2.2.2
Subject 2: Numerical Methods
VHS: 45h00 (Cours: 1h30, TD: 1h30, TP : 1h30)
Credits: 5
Coefficient: 3

Teaching Objectives:

Familiarization with numerical methods and their applications in the field of mathematical computations.

Recommended Prior Knowledge:

Mathematics 1, Mathematics 2, Computer Science 1, and Computer Science 2

Course Content:

Chapter 1: Solving Nonlinear Equations $f(x)=0$ (3 weeks)
Chapter 2: Polynomial Interpolation (2 weeks)
Chapter 3: Function Approximation (2 weeks)
Chapter 4: Numerical Integration (2 weeks)
Chapter 5: Solving Ordinary Differential Equations (Initial Condition Problem or Cauchy Problem) (2 weeks)
Chapter 6: Direct Method for Solving Systems of Linear Equations (2 weeks)
Chapter 7: Approximate Method for Solving Systems of Linear Equations (2 weeks)

Assessment Method:

Continuous Assessment: 40%; Final Exam: 60%.

TP Numerical Methods TWH: 22h30 (Lab: 1h30)**Teaching Objectives:**

Programming of various numerical methods for their application in the field of mathematical computations using a scientific programming language.

Recommended Prior Knowledge:

Numerical Methods, Computer Science 2, and Computer Science 3.

Course Content:

Chapter 1: Solving Nonlinear Equations	(3 weeks)
Chapter 2: Interpolation and Approximation	(3 weeks)
Chapter 3: Numerical Integration	(3 weeks)
Chapter 4: Differential Equations	(2 weeks)
Chapter 5: Systems of Linear Equations	(4 weeks)

Assessment Method:

Continuous Assessment: 100%.

Semester: 4

Teaching Unit: UEM 2.2

Subject 3: CAD (Computer-Aided Drawing)

TWH: 22H30 (Lab: 1h30)

Credits: 2

Coefficient: 1

Teaching Objectives : This course will enable students to acquire the principles of representing parts in technical drawing. Furthermore, this subject will allow students to represent and read blueprints.

Recommended Prior Knowledge : Technical Drawing..

Course Content :

1. INTRODUCTION TO THE CHOSEN SOFTWARE (4 weeks)

(SolidWorks, AutoCAD, Catia, Inventor, etc.)

1.1 Introduction and history of CAD;

1.2 Configuration of the chosen software (interface, shortcut bar, options, etc.);

1.3 Reference elements of the software (help, tutorials, etc.);

1.4 Saving files (part file, assembly file, drawing file, save procedure for submission to the instructor);

1.5 Communication and interdependence between files.

2. CONCEPT OF SKETCHES (3 weeks)

2.1 Sketching tools (point, line segment, arc, circle, ellipse, polygon, etc.);

2.2 Sketch relations (horizontal, vertical, equal, parallel, collinear, fixed, etc.);

2.3 Sketch dimensioning and geometric constraints.

3. 3D Modeling (3 weeks)

3.1 Concepts of planes (front plane, right plane, and top plane);

3.2 Basic features (extrusion, material removal, revolution);

3.4 Display functions (zoom, multiple views, multiple windows, etc.);

3.5 Editing tools (Erase, Offset, Copy, Mirror, Trim, Extend, Move);

3.6 Creating a cross-sectional view of the model.

4. 2D DRAWING OF THE 3D MODEL (3 weeks)

4.1 Editing the drawing sheet and title block:

4.2 View selection and drawing layout:

4.3 Object properties and styling (hatching, dimensions, text, tables, etc.)

5. ASSEMBLIES (2 weeks)

5.1 Assembly constraints (parallel, coincident, coaxial, fixed, etc.):

5.2 Creating assembly drawings:

5.3 Assembly drawing and parts list:

1. Exploded view.

Assessment Method :

Continuous Assessment: 100%.

Semester: 4

Teaching Unit: UEM 2.2

Subject 1: TP MDC (Soil Mechanics) and MDC (Construction Materials)

VHS: 45h00 (TP: 3h00)

Credits: 3

Coefficient: 2

MDC (Soil Mechanics)

Teaching Objectives :

The student will be able to characterize the physical parameters of soils, classify them from in-situ and laboratory identification tests, and control their compaction.

Recommended Prior Knowledge:

Soil Mechanics course.

Course Content:

- Measurement of weight characteristics (density – water content)
- Measurement of consistency parameters (Atterberg limits)
- Particle size analysis (by sieving and sedimentation)
- Measurement of compaction and bearing capacity characteristics (Proctor and CBR tests)
- In-situ density measurement (membrane densitometer test)

Assessment Method:

Continuous Assessment: 100%.

MDC (Construction Materials)**Teaching Objectives :**

The student will be able to characterize the physico-mechanical parameters of construction materials.

Recommended Prior Knowledge:

Construction Materials course.

Course Content:

- Lab 1: Densities of cement, sand, and gravel
- Lab 2: Particle size analysis of sand and gravel
- Lab 3: Water content and bulking of sand
- Lab 4: Porosity of sand and gravel
- Lab 5: Volumetric coefficient of gravel
- Lab 6: Sand equivalent
- Lab 7: Consistency and setting test of cement

Assessment Method:

Continuous Assessment: 100%.

Semester: 4

Teaching Unit: UEM 2.2

Subject 5: Lab: FM and SoM

TWH: 15h00 (Lab: 1h00)

Credits: 1

Coefficient: 1

Teaching Objectives :

Mettre en application les différentes notions étudiées dans les matières « Fluid Mechanics » enseigné en semestre 3 et la matière « Résistance des matériaux » du semestre en cours.

Recommended Prior Knowledge:

Partie I : Fluid Mechanics

Partie II : Résistance des matériaux.

Course Content:

Part I: Practical Work: Fluid Mechanics

TP N°1: Measurement of density and specific gravity of liquids

TP No. 2: Measurement of liquid viscosity

TP No. 3: Measuring the pressure of liquids and calibrating a pressure gauge

TP N°4: Measurement of hydrostatic force and determination of the center of pressure

TP N°5: Measurement of liquid flow rate

Part II: Practical Work: Strength of materials

TP No. 1. Simple tension-compression tests

TP No. 2. Torsion test

TP No. 3. Simple bending test

TP No. 4. Resilience testing

TP No. 5. Hardness test

Assessment Method:

Continuous Assessment: 100%.

Semester: 4**Teaching Unit: UET 2.2****Subject 1: TIC (Techniques de l'information et de la communication)****VHS: 45h00 (Cours: 1h30 & Workshop : 1h30)****Credits: 2****Coefficient: 2****Teaching Objectives:**

This course aims to develop in students the transversal skills necessary for communicating scientific knowledge. It focuses on mastering literature searches and the use of digital tools (ICT) to collect and organize information, writing clear and well-structured scientific documents (introduction, methodology, results, discussion according to the IMRaD model), delivering compelling oral presentations tailored to the audience, and adhering to ethical and integrity guidelines (particularly intellectual integrity when citing sources). The course emphasizes clarity and conciseness in scientific style – writing must be "precise, clear, and concise" – as well as the ethics of communication (avoiding plagiarism, properly citing sources, etc.).

Prerequisites:

Students must have a scientific baccalaureate or equivalent qualification, with a good command of written and spoken French. Basic computer skills are recommended (word processing, internet browsing, email).

Course Content:**Chapter 1: Introduction to Scientific Communication (1 week)****Chapter 2: Literature Review and ICT (1 week)****Chapter 3: Referencing and Bibliography (1 week)****Chapter 4: Structure of a Scientific Document (1 week)****Chapter 5: Writing a Scientific Document (3 weeks)****Chapter 6: Introduction to Oral Presentations and Public Speaking Techniques (2 weeks)****Public Speaking Techniques:****Chapter 7: Visual Aids and ICT for Presentations (1 week)****Chapter 8: Professional Written Expression (1 week)****Chapter 9: Interpersonal Communication and Active Listening (1 week)****Chapter 10: Ethics and Academic Integrity (1 week)****Chapter 11: Scientific Standards and Practices (1 week)****Workshops :**

Workshop 1: Note-taking exercise based on a short video or scientific text; sharing of effective note-taking techniques (active listening, keywords, organization).

Workshop 2: Bibliographic research workshop: find 5 relevant references on a given topic, download them or extract their abstracts; critical evaluation of source reliability (evaluator, date, content).

Workshop 3: Citation exercise: identify and format references in a given text. Creation of a bibliography according to a given style.

Workshop 4: Drafting a detailed outline (IMRaD) for a given research topic (e.g., a simple scientific problem), identifying the key ideas of each section. ATL 5 :

- Writing a 150-200 word summary of a provided scientific article or short presentation. Exercises in reformulating arguments for the introduction.
- Writing exercise: briefly describing a simple method or experiment based on a given protocol. Creating tables or graphs from simulated data.
- Revision workshop: starting with a deliberately confusing scientific paragraph, reworking the wording to make it clearer and more concise. Correcting long or convoluted sentences.

ATL : 6

- Presentation preparation exercise: Each student prepares a short oral outline on a simple topic in a few minutes, then presents it briefly. Feedback is given on the argument and structure.
- Short individual oral presentations on a familiar topic, with optional video recording. Self-assessment and group feedback on voice and gestures.

ATL 7: Creation of a short slideshow (3–5 slides) on a simple scientific topic. Discussion on visual effectiveness.

ATL 8: Writing a professional email to a professor or supervisor (request for information, project submission). Collaborative proofreading of a text to eliminate common errors.

ATL 9: Role-play: Structured debate on a scientific topic (with turn-taking), or peer-to-peer feedback on a mini-presentation.

ATL 10: Formatting a standard document in Word or LaTeX (cover page, table of contents, chapters, bibliography).

Assessment Method : examen 100%

Detailed Program by Subject for Semester 5 (S5)

Semester: 5

Teaching Unit: UEF 3.1.1

Subject 1: Strength of Materials 2

TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)

Credits: 4

Coefficient: 2

Teaching Objectives:

This course is a continuation of the Strength of Materials course taught in the fourth semester; it covers combined loadings, energy methods, and statically indeterminate systems.

Recommended Prior Knowledge:

SoM 1, Materials Science, Mathematics.

Course Content :

Chapter 1: Plane Bending of Symmetrical Beams – Review	(2 weeks)
Chapter 2: Displacement of Symmetrical Beams in Plane Bending	(2 weeks)
Chapter 3: General Theorems of Elastic Systems (Applications)	(3 weeks)
Chapter 4: Combined Stresses	(3 weeks)
Chapter 5: Solving Hyperstatic Systems	(4 weeks)
Chapter 6: Design Examples – Applications	(1 week)

Assessment Method:

Contrôle continu : 40% ; Examen : 60 %.

Semester: 5
Teaching Unit: UEF 3.1.1
Subject 2: Reinforced Concrete 1
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Teaching Objectives:

To teach the physical and mechanical characteristics of reinforced concrete. To learn the sizing of sections subjected to simple loadings (tension, compression, and simple bending) according to the BAEL and CBA93 regulations.

Recommended Prior Knowledge:

Résistance des matériaux 1, Construction Materials.

Course Content:

Chapter 1. Formulation and Mechanical Properties of Reinforced Concrete (2 weeks)

Chapter 2. Regulatory Requirements (3 weeks)

Chapter 3. Bond and Anchorage (3 weeks)

Chapter 4. Simple Compression (4 weeks)

Chapter 5. Simple Tension (3 weeks)

Assessment Method:

Continuous Assessment: 40%; Exam: 60%.

Semester: 5
Teaching Unit: UEF 3.1.1
Subject 3: Steel Structures
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Teaching Objectives:

Upon completion of this course, the acquired knowledge should enable the student to understand the basics of calculating metallic elements and knowledge of the regulations in force (EC3 and CCM97) and to have general knowledge of the philosophy of dimensioning and the operation of assemblies.

Recommended Prior Knowledge:

Applied Mathematics, Rational Mechanics, Strength of Materials 1.

Course Content:

Chapter 1. General Concepts (1 week)

Steel in construction, Steel materials, Mechanical properties of steels.

Chapter 2. Basic Concepts and Safety (3 weeks)

Safety concepts, Characteristic values of actions, Technical approaches in structural calculations, Regulations (CCM97 and Eurocode 3), Principles of safety verification, Stresses and combinations of actions (EC3 and CCM97).

Chapter 3. Connections (4 weeks)

General information on connections, Connection methods (Rivets, bolts, welding), Technological aspects and operating principles.

Chapter 4. Calculation of members subjected to simple tension (3 weeks)

Use of tension members, Behavior of tension members, Calculation of the net cross-sectional area, Verification of tension members at the ultimate limit state (ULS), Consideration of the effects of connection eccentricities in the calculation of tension members.

Chapter 5. Calculation of flexural members (4 weeks)

Use of flexural members, Elastic calculation of resistance to bending moments, Introduction to the plastic analysis of sections, Resistance to shear force, Verification of flexural members at the ULS (bending moments, shear forces, combined forces), Verification of flexural members at the SLS (calculation of deflections).

Assessment Method :

Contrôle continu: 40 % ; Examen: 60 %.

Bibliographic References:

1. J. MOREL, "Structural Analysis Métalliques selon l'EUROCODE 3".
2. "Règles de conception des structures en acier CCM97", CGS edition, Algiers 1999
3. "Eurocode 3 version", 2008
4. J. BROZZETTI, M.A. HIRT, R. BEZ, "Construction Métallique, Exemples Numériques adaptés aux Eurocodes", Presses Polytechniques et Universitaires Romandes.
5. S.P. TIMOSHENKO, "Théorie de la Stabilité Élastique", DUNOD.

Semester: 5
Teaching Unit: UEF 3.1.2
Subject 1: Soil Mechanics 2
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Teaching Objectives:

The objective of this course is to allow students to build upon the knowledge acquired in soil mechanics (Semester 4). Students will receive instruction on calculating stresses in soils, calculating settlements, and soil consolidation. They will also learn about soil behavior under shear and soil investigation methods.

Recommended Prior Knowledge:

Soil Mechanics 1, Strength of materials1.

Course Content:

Chapter 1. Stresses and Deformations (3 weeks)

Chapter 2. Soil Settlement and Consolidation (5 weeks)

Chapter 3. Soil Shear Strength (4 weeks)

Chapter 4. Soil Investigation and Exploration (3 weeks)

Assessment Method:

Contrôle continu: 40%; Examen: 60%.

Semester: 5
Teaching Unit: UEF 3.1.2
Subject 2: Construction Materials 2
TWH: 22h30 (Lecture: 1h30)
Credits: 2
Coefficient: 1

Teaching Objectives:

The objective is to enable students to build upon the material taught in Semester 4, particularly regarding the components of concrete and their behavior in the fresh state (workability) and in the hardened state (mechanical strength), while also describing the different types of concrete based on current standards. Furthermore, students will learn about the manufacturing processes of various materials, from raw materials to the finished product.

Recommended Prior Knowledge:

During semester 4, the student will have acquired preliminary and basic knowledge of the physical and mechanical characteristics of binders and aggregates. The student will be able to differentiate between the types of mortars.

Course Content:

Chapter 1. Concrete	(7 weeks)
Chapter 2. Ceramic Products	(4 weeks)
Chapter 3. Ferrous and Non-Ferrous Metals	(2 weeks)
Chapter 4. Glass	(2 weeks)

Assessment Method :

Exam: 100%.

Semester: 5
Teaching Unit: UEM 3.1
Subject 1: Topography
VHS: 22h30 (Cours : 1h30, TP: 1h30)
Credits: 3
Coefficient: 2

Teaching Objectives :

The student will learn the fundamentals of surveying, enabling them to subsequently plan and verify the layout of a structure, including leveling, angle and coordinate measurements, and the creation of topographic plans.

The student must be able to plan and verify the layout of a structure or parts of a structure on the ground.

Practical exercises will allow the student to apply the acquired theoretical knowledge. The student will therefore have the opportunity to perform all the measurements, calculations, and transfers known in the field of surveying.

Recommended Prior Knowledge:

Mathématiques ; Physique 1 ; Technical Drawing

Course Content:

Chapter 1. General Concepts (1 week)

Chapter 2. Distance Measurement (1 week)

Chapter 3. Angle Measurement (1 week)

Chapter 4. Area Determination (1 week)

Chapter 5. Direct and Indirect Leveling (1 week)

Chapter 6. Traversing (2 weeks)

Chapter 7. Tacheometry (3 weeks)

Chapter 8. Survey by Abscissa and Ordinate and Quasi-Ordinate (1 week)

Chapter 9. Lateral Oblique Survey (1 week)

Chapter 10. Setting Out (3 weeks)

Practical Work

Lab 1: Measurement of angles and distances. Angles: horizontal and vertical;
 Distances: Direct method, Indirect method.

Lab 2: Traversing

Site reconnaissance, Station selection, Location sketch, Measurements (Angles and distances), Calculations and plotting

Lab 3: Tacheometry

Preparation of field sketch, Detail survey by radiation, Calculations and plotting

Lab 4: Survey by abscissa and ordinate and quasi-ordinate

Choix des lignes d'opération, Mesures, Calculs et report

TP.5: Measurements by lateral obliques

Preparation of field sketch, Detail survey by radiation, Calculations and plotting

Lab 6: Setting out

Setting out d'alignements: Calculs préalable (Bureau), Setting out sur terrain, Setting out d'un virage, Calculs préalable (Bureau), Setting out sur terrain, Setting out d'un bâtiment.

Assessment Method:

Contrôle continu: 40%; Examen: 60%.

Semester: 5
Teaching Unit: UEM 3.1
Subject 2: TP Soil Mechanics 2
TWH: 22h30 (Lab: 1h30)
Credits: 2
Coefficient: 1

Teaching Objectives:

The student will have the opportunity to carry out practical laboratory tests that are related to the knowledge acquired in the MDS2 course.

Recommended Prior Knowledge:

SM1 and SM2.

Course Content:

TP N.1: Soil Permeability

Constant head and variable head permeameters.

TP N.2: Compressibility test using the oedometer

TP N.3: Direct shear test in the Casagrande shear box

Assessment Method:

Continuous Assessment: 100%.

Bibliographic References:

1. J. Collas et M. havard, "Guide de géotechnique: Lexique et Essais", Eyrolles Editions, 1983.

Semester: 5
Teaching Unit: UEM 3.1
Subject 3: TP Matériaux de Construction 2
TWH: 22h30 (Lab: 1h30)
Credits: 2
Coefficient: 1

Teaching Objectives :

The main objective of these practical sessions is to develop in students an interest in understanding certain specific properties of materials, while adhering to current standards, and above all, to familiarize them with a key material in the field of civil engineering: concrete. The sessions provide students with direct exposure to laboratory techniques.

Having acquired basic knowledge of materials through practical exercises, students then need to deepen their understanding through more specific tests on concrete.

Recommended Prior Knowledge :

Construction Materials, TP Construction Materials, Strength of Materials1.

Course Content :

Lab 1: Determination of the fineness modulus and fines content of sand.

Lab 2: Use of the Dreux-Gorisse method for determining concrete mix design.

Lab 3: Preparation and testing of mortars.

Lab 4: Workability test using the Abrams cone.

Lab 5: Crushing test on concrete.

Lab 6: Non-destructive testing.

Assessment Method :

Contrôle continu : 100%.

Bibliographic References

1. G. Dreux, Le nouveau guide du béton, Eyrolles Editions.
2. F. Gorisse, Essais et contrôle des bétons, Eyrolles Editions.

Semester: 5
Teaching Unit: UEM 3.1
Subject 4: Building Drawing
TWH: 37h30 (Lab: 2h30)
Credits: 3
Coefficient: 2

Teaching Objectives:

The student must be able to:

- Optimize their technological "culture" (understanding and communicating information graphically),
- Know the common vocabulary and conventions of graphic representation,
- Take into account the link between design and execution (feasibility).

Recommended Prior Knowledge:

Technical Drawing

Course Content:

Chapter 1. Principles of Technical Drawings	(3 weeks)
Chapter 2. Building Drawings	(4 weeks)
Chapter 3. Specific Rules and Conventions for Drawing Presentation	(5 weeks)
Chapter 4. Drawing of Sanitation Works	(3 weeks)

Assessment Method:

Continuous Assessment: 100%.

Semester: 5
Teaching Unit: UED 3.1
Subject 2: General Hydraulics
TWH: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Teaching Objectives

To teach the fundamental bases of hydraulics, the fundamental flow equations, the evaluation of head loss, and an introduction to network calculations.

Recommended Prior Knowledge:

Fluid Mechanics

Course Content:

Chapter 1. Hydrostatics	(2 weeks)
Chapter 2. Fundamental Equations of Hydrodynamics	(2 weeks)
Chapter 3. Dynamics of Real Liquids	(3 weeks)
Chapter 4. Flow Regimes in Pipes, Hydraulic Resistance	(3 weeks)
Chapter 5. Flow Through Orifices	(2 weeks)
Chapter VI: Open Channel Flow and Weirs	(3 weeks)

Assessment Method:

Exam: 100%.

Semester: 5
Teaching Unit: UET 3.1
Subject: Construction Techniques and Regulations
TWH: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Teaching Objectives:

This course is composed of two parts. The first part aims to present students with the technical and technological aspects of construction operations. The second part introduces students to the basic concepts of the various regulations applied in the design of civil and industrial buildings, with an application of the rules for verifying reinforced concrete structures according to the RPA (French Building Code).

Recommended Prior Knowledge:

The subjects taught in semester 4.

Contenu de la matière:

Chapter 1. Project Development Techniques	(1 week)
Chapter 2. Site Preparation Techniques	(3 weeks)
Chapter 3. Reinforced Concrete Construction Techniques	(2 weeks)
Chapter 4. Steel and Composite Structures	(2 weeks)
Chapter 5. Introduction to Various Regulations	(2 weeks)
Chapter 6. Seismic Design Rules RPA 99 version 2003	(1 week)
Chapter 7. Design of Reinforced Concrete Structures	(2 weeks)
Chapter 8. Specification of Structural Elements	(2 weeks)

Assessment Method:

Examen:100%.

Detailed Program by Subject for Semester 6 (S6)

Semester: 6
Teaching Unit: UEF 3.2.1
Subject 1: Structural Analysis
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
C
redits: 4
Coefficient: 2

Teaching Objectives :

This course should allow students to deepen their knowledge of strength of materials and to acquire methods for solving hyperstatic two-dimensional systems and structures.

Recommended Prior Knowledge :

Strength of Materials 1, Strength of Materials 2.

Course Content :

Chapter 1. Statically Determinate Truss Systems	(4 weeks)
Chapter 2. Statically Determinate Frames	(2 weeks)
Chapter 3. Influence Lines	(3 weeks)
Chapter 4. Statically Indeterminate Systems	(6 weeks)

Assessment Method:

Contrôle continu : 40 %; Examen : 60 %.

Semester: 6
Teaching Unit: UEF 3.2.1
Subject 2: Metal Constructions
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Teaching Objectives:

Upon completion of this course, the knowledge acquired in metal framing (semester 5) should enable the student to complete their general knowledge on the phenomena of elastic instabilities of thin profiles: theoretical and regulatory aspects.

Recommended Prior Knowledge:

To follow this course, it is necessary to have followed the CM1 course on S5 and to have some knowledge of the theory of elastic stability.

Course Content:

Chapter 1. Elastic Instability Phenomena	(2 weeks)
Chapter 2. Calculation of Parts Subjected to Simple Compression	(5 weeks)
Chapter 3. Calculation of Parts Subjected to Combined Buckling	(6 weeks)
Chapter 4. Lateral Buckling of Metallic Parts	(2 weeks)

Assessment Method:

Contrôle continu: 40 %; Examen : 60 %.

Semester: 6

Teaching Unit: UEF 3.2.2

Subject 1: Reinforced Concrete 2

TWH: 67h30 (Lecture: 3h00, Tutorial: 1h30)

Credits: 6

Coefficient: 3

Teaching Objectives:

To teach the design of standard cross-sections (rectangular and T-shaped) under simple and combined loadings, including the effects of shear force and torsion.

Recommended Prior Knowledge:

Strength of materials, Construction Materials, Reinforced concrete 1.

Course Content:

Chapter 1. Calculation of Reinforced Concrete Sections Subjected to Simple Bending **(3 weeks)**

Chapter 2. Shear Force **(3 weeks)**

Chapter 3. Calculation of Reinforced Concrete Sections Subjected to Combined Bending **(7 weeks)**

Chapter 4. Torsion **(2 weeks)**

Assessment Method:

Contrôle Continu : 40%; Examen: 60%.

Semester: 6
Teaching Unit: UEF 3.2.2
Subject 2: Foundations and Geotechnical Works
TWH: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Teaching Objectives:

In this subject, students will have the opportunity to acquire knowledge about foundations and geotechnical structures. They will be able to calculate and verify the stability of certain structures, such as retaining walls, foundations, and embankments.

Recommended Prior Knowledge:

Knowledge acquired in SM1, SM2, SoM1, SoM2, and RC1 courses.

Course Content:

Chapter 1. Limit Equilibrium States	(3 weeks)
Chapter 2. Retaining Structures	(4 weeks)
Chapter 3. Shallow Foundations	(4 weeks)
Chapter 4. Slope Stability	(4 weeks)

Assessment Method:

Contrôle continu : 40%; Examen : 60%.

Semester: 6

Teaching Unit: UEM 3.2

Subject 1: End-of-Degree Project

TWH: 45h00 (Lab: 3h00)

Credits: 4

Coefficient: 2

Teaching Objectives:

They contribute to the assimilation of the knowledge outlined in the curriculum. They are particularly focused on the practical application of concepts. They aim to encourage students' intellectual openness. They prioritize the development of initiative and autonomy in carrying out work, while leaving certain aspects very open:

The project may be individual or collective,

Recommended Prior Knowledge:

SoM, RC, SM, CM, Building Drawing, CAD, Foundations and Geotechnical Works

Course Content:

- Presentation and description of the project
- Presentation of the different calculation steps of a project
- Calculation assumptions
- Materials used
- Standards and regulations used
- Choice of structural system
- Pre-sizing of structural elements and load evaluation
- Calculation of floor reinforcement (hollow core slabs, flat slabs)
- Calculation of secondary elements (a balcony, parapet wall)
- Calculation and reinforcement of staircases
- Calculation and reinforcement of a frame
- Foundation system.
- Production des plans (Plan de coffrage, plan de ferrailage ...) pour les éléments calculés.
- Conclusions and prospects

Assessment Method :

Continuous Assessment: 100%.

Bibliographic References:

1. A. GUERRIN , R.C. LAUVAUR, "Traité du béton armé Tome 1-3-4-11", Dunod Edition.
2. Jean- Pierre Mougain, "Cours de béton armé B.A.E.L. 91", BERTI Edition.
3. Jean Perchat et Jean Roux, "Maitrise du B.A.E.L. 91 et des D.T.U associés", EYROLLES.
4. Jean Perchat et Jean Roux, "Pratique du B.A.E.L. 91 (Cours avec exercices corrigés)", EYROLLES.

Semester: 6
Teaching Unit: UEM 3.2
Subject 2: Computer-Aided Calculation
TWH: 22h30 (Lab: 1h30)
Credits: 3
Coefficient: 2

Teaching Objectives:

To familiarize students with structural engineering software. The student must know the essential functionalities of a calculation software, based on an existing project, and must be able to master the software interface, correctly enter data, and retrieve results.

Recommended Prior Knowledge:

Computer Science 1, 2, and 3

Course Content:

Chapter 1. Basic Concepts of Calculation Software (3 weeks)

Chapter 2. Getting Started with Available Software (6 weeks)

Chapter 3. Study and Monitoring of a Real-World Project (6 weeks)

Assessment Method:

Continuous Assessment: 100%.

Semester: 6
Teaching Unit: UEM 3.2
Subject 3: Quantity Surveying and Cost Estimation
TWH: 22h30 (Lecture: 1h30)
Credits: 2
Coefficient: 1

Teaching Objectives:

The objective of this teaching unit is to provide the student with knowledge of the basic tools for establishing a preliminary measurement and a quote, as well as knowledge of the different measurement procedures.

Prior Knowledge:

This teaching unit requires the essential prerequisites of Construction Drawing and CAD.

Course Content:

Chapter 1. General Concepts (1 week)

Chapter 2. The Process of Quantity Surveying and Preliminary Quantity Surveying (2 weeks)

Chapter 3. Methods of Quantity Surveying and Preliminary Quantity Surveying for Construction Work (2 weeks)

Chapter 4. Application of Preliminary Quantity Surveying for Earthworks and Excavations (2 weeks)

Chapter 5. Preliminary Quantity Surveying in Masonry (2 weeks)

Chapter 6. Preliminary Quantity Surveying for Reinforced Concrete (3 weeks)

Chapter 7. Cost Estimation (3 weeks)

Assessment Method:

Exam: 100%.

Semester: 6
Teaching Unit: UED 3.2
Subject 1: Roads and Utility Networks
TWH: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Teaching Objectives :

In this subject, the student will learn about all the infrastructure works and projects related to the construction and development of access and traffic routes around buildings: roads, sidewalks, cycle paths, green spaces, public lighting, street furniture, etc.

Recommended Prior Knowledge:

Prior knowledge in construction materials, soil mechanics, technical drawing, and plan reading

Course Content:

- | | |
|-------------------------------------|-----------|
| Chapter 1. Roadworks | (3 weeks) |
| Chapter 2. Sanitation | (5 weeks) |
| Chapter 3. Various Utilities | (5 weeks) |
| Chapter 4. Green Spaces | (2 weeks) |

Assessment Method:

Exam: 100%.

Semester: 6
Teaching Unit: UED 3.2
Subject 2: Construction Site Management
TWH: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Teaching Objectives:

Acquire the theoretical and practical knowledge necessary to master the problems of organization and planning of work in construction.

Prior Knowledge:

Knowledge acquired in the General Construction Processes course.

Course Content:

Chapter 1. Site Setup	(1 week)
Chapter 2. Site Equipment	(1 week)
Chapter 3. Work Planning	(3 weeks)
Chapter 4. Scheduling and Planning	(3 weeks)
Chapter 5. PERT Language	(3 weeks)
Chapter 6. Site Management	(4 weeks)

Assessment Method:

Exam: 100%.

Semester: 6
Teaching Unit : UET 3.2
Subject : Entrepreneurship and Start-ups
TWH: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Teaching Objectives:

This course aims to introduce students to the fundamentals of entrepreneurship, startup creation, and innovation processes. It will enable students to acquire the skills necessary to identify innovative opportunities, develop a viable business concept, and understand the essential steps involved in creating a startup.

Course Content :

Chapter 1: Introduction to Entrepreneurship	(2 weeks)
Chapter 2: Identifying Innovative Opportunities	(1 week)
Chapter 3: Business Model Canvas	(3 weeks)
Chapter 4: Introduction to the Business Plan	(2 weeks)
Chapter 5: Financing Startups	(3 weeks)
Chapter 6: Communication and Leadership	(1 week)
Chapter 7: Legal and Administrative Aspects	(1 week)
Chapter 8: From Concept to Implementation - Implementing the Innovative Project	(2 weeks)

Assessment Method: examen 100%