ÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿ

Democratic and Popular Republic of Algeria

ÿÿÿÿÿ ÿÿÿÿÿÿÿ ÿÿÿÿÿÿ ÿÿÿÿÿÿ ÿÿÿÿÿÿ

Ministry of Higher Education and Scientific Research

University

Logo

TRAINING OFFER
LMD

ACADEMIC LICENSE

NATIONAL PROGRAM
2021 – 2022

(2nd update)

Establishment	Faculty / Institute	Department

Domain	Sector	Speciality
Sciences And Technologies	***Industrial hygiene and safety***	***Industrial hygiene and safety***

ÿÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿ

Democratic and Popular Republic of Algeria

ÿÿÿÿÿ ÿÿÿÿÿÿÿ ÿÿÿÿÿÿ ÿÿÿÿÿÿ ÿÿÿÿÿÿÿ

Ministry of Higher Education and Scientific Research

ÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿ

ÿÿÿÿÿÿ ÿÿÿÿÿÿÿ ÿ ÿÿÿÿÿÿÿÿÿÿÿ

Educational Committee
National Domain
Science and Technology

The Lord

a ÿ. ÿ .

ÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿÿÿ

The Lord and the Lord

0221 2022

Al-Qadr	Al-Qaeda/Al-Qaeda	Al-Qaeda

ÿÿÿÿÿÿÿ	Al-Qaeda	Al-Hajj
and the Lord ÿÿÿÿÿÿ	ÿ ÿÿÿ ÿÿÿÿÿÿ ÿÿÿÿÿÿ	ÿÿÿÿ ÿ ÿÿÿÿÿÿÿÿÿ

Degree title: Industrial Hygiene and Safety

Year: 2021-2022

Summary

I – License Identity Card

1 **-** Location of the training :

Faculty (or Institute):

Department :

References of the license authorization order (attach a copy of the order)

2 **-** External partners :

Other partner establishments:

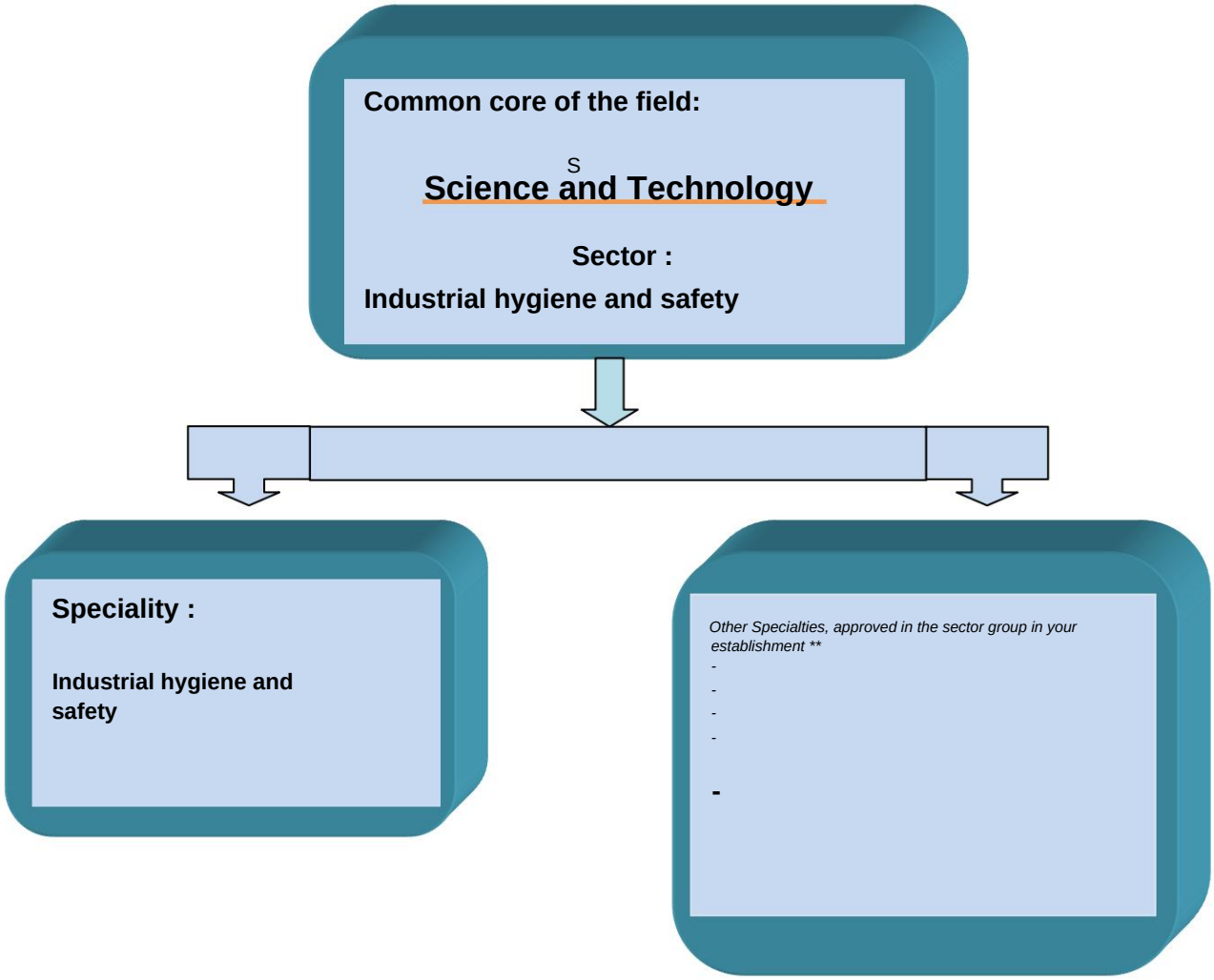
Businesses and other socio-economic partners:

International partners:

3 – Context and objectives of the training

A – General organization of the training : position of the project

***Include in the following diagram the License that is the subject of this framework as well as all 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 sector 'Hygiene and Industrial Safety' (HSI), in the Science and Technology (ST) field, takes care of the prevention and management aspects of risks and dangers linked to economic and industrial activities (fires, explosions, pollutant releases, work accidents, etc.).

Risk control and prevention are essential to ensuring the safety of property and people. Constant technological advances and increasingly stringent environmental and occupational safety legislation are making hygiene and risk prevention increasingly complex tasks.

The training aims to provide the basic knowledge that will enable the future graduate to be able to take on this mission. He is called upon to manage and control risk through organizational and technical measures in order to improve the condition of people at work and to preserve the environment.
The course provided allows, at the end of the 3rd year, not only to continue studies to prepare for masters, but also to integrate the socio-economic sector with appreciable skills.

C – Targeted profiles and skills:

The theoretical and practical knowledge (Knowledge and Know-how) acquired in this training allows the graduate to respond to the concerns of industrial and service companies, within the framework of an ergonomic, hygiene and industrial safety approach. In this respect, the young manager is able to:

- ÿ intervene directly to inspect all areas affecting working conditions through an assessment and analysis of the main risks and nuisances linked to working conditions with the aim of prevention and management;
- ÿ prepare, in compliance with regulations, technological and/or structural developments in companies in the areas of the development and design of work systems (the design and organization of workstations);
- ÿ integrate into their strategy and management the ecological effects relating to the environment ;
- ÿ establish a policy within the company regarding Health and Safety and prevention.

D – Regional and national employability potential:

The growing economic development of the country is not without consequences for the security of humans and the ecosystem.
The use of new processes and increasingly complex machines in production and service activities leads us to implement procedures and means to identify and assess risks in order to comply with regulatory requirements.

The Bachelor's degree program in "Industrial Hygiene and Safety" aims to train versatile executives with knowledge and expertise that will enable them to integrate into all socio-economic, professional, and industrial sectors. They are intended to occupy positions that allow them to perform the following functions:

- ÿ Protect the health of staff against risks, work accidents and occupational diseases;
- ÿ Protect industrial heritage;
- ÿ Protect the environment against risks;
- ÿ Carry out disaster assessments;
- ÿ Carry out audits.

With the curriculum offered within the framework of this degree, graduates are able to integrate different economic sectors:

- ÿ Production and service companies;
- ÿ Local authorities and public bodies;
- ÿ The health sector;
- ÿ Insurance companies;
- ÿ Justice.

E – Gateways to other specialties:

Semesters 1 and 2 common	
Sector	**Specialties**
Aeronautics	Aeronautics
Civil engineering	Civil engineering
Climate engineering	Climate engineering
Maritime engineering	Naval Propulsion and Hydrodynamics
	Naval construction and architecture
Mechanical Engineering	Energy
	Mechanical construction
	Materials Engineering
Hydraulic	Hydraulic
Transportation Engineering	Transportation Engineering
Metallurgy	Metallurgy
Optics and precision mechanics	Optics and photonics
	Precision mechanics
Public works	Public works
Automatic	Automatic
Electromechanics	Electromechanics
	Industrial maintenance
Electronic	Electronic
Electrical engineering	Electrical engineering
Biomedical Engineering	Biomedical Engineering
Industrial engineering	Industrial engineering
Telecommunication	Telecommunication
Process engineering	Process engineering
Mining engineering	Mining
	Valorization of mineral resources
Hydrocarbons	Hydrocarbons
Industrial hygiene and safety	Industrial hygiene and safety
Petrochemical industries	Refining and petrochemicals

Table of sectors and specialties in the Science and Technology field

Sector group A	Common semester 3
Sector	**Specialties**
Automatic	Automatic
Electromechanics	Electromechanics
	Industrial maintenance
Electronic	Electronic
Electrical engineering	Electrical engineering
Biomedical Engineering	Biomedical Engineering
Industrial engineering	Industrial engineering
Telecommunication	Telecommunication

Group of streams B	Common semester 3
Sector	**Specialties**
Aeronautics	Aeronautics
Civil engineering	Civil engineering
Climate engineering	Climate engineering
Maritime engineering	Naval Propulsion and Hydrodynamics
	Naval construction and architecture
Mechanical Engineering	Energy
	Mechanical construction
	Materials Engineering
Hydraulic	Hydraulic
Transportation Engineering	Transportation Engineering
Metallurgy	Metallurgy
Optics and precision mechanics	Optics and photonics
	Precision mechanics
Public works	Public works

Sector group C	Common semester 3
Sector	**Specialties**
Process engineering	Process engineering
Mining engineering	Mining
	Valorization of mineral resources
Hydrocarbons	Hydrocarbons
Industrial hygiene and safety	Industrial hygiene and safety
Petrochemical industries	Refining and petrochemicals

The courses which present common basic teachings between them (semester 3) have been grouped into 3 groups: A, B and C. These groups correspond schematically to the families of Electrical Engineering (Group A), Mechanical Engineering and Civil Engineering (Group B) and finally Process Engineering and Mining Engineering (Group C).
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.

Half	Group of sectors	Common lessons
Semester 1	A - B - C	(30/30) Credits
Semester 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.

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 organized at the end of each semester. It brings together teachers and students from the year group 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:

ÿ Evolution of the rate of students who have chosen this degree (Supply/demand ratio). ÿ Rate and quality of students who choose this degree.

During training:

ÿ Regularity of educational committee meetings. ÿ Conformity of the themes of the End of Cycle Projects with the nature of the training.
ÿ Quality of the relationship between students and the administration.
ÿ Support provided to students in difficulty.
ÿ Student satisfaction rate with teaching and methods teaching.

Downstream of the training:

ÿ Student success rate per semester in this degree. ÿ Student dropout rate (failures and dropouts).
ÿ Identification of the causes of student failure.
ÿ Reorientation alternatives are offered to students who fail.
ÿ Rate of students who graduate on time. ÿ Rate of students who continue their studies after the bachelor's 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, upon request, be made available to the various institutions: National Educational Committee for the Field of Science and Technology,

Regional Conferences, Vice-Rectorate in charge of pedagogy, Faculty, etc.

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

ÿ Equipping teaching rooms and laboratories with materials and supports necessary for educational improvement (projection systems (data shows), Wi-Fi connection, etc.).

ÿ Existence of a communication and teaching platform in which courses, tutorials and practical work are accessible to students and their questions are answered.
ÿ Equipping educational laboratories with materials and equipment in adequacy with the content of the lessons.

- ÿ Number of actual teaching weeks provided during a semester and what about student absenteeism?
- ÿ Rate of completion of teaching programs.
- ÿ Digitization and conservation of End of Studies and/or End of Cycle dissertations.
- ÿ Number of practical exercises carried out as well as the multiplication of the type of practical exercises per subject (diversity of practical exercises).
- ÿ Quality of the establishment's documentary collection in relation to the specialty and its accessibility.
- ÿ Support from the socio-economic sector { training (company visits, company internships, courses-seminars given by professionals, etc.).

3. Integration of graduates:

A coordination committee is created, composed of training managers and members of the Administration, which is mainly responsible for monitoring the integration of graduates of the sector into professional life, for creating a monitoring file of graduates of the sector, for identifying and/or updating existing economic and industrial potential at regional and national level, for anticipating and encouraging new professions related to the sector in association with the chamber of commerce, the various employment support agencies, public and private operators, etc., for participating in any action concerning the professional integration of graduates (organization of events with socio-economic operators).

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

- ÿ Recruitment rate of graduates in the socio-economic sector in a position in direct relationship with training.
- ÿ Nature of jobs held by graduates.
- ÿ Diversity of outlets.
- ÿ Establishment of an association of former graduates of the sector.
- ÿ Creation of small businesses by graduates of the specialty.
- ÿ Degree of employer satisfaction.

G- Student assessment through continuous assessment and personal work:

G1- Evaluation by Continuous Assessment:

The importance of the methods of continuous assessment on the training of students in terms of educational achievements is no longer to be demonstrated. In this regard, Articles 20, 21 and 22 of Order 712 of November 3, 2011, define and specify the methods and organization of the continuous assessment of students according to the training course. The calculation of the averages of the continuous assessment (supervised work and practical work) is made from a weighting of all the elements that constitute 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 university establishments showed heterogeneity in the implementation of continuous assessment of students. Therefore, we are led to admit a real deficit in the effective management of this pedagogical activity, which required serious reflection on this subject on our part, which, combined with proposals from several establishments, resulted in the recommendations below.

The analysis of the various proposals from these establishments showed that, indeed, Articles 21 and 22 of Order 712 of 3 November 2011 are not explicit enough and deserve more clarification. These articles could be enriched by taking into account the following points which represent a summary of the proposals collected.

1. Proposals relating to subjects with supervised work:

1.1. Preparation of the exercise series:

The teacher responsible for the subject must organize himself by proposing a series of exercises for each chapter of the course. This series must be exhaustive, with exercises for understanding the course and standard exercises to be solved during tutorial sessions.
These exercises must be prepared by the student before attending the tutorial. This preparation can be assessed. The assessment method is left to the discretion of the instructor in charge of the tutorial.

Exercises not resolved in TD can be the subject of personal work to be completed by groups of 3 to 4 students and submitted for assessment (deadline: 1 week).

1.2. Written questions:

Each end of a series of exercises *(i.e.* each end of a chapter) will be marked by a short written test. This test must be organized in collaboration with the subject head in order to ensure a fair assessment for all students (essentially when several teachers are involved in the tutorials).

1.3. Student participation in tutorials:

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

1.4. Student attendance:

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

2. Case of methodological units (Practical work):

Just like the TDs, the TPs must be prepared by the student. A test to control this preparation must be organized by the teacher before each manipulation (in the form of short comprehension questions, multiple choice questions, diagram of the manipulation, etc.). A report (by working group) must be submitted at the end of the practical work session.

title, the teacher must prepare a standard report (outline) to facilitate the work for the students so that they can actually submit it at the end of the practical work session.
At the end of the semester, the teacher organizes a practical test which summarizes all the manipulations carried out by the student.

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

It is very difficult to carry out 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 numbers of students.

However, the teacher in charge of this subject may, if he wishes, inform the students that he may possibly assess them (ongoing) by asking them to prepare presentations, to make reports, to research the course supplement, to use free software, to ask the students to watch at home a popular science film related to the subject (after having given them either the film on electronic media or having given them the internet link to this film) and then ask them to submit a written report or to make an oral presentation of the summary of this film, etc. The bonus for these activities is left to the discretion of the teacher and the training team who alone are able to define the best way to take this personal work into account in the overall mark of the final exam.

Along the same lines, and in the case where the number of students in this subject is reasonable (20 to 30 students), which may be the case for many masters, the head of the subject may consider continuous assessments of the student { like what is done in subjects with supervised work. The only obligation to be respected is that students should be informed of this procedure and validated during the first Academic Council.

In any case, the teacher and the teaching team are free to include any type of assessment they deem appropriate to encourage students to take better charge of their course and, at the same time, combat the phenomenon of student absenteeism.
to the courses.

4. Harmonization of continuous monitoring:

The use of a common grid for assessment would promote the harmonization of these practices from one teacher to another, from one department to another and from one establishment to another. It would also constitute a structuring and reassuring benchmark for students.
To do this, we propose below an evaluation grid {for information purposes only} which presents the different continuous assessments allowing us to evaluate the degree of acquisition of students' skills, whether in terms of knowledge, analytical skills or synthesis skills.

Please note that these assessments are not intended to "trap" students by imposing very difficult continuous assessments on them. On the contrary, the aim is to "honestly" assess the degree of assimilation of the different skills and knowledge taught to the student in all
objectivity. In the same spirit, we would gain by promoting the contractualization of the assessment of learning by specifying, for example, the success criteria and good practices that would lead to correct and precise answers to the 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 assess students' ability to use their skills in more complex situations.

4-1 Practical work:

Preparation of exercise series 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 tutorials	20%	04 points
Total	**100%**	**20 points**

4.2 Practical work:

Practical work preparation tests Report	20%	04 points
(must be submitted at the end of the practical work 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 spirit of the LMD. A very substantial amount of time has been allocated to it each week: approximately 50% of the total training time (see the "Overall Training Summary" table in this training offer).
A survey conducted by the CPND-ST among training teams across all university establishments indicated that time spent on students' personal work could be used wisely, under good teacher supervision, rationally and in various forms. The tasks that would then be completed by volunteer students would be evaluated 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 knowledge and strengthen the training of students, they will be asked to complete 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, ... These activities can be evaluated, graded and entered 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 teamwork spirit.

The theme of the mini course project must be well targeted and decided by the teacher for a group of students (2 to 5 maximum), sanctioned by a single report (10 pages maximum) and a short collective oral presentation (preferably with audio-visual support). A mark, common to the group, is awarded according to an evaluation grid (presentation of the document and use of bibliographic resources, oral presentation, respect for time, answers to questions, etc.) and will then be counted, as a bonus, in the continuous assessment mark.

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

Visits, educational outings, discovery and/or immersion courses are opportunities for students that can help them better understand the reality of the working world and help them achieve better professional integration later on.
Administrative managers and teachers must encourage, as much as possible, this very important aspect of training and ensure the organization of educational visits and outings throughout the training course.
They must also help/encourage students to prospect 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 holidays.

In this context, teachers must ensure that students take notes during these outings and require reports (reports of a few pages). This activity can be evaluated, graded and recorded as a bonus for the student who completes it. Students can be offered templates *to* help them present their internship report properly.

4. Participation in scientific events:

In order to instill in students the scientific spirit (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 on the occasion of exhibitions, fairs and others.
This activity can be assessed, graded and entered 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 between them (promotional pages,

discussion forum on a specific issue in a course, 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 as a lever for success, is largely based on the personal work that the student is required to do, by appropriating the resources and tools made available to them. All of this must, of course, be supervised and formalized within the framework of the educational monitoring and support that must be provided jointly by the university teacher and the administrative manager throughout the training course.

This autonomy will allow him to build his professional identity based on his aspirations, his abilities and his achievements or even to build his academic career in the pursuit of higher education.

4 - Human resources available:

A: Supervision capacity (expressed in number of students that can be supported):

Number of students:

B: Internal teaching team mobilized for the specialty: (To be completed and endorsed by the faculty or institute)

First and last name	Graduation Diploma	Specialty diploma (Master, doctorate)	Grade	Materials to teach	Signing in

Departmental visa

Faculty or institute visa

C: External teaching team mobilized for the specialty: (To be completed and endorsed by the faculty or institute)

First and last name	Establishment of attachment	Graduation Diploma	Specialty diploma (Master, doctorate)	Grade	Materials to teach	Signing in

Departmental visa

Faculty or institute visa

D: Overall summary of human resources mobilized for the specialty (L3) :

Grade	Internal Staff	External Staff	Total
Teachers			
Lecturers (A)			
Lecturers (B)			
Assistant Professor (A)			
Assistant Professor (B)			
Other (*)			
Total			

(*) Technical and support staff

5 - Material resources specific to the specialty

A- Educational Laboratories and Equipment: **Sheet of existing educational equipment for the practical work of the planned training (1 sheet per laboratory)**

Lab title:

Student capacity:

No.	Equipment designation	Number	Observations

B- Internships and company training: (see agreements/conventions section)

Internship location	Number of students	Duration of the internship

C- Documentation available at the specific establishment level { the training offered (Mandatory field):

D- Personal work and ICT spaces available at department and faculty level :

II – Half-yearly organization sheets for the specialty courses

Semester 1

Unit teaching	Materials Titled	Credits	Hourly volume weekly Course	TD	TP	Volume Hourly Biannual (15 weeks)	Work Complementary in consultation (15 weeks)	Assessment method Control Continuous	Exam
Fundamental EU Code: UEF 1.1 Credits: 18 Coefficients: 9	Mathematics 1	6	3	3h00	1h30	67h30	82h30	40%	60%
	Physics 1	6	3	3h00	1h30	67h30	82h30	40%	60%
	Structure of matter	6	3	3h00	1h30	67h30	82h30	40%	60%
Methodological EU Code: UEM 1.1 Credits: 9 Coefficients: 5	Physics 1 Practical Work	2	1		1h30	10:30 p.m.	27:30	100%	
	Chemistry 1 practical work	2	1		1h30	10:30 p.m.	27:30	100%	
	Computer Science 1	4	2	1h30	1h30	45h00	55h00	40%	60%
	Writing methodology	1	1	1h00		3:00 p.m.	10:00 a.m.		100%
EU Discovery Code: UED 1.1 Credits: 1 Coefficients: 1	Careers in Science and Technologies 1	1	1	1h30		10:30 p.m.	2:30 a.m.		100%
E Transversal Code: UET 1.1 Credits: 2 Coefficients: 2	Ethical and deontological dimension (the foundations)	1	1	1h30		10:30 p.m.	2:30 a.m.		100%
	Foreign language 1 (French or English)	1	1	1h30		10:30 p.m.	2:30 a.m.		100%
Total semester 1		**30**	**17**	**4:00 p.m.**	**4:30 a.m.**	**375 hours**	**375 hours**		

Semester 2

Unit teaching	Materials Titled	Credits	Weekly hourly volume Course	TD	TP		Volume Hourly Biannual (15 weeks)	Work Complementary in consultation (15 weeks)	Assessment method Control Continuous	Exam
Fundamental EU Code: UEF 1.2 Credits: 18 Coefficients: 9	Mathematics 2	6	3	3h00	1h30		67h30	82h30	40%	60%
	Physics 2	6	3	3h00	1h30		67h30	82h30	40%	60%
	Thermodynamics	6	3	3h00	1h30		67h30	82h30	40%	60%
Methodological EU Code: UEM 1.2 Credits: 9 Coefficients: 5	Physics 2 Practical Work	2	1			1h30	10:30 p.m.	27:30	100%	
	Chemistry 2 practical work	2	1			1h30	10:30 p.m.	27:30	100%	
	Computer Science 2	4	2	1h30		1h30	45h00	55h00	40%	60%
	Presentation methodology	1	1	1h00			3:00 p.m.	10:00 a.m.		100%
EU Discovery Code: UED 1.2 Credits: 1 Coefficients: 1	Careers in science and technologies 2	1	1	1h30			10:30 p.m.	2:30 a.m.		100%
Transversal EU Code: UET 1.2 Credits: 2 Coefficients: 2	Foreign language 2 (French and/or English)	2	2	3h00			45h00	5:00 a.m.		100%
Total semester 2		**30**	**17**	**4:00 p.m.**	**4:30 a.m.**	**4:30 a.m.**	**375 hours**	**375 hours**		

Semester 3

Unit teaching	Materials Titled	Credits		Hourly volume weekly Course	TD	TP		Volume Hourly Biannual (15 weeks)	Work Complementary in consultation (15 weeks)	Assessment method Control Continuous	Exam
Fundamental EU Code: UEF 2.1.1 Credits: 10 Coefficients: 5	Mathematics 3	6	3	3h00	1h30			67h30	82h30	40%	60%
	Waves and vibrations	4	2	1h30	1h30			45h00	55h00	40%	60%
Fundamental EU Code: UEF 2.1.2 Credits: 8 Coefficients: 4	Fluid mechanics	4	2	1h30	1h30			45h00	55h00	40%	60%
	Mineral chemistry	4	2	1h30	1h30			45h00	55h00	40%	60%
Methodological EU Code: UEM 2.1 Credits: 9 Coefficients: 5	Probability and statistics	4	2	1h30	1h30			45h00	55h00	40%	60%
	Computer Science 3	2	1			1h30		10:30 p.m.	27:30	100%	
	Technical drawing	2	1			1h30		10:30 p.m.	27:30	100%	
	TP Waves and vibrations	1	1			1 hour		3:00 p.m.	10:00 a.m.	100%	
EU Discovery Code: UED 2.1 Credits: 2 Coefficients: 2	HSE Installations industrial	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
	Regulations and standards	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
Transversal EU Code: UET 2.1 Credits: 1 Coefficients: 1	Technical English	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
Total semester 3		**30**	**17 1**	**30 p.m.**	**7:30 a.m.**	**4:00 a.m.**		**375 hours**	**375 hours**		

Semester 4

Unit teaching	Materials Titled	Credits		Hourly volume weekly Course	TD	TP		Volume Hourly Biannual (15 weeks)	Work Complementary in consultation (15 weeks)	Assessment method Control Continuous	Exam
Fundamental EU Code: UEF 2.2.1 Credits: 10 Coefficients: 5	Risk typology	6	3	3h00	1h30			67h30	82h30	40%	60%
	Human and material reliability	4	2	1h30	1h30			45h00	55h00	40%	100%
Fundamental EU Code: UEF 2.2.2 Credits: 8 Coefficients: 4	Regulations and standards in HSI	4	2	1h30	1h30			45h00	55h00	40%	60%
	Numerical methods	4	2	1h30	1h30			45h00	55h00	40%	60%
Methodological EU Code: UEM 2.2 Credits: 9 Coefficients: 5	Control and measuring devices	5	3	1h30	1h30	1h00		60h00	65h00	40%	60%
	Methods and tools in HSI	2	1				1h30	10:30 p.m.	27:30	100%	
	Numerical Methods Practical Work	2	1				1h30	10:30 p.m.	27:30	100%	
EU Discovery Code: UED 2.2 Credits: 2 Coefficients: 2	Management systems	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
	Environment and hygiene	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
Transversal EU Code: UET 2.2 Credits: 1 Coefficients: 1	Techniques of expression, information and communication	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
Total semester 4		**30**	**17**	**1:30 p.m.**	**7:30 a.m.**	**4:00 a.m.**		**375 hours**	**375 hours**		

Semester 5

Unit teaching	Materials Titled	Credits		Hourly volume weekly Course	TD	TP		Volume Hourly Biannual (15 weeks)	Work Complementary in consultation (15 weeks)	Assessment method Control Continuous	Exam
Fundamental EU Code: UEF 3.1.1 Credits: 12 Coefficients: 6	Fire safety	6	3	3h00	1h30			67h30	82h30	40%	60%
	Facility security and industrial equipment	6	3	3h00	1h30			67h30	82h30	40%	60%
Fundamental EU Code: UEF 3.1.2 Credits: 6 Coefficients: 3	Industrial toxicology	4	2	1h30	1h30			45h00	55h00	40%	60%
	Protection environment	2	1	1h30				10:30 p.m.	27:30		100%
Methodological EU Code: UEM 3.1 Credits: 9 Coefficients: 5	Qualitative methods of risk analysis	3	2	1h30	1h00			37h30	37h30	40%	60%
	Industrial acoustics	2	1	1h30				10:30 p.m.	27:30	40%	60%
	Integrated management system in HSI	2	1	1h30				10:30 p.m.	27:30		100%
	Data analysis and Statistical tools	2	1	1h30				10:30 p.m.	27:30		100%
EU Discovery Code: UED 3.1 Credits: 2 Coefficients: 2	Sustainable development	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
	Notions of ecology	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
Transversal EU Code: UET 3.1 Credits: 1 Coefficients: 1	Case study in HSI	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
Total semester 5		**30**	**17**	**7:30 p.m.**	**5:30 a.m.**	**12:00 a.m.**		**375 hours**	**375 hours**		

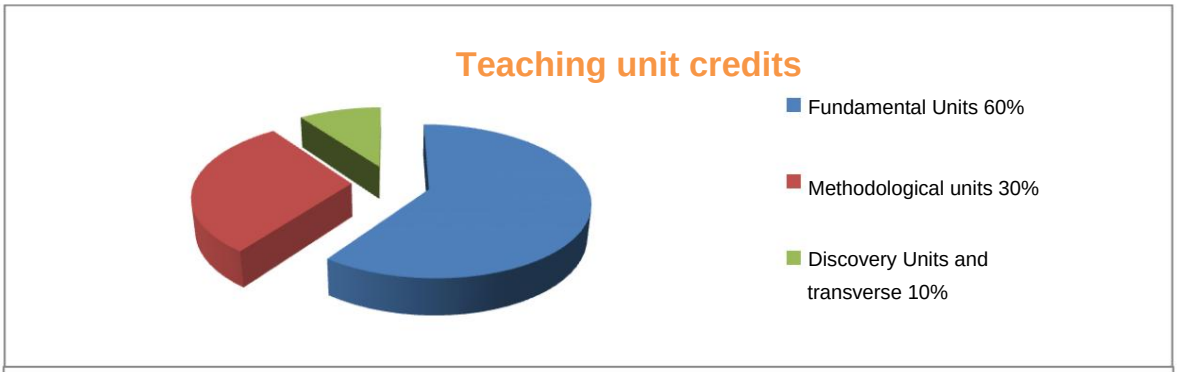
Semester 6

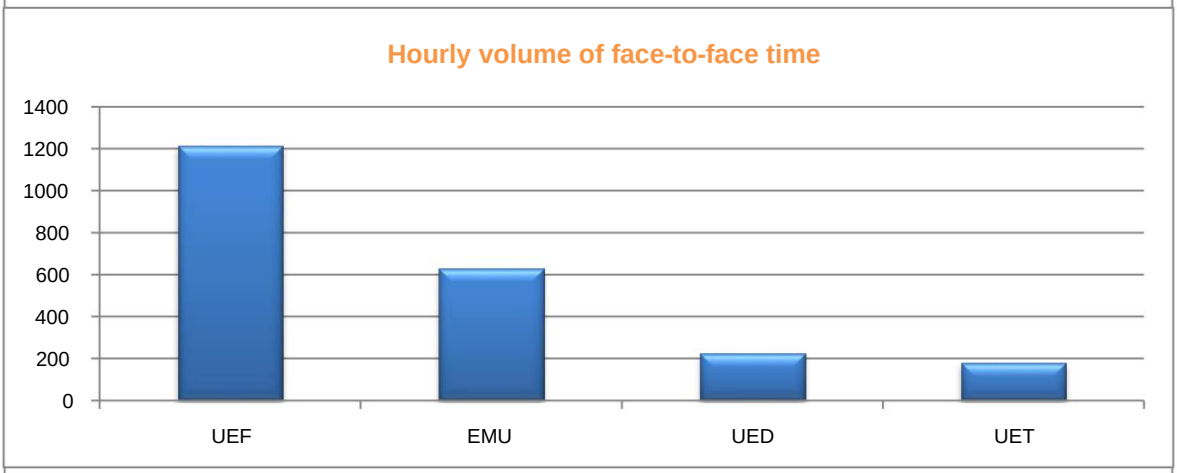
Unit teaching	Materials Titled	Credits		Hourly volume weekly Course	TD	TP		Volume Hourly Biannual (15 weeks)	Work Complementary in consultation (15 weeks)	Assessment method Control Continuous	Exam
Fundamental EU Code: UEF 3.2.1 Credits: 10 Coefficients: 5	Quantitative methods of risk analysis	4	2	1h30	1h30			45h00	55h00	40%	60%
	Insurance and Pricing risks	6	3	3h00	1h30			67h30	82h30	40%	60%
Fundamental EU Code: UEF 3.2.2 Credits: 8 Coefficients: 4	Hazard studies and impact studies	4	2	1h30	1h30			45h00	55h00	40%	60%
	Waste treatment	4	2	1h30	1h30			45h00	55h00	40%	60%
Methodological EU Code: UEM 3.2 Credits: 9 Coefficients: 5	End of Cycle Project	4	2				3:00 a.m.	45h00	55h00	100%	
	Crisis management	3	2	1h30	1h00			37h30	37h30	40%	60%
	Industrial ergonomics	2	1	1h30				10:30 p.m.	27:30		100%
EU Discovery Code: UED 3.2 Credits: 2 Coefficients: 2	Occupational pathologies and work accidents	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
	Simulation concepts crisis	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
Transversal EU Code: UET 3.2 Credits: 1 Coefficients: 1	Entrepreneurship and business management	1	1	1h30				10:30 p.m.	2:30 a.m.		100%
Total semester 6		**30**	**17**	**3:00 p.m.**	**7:00 a.m.**		**3:00 a.m.**	**375 hours**	**375 hours**		

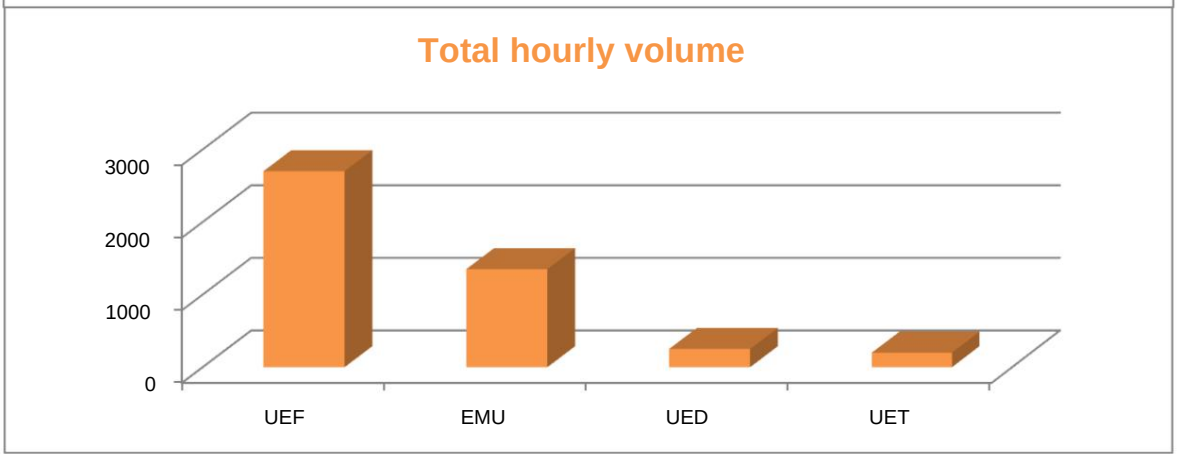
The assessment methods presented in these tables are given for information purposes only; the establishment's training team may suggest other weightings.

Overall training summary:

VH \ EU	UEF	EMU	UED	UET	Total
Course	742h30	255h00	225h00	6:00 p.m.	2:02 p.m.:30 p.m.
TD	472h30	75h00	---	---	547h30
TP	---	300h00	---	---	300h00
Personal work	1485h00	720h00	25h00	8:00 p.m.	2250h00
Other (specify)	---	---	---	---	---
Total	2700h00	1350h00	250h00	8:00 p.m.	4500h00
Credits	108	54	10	8	180
% in credits for each EU	60%	30%	10%		100%







III - Detailed programs by subject

Semester: 1

Teaching unit: UEF 1.1

Subject 1: Mathematics 1

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

Credits: 6

Coefficient: 3

Teaching objectives

This first subject of mathematics is particularly dedicated to the homogenization of the level of students at the entrance to university. The first new elements are taught progressively in order to lead students towards more advanced mathematics. The concepts covered in this subject are fundamental and among the most used in the field of Science and Technology.

Recommended prior knowledge

Basic concepts of mathematics for final year classes (sets, functions, equations, etc.).

Content of the material:

Chapter 1. Methods of Mathematical Reasoning 1-1 Direct Reasoning. 1-2 Reasoning by Contraposition. 1-3 Reasoning by Absurdity. 1-4 Reasoning by counter-example. 1-5 Reasoning by recurrence. **(1 Week)**

Chapter 2. Sets, Relations and Applications 2.1 Set Theory. 2-2 Order Relation, Equivalence Relations. 2-3 Injective, Surjective, Bijective Application: Definition of an Application, Direct Image, Reciprocal Image, Characteristic of an Application. **(2 Weeks)**

Chapter 3. Real functions with one real variable (3 Weeks)
3-1 Limit, continuity of a function. 3-2 Derivative and differentiability of a function.

Chapter 4. Application to Elementary Functions 4-1 Power Function. 4-2 Logarithmic Function. 4-3 Exponential Function. 4-4 Hyperbolic Function. 4-5 Trigonometric Function. 4-6 Inverse Function **(3 Weeks)**

Chapter 5. Limited Development 5-1 Taylor's Formula. 5-2 Limited Development. 5-3 Applications. **(2 Weeks)**

Chapter 6. Linear Algebra 6-1 Laws and internal composition. 6-2 Vector space, basis, dimension (definitions and elementary properties). 6-3 Linear application, kernel, image, rank. **(4 Weeks)**

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

1- K. Allab, Elements of analysis, Function of a real variable, 1st & 2nd years of university, Office of University Publications.

2- J. Rivaud, Algebra: Preparatory Classes and University Volume 1, Exercises with Solutions, Vuibert.

3- N. Faddeev, I. Sominski, Collection of exercises in higher algebra, Moscow Edition

Balabne, Mr. Duflo, Mr. Frish, D. Guegan, Geometry – 2 e first year classes 4 - Mr. preparatory, Vuibert University.

5- B. Calvo, J. Doyen, A. Calvo, F. Boshet, Algebra exercises, 1st scientific cycle preparation for the grandes écoles 2nd year, Armand Colin – Collection U.

6- J. Quinet, Elementary course in higher mathematics 1- Algebra, Dunod.
7- J. Quinet, Elementary course in higher mathematics 2- Usual functions, Dunod.
8- J. Quinet, Elementary course in higher mathematics 3- Integral calculus and series, Dunod.

9- J. Quinet, Elementary course in higher mathematics 4- Differential equations, Dunod.

Semester: 1

Teaching unit: UEF 1.1
Subject 2: Physics 1
VHS: 67h30 (Lecture: 3h00, Tutorial: 1h30)
Credits: 6
Coefficient: 3

Teaching objectives

Introduce the student to the basics of Newtonian physics through three main parts: Kinematics, Dynamics and Work and Energy.

Recommended prior knowledge

Notions of mathematics and physics.

Content of the material:

Mathematical reminders **(2 Weeks)**

1- Dimensional equations
2- Vector calculus: scalar product (norm), vector product, multivariate functions, derivation. Vector analysis: gradient, rotational operators, etc.

Chapter 1. Cinematics (5 Weeks)

1- Position vector in coordinate systems (Cartesian, cylindrical, spherical, curvilinear) - law of motion - Trajectory. 2- Velocity and acceleration in coordinate systems. 3- Applications: Movement of the material point in the
different coordinate systems. 4- Relative motion.

Chapter 2. Dynamics: 1- General: **(4 Weeks)**

Mass - Force - Momentum - Absolute and Galilean Frame of Reference. 2- Newton's Laws. 3- Principle of Conservation of Momentum. 4- Differential Equation of Motion. 5- Angular Momentum. 6- Applications of the Fundamental Law for Forces (Constant, Time-Dependent, Speed-Dependent, Central Force, etc.).

Chapter 3. Work and Energy 1- **(4 Weeks)**

Work of a force. 2- Kinetic Energy. 3- Potential Energy – Examples of potential energy (gravity, gravitational, elastic). 4- Conservative and non-conservative forces - Total energy theorem.

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

1. A. Gibaud, Mr. Henry; Physics course - Mechanics of the point - Course and corrected exercises; Dunod, 2007.
2. P. Fishbane et al. ; Physics For Scientists and Engineers with Modern Physics, 3rd Ed.; 2005.
3. PA Tipler, G. Mosca; Physics For Scientists and Engineers, 6th Ed., WH Freeman Company, 2008.

Semester: 1

Teaching unit: UEF 1.1

Subject 3: Structure of matter

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

Credits: 6

Coefficient: 3

Teaching objectives

Teaching this subject allows the student to acquire basic formalisms in chemistry, particularly within the subject describing the atom and the chemical bond, the chemical elements and the periodic table with energy quantification. Making students more capable of solving chemistry problems.

Recommended prior knowledge

Basic concepts of mathematics and general chemistry.

Content of the material:

Chapter 1: Fundamental notions **(2 Weeks)**

States and macroscopic characteristics of the states of matter, changes of states of matter, notions of atom, molecule, mole and Avogadro's number, atomic mass unit, atomic and molecular molar mass, molar volume, Law of mass: Conservation of mass (Lavoisier), chemical reaction, Qualitative aspect of matter, Quantitative aspect of matter.

Chapter 2: Main constituents of matter Introduction: **(3 Weeks)**

Faraday's experiment: relationship between matter and electricity, Highlighting the constituents of matter and therefore of the atom and some physical properties (mass and charge), Rutherford's planetary model, Presentation and characteristics of the atom (Symbol, atomic number Z, mass number A, number of protons, neutrons and electrons), Isotopy and relative abundance of different isotopes, Separation of isotopes and determination of the atomic mass and the average mass of an atom: Mass spectrometry: Bainbridge spectrograph, Binding and cohesion energy of nuclei, Stability of nuclei.

Chapter 3: Radioactivity – Nuclear reactions **(2 Weeks)**

Natural radioactivity (ÿ, ÿ and ÿ radiation), Artificial radioactivity and nuclear reactions, Kinetics of radioactive decay, Applications of radioactivity.

Chapter 4: Electronic structure of the atom **(2 Weeks)**

Wave-particle duality, Interaction between light and matter, Bohr's atomic model: hydrogen atom, The hydrogen atom in wave mechanics, Polyelectronic atoms in wave mechanics.

Chapter 5: Periodic Classification of Elements D. **(3 Weeks)**

Mendeleev's Periodic Classification, Modern Periodic Classification, Evolution and Periodicity of Physicochemical Properties of Elements, Calculation of Radii (Atomic and Ionic), Successive Ionization Energies, Electronic Affinity and Electronegativity (Mulliken Scale) by Slater's Rules.

Chapter 6: Chemical Bonds **(3 Weeks)**

Covalent bonding in Lewis theory, Polarized covalent bonding, dipole moment and partial ionic character of the bond, Geometry of molecules: Gillespie theory or VSEPR, Chemical bonding in the quantum model.

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references 1.

Ouahes, Devallez, General Chemistry, OPU.
2. SS Zumdhal & coll., General Chemistry, De Boeck University.
3. Y. Jean, Electronic structure of molecules: 1 from the atom to simple molecules, 3rd edition, Dunod, 2003.

4. F. Vassaux, Chemistry in IUT and BTS.
5. A. Casalot & A. Durupthy, Inorganic Chemistry 2nd cycle course, Hachette.
6. P. Arnaud, Course in Physical Chemistry, Ed. Dunod.
7. M. Guymont, Structure of matter, Belin Coll., 2003.
8. G. Devore, General Chemistry: T1, study of structures, Coll. Vuibert, 1980.
9. M. Karapetiantz, Constitution of Matter, Ed. Mir, 1980.

Semester: 1

Teaching unit: UEM 1.1 Subject 1: Physics

1 practical work VHS: 10:30 p.m.

(practical work: 1:30 p.m.)

Credits: 2

Coefficient: 1

Teaching objectives Consolidate the theoretical knowledge provided in the course through a number of practical exercises.

Recommended prior knowledge: Notions of mathematics and physics.

Content of the material:

5 manipulations minimum (3 hours / 15 days):

- Methodology for presenting practical work reports and calculating errors.
- Verification of Newton's 2nd law - Free fall -
Simple
pendulum - Elastic
collisions - Inelastic collisions
- Moment of inertia - Centrifugal
force

Assessment method:

Continuous assessment: 100%.

Semester: 1

Teaching unit: UEM 1.1

Subject 2: Chemistry 1 Practical Work

VHS: 10:30 p.m. (TP: 1:30 p.m.)

Credits: 2

Coefficient: 1

Teaching objectives

Consolidate the theoretical knowledge provided during the structure of matter course through a number of practical exercises.

Recommended prior knowledge

Basic Chemistry Concepts.

Content of the material:

1. Laboratory safety

2. Preparation of solutions

3. Notions on uncertainty calculations applied to chemistry.

4. Acid-base dosage by colorimetry and pH-metry.

5. Acid-base dosage by conductivity meter.

5. Oxidation-reduction assay

6. Determination of water hardness

7. Determination of ions in water: determination of chloride ions by the Mohr method.

Assessment method:

Continuous assessment: 100%

Semester: 1

Teaching unit: UEM 1.1

Subject 3: Computer Science 1

VHS: 45h00 (Course: 1h30, Practical work: 1h30)

Credits: 4

Coefficient: 2

Objective and recommendations:

The objective of the subject is to enable students to learn to program 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 must be implicitly addressed during language learning.

Recommended prior knowledge

Basic concepts of web technology.

Content of the material:

Part 1. **Introduction to Computer** **(5 Weeks)**

Science 1- Definition of Computer Science
2- Evolution of computing and computers
3- Information coding systems
4- Operating principle of a computer
5- Hardware part of a computer
6- System part
Basic systems (operating systems (Windows, Linux, Mac OS, etc.)
Programming languages, application software

Part 2. **Concepts of algorithm and program** 1- **(10 Weeks)**
Concept of an algorithm
2- Organizational chart representation
3- Structure of a program
4- The approach and analysis of a problem
5- Data structure: Constants and variables, Data types
6- Operators: assignment operator, relational operators, logical operators, arithmetic operations, priorities in operations
7- Input/output operations
8- Control structures: Conditional control structures, Repetitive control structures

Computer Science 1:

The practical exercises are intended to illustrate the concepts taught during the course. These exercises should begin with the lessons according to the following schedule:

• Introductory and familiarization work with the computer machine from a hardware and operating system point of view (exploration of the different functionalities of the OS)
• Introductory practical work on using a programming environment (Editing, Assembly, Compilation, etc.)

• Practical work on applying programming techniques seen in class.

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references 1-

John Paul Mueller and Luca Massaron, Algorithms for Dummies large format, 2017.
2- Charles E. Leiserson, Clifford Stein and Thomas H. Cormen, Algorithmics: course with 957 exercises and 158 problems, 2017.

3- Thomas H. Cormen, Algorithms: Basic Notions, 2013.

Semester: 1

Teaching unit: UEM 1.1

Subject 4: Writing Methodology

VHS: 3:00 p.m. (Class: 1 hour)

Credits: 1

Coefficient: 1

Teaching objectives

To familiarize and train students with current concepts of writing methodology in force in the Science and Technology profession. Among the skills to be acquired: Knowing how to present oneself; Knowing how to write a CV and a cover letter; Knowing how to position oneself in writing or orally in relation to an opinion or an idea; Mastering syntax and spelling in writing.

Recommended prior knowledge

Basic French. Basic principles of writing a document.

Content of the material:

Chapter 1. Concepts and generalities on writing techniques - Definitions, standards **(2 Weeks)**

- Applications: writing a summary, a letter, a request

Chapter 2. Information retrieval, synthesis and exploitation - Information retrieval in libraries (Paper format: Books, Journals) **(3 Weeks)**

-Researching information on the Internet (Digital: Databases; Search engines, etc.).

- Applications

Chapter 3 Techniques and Procedures of Writing **(3 Weeks)**

- Basic Principles of Writing - Punctuation, Syntax, Sentences
- The length of sentences
- Division into paragraphs
- The use of a neutral style and writing in the third person
- Readability
- Objectivity
- Intellectual rigor and plagiarism

Chapter 4 Writing a Report **(4 Weeks)**

Cover pages, Summary, Introduction, Method, Results, Discussion, Conclusion, Bibliography, Appendices, Summary and Keywords

Chapter 5. Applications **(3 Weeks)**

Report of a practical work

Assessment method:

Exam Control: 100%.

Bibliographic references:

1. J.-L. Lebrun, Practical guide to scientific writing, EDP Sciences, 2007.
2. M. Fayet, Successful Reporting, 3rd edition, Eyrolles, 2009.
3. M. Kalika, Master's thesis - Managing a thesis, Writing a report, Preparing a defense, Dunod, 2016.
4. M. Greuter, Succeeding in your dissertation and internship report, l'Etudiant, 2014
5. F. Cartier, Written and oral communication, Edition GEP- Groupe Eyrolles, 2012.
6. M. Fayet, Methods of written and oral communication, 3rd edition, Dunod, 2008.

7. E. Riondet, P. Lenormand, The big book of letter models, Eyrolles, 2012.
8. R. Barrass, Scientist must write – A guide to better writing for scientists, engineers and students, 2d edition, Routledge, 2002.
9. G. Andreani, The Practice of Correspondence, Hachette, 1995.
10. Ph. Rubens, Science & Technical Writing, A Manual of Style, 2d edition, Routledge, 2001.
11. A. Wallwork, User Guides, Manuals, and Technical Writing – A Guide to Professional English, Springer, 2014.

Semester: 1

Teaching unit: UED 1.1

Subject 1: Careers in Science and Technology 1

VHS: 10:30 p.m. (Class: 1.5 hours)

Credits: 1

Coefficient: 1

Objective of the subject:

To introduce the student, in a first step, to all the sectors covered by the Science and Technology Field and in a second step to a range of careers that these sectors lead to. In the same context, this subject introduces the new challenges of sustainable development as well as the new careers that can result from it.

Recommended prior knowledge

None.

Content of the subject:

1. What are engineering sciences? **(2 weeks)**

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

2. Electronics, Telecommunications, Biomedical Engineering, Electrotechnics, Electromechanics, Optics & Precision Mechanics sectors: - Definitions, fields of application (Home **(2 weeks)**
automation, embedded applications for automobiles, Video surveillance, Mobile telephony, Optical fiber, Advanced scientific instrumentation, Imaging and medical instrumentation, Giant mirrors, Contact lenses, Transport and Distribution of electrical energy, Power generation plants, Energy efficiency, Maintenance of industrial equipment, Elevators, Wind turbines, etc.)

- Role of the specialist in these areas.

3. Automation and Industrial Engineering sectors: - Definitions, **(1 week)**
fields of application (Automated industrial chains, Machine tools { Numerical control, Robotics, Inventory management, Goods traffic management, Quality, - Role of the specialist in these fields.

4. Process Engineering, Hydrocarbons and Petrochemical Industries:

(2 weeks)

- Definitions, Pharmaceutical industry, Food industry, Leather and textile industry, Biotechnologies, Chemical and petrochemical industry, Plastics industry, Energy sector (oil, gas), etc.

- Role of the specialist in these areas.

5. Sustainable development (SD): Definitions, **(4 weeks)**
Global issues (climate change, Demographic transitions, Depletion of resources (oil, gas, coal, etc.), Biodiversity loss, etc.), SD diagram (Sustainable = Viable + Livable + Equitable), SD actors (governments, citizens, socio-economic sector, international organizations, etc.), Global nature of SD challenges

6. Sustainable engineering: **(4 weeks)**
Definition, Principles of sustainable engineering (definitions of: sustainable energy/energy efficiency, sustainable mobility/ ecomobility, resource recovery (water, metals and minerals, etc.), sustainable production), Relevance of sustainable engineering in S&T sectors, Relationship between sustainability and engineering, Responsibility of engineers in carrying out sustainable projects, etc.

Student's personal work for this subject:

The teacher in charge of this subject can inform his students that he can always assess them by asking them to prepare job descriptions. Ask students to watch a popular science film at home related to the chosen job (after giving them either the film electronically or giving them the internet link to this film) and then ask them to submit a written report or make an oral presentation of the summary of this film, etc. The credit for these activities is left to the discretion of the teacher and the training team who alone are able to define the best way to take this personal work into account in the overall grade of the final exam.

Group work: Development of job descriptions for professions in each sector based on recruitment advertisements found on job application sites (e.g. **http://www.onisep.fr/Decouvrir-les-metiers,** www.indeed.fr, **www.pole-emploi.fr)** (1 sector / group).

Depending on the capacity of the establishments, recommend calling on doctoral students and former graduates of the establishment in a tutoring/mentoring system where each group can call on its tutor/mentor to develop the job description/discover the different ST professions.

Assessment method:

100% exam

Bibliographic references:

1- What jobs for tomorrow? Publisher: ONISEP, 2016, Collection: Les Dossiers.
2- J. Douënel and I. Sédès, Choosing a career according to your profile, Editions d'Organisation, Collection: Employment & career, 2010.
3- V. Bertereau and E. Ratière, What Job Are You Made For? Publisher: L'Étudiant, 6th edition, Collection: Métiers, 2015.

4- The great book of professions, Publisher: L'Étudiant, Collection: Métiers, 2017.
5- Careers in the aeronautics and space industry, Collection: Parcours, Edition: ONISEP, 2017.
6- Careers in electronics and robotics, Collection: Parcours, Edition: ONISEP, 2015.
7- Environmental and sustainable development professions, Collection: Parcours, Edition: ONISEP, 2015.

8- Construction and public works trades, Collection: Parcours, Edition: ONISEP, 2016.
9- Transport and logistics professions, Collection: Parcours, Edition: ONISEP, 2016.
10- Energy professions, Collection: Parcours, Edition: ONISEP, 2016.
11- Mechanical professions, Collection: Parcours, Edition: ONISEP, 2014.
12- Careers in chemistry, Collection: Parcours, Edition: ONISEP, 2017.
13- Web professions, Collection: Parcours, Edition: ONISEP, 2015.
14- Careers in biology, Collection: Parcours, Edition: ONISEP, 2016.

Semester: 1

Teaching unit: UET 3.1

Subject: Ethical and deontological dimension (the foundations)

VHS: 10:30 p.m. (Class: 1.5 hours)

Credits: 1

Coefficient: 1

Teaching objectives:

The main objective of this course is to facilitate an individual's immersion in student life and their transition into a responsible adult. It helps develop students' awareness of ethical principles. Introduce them to the rules that govern life at the university (their rights and obligations towards the university community) and in the world of work,
raise awareness of respect for and promotion of intellectual property and explain to them the risks of moral evils such as corruption and how to combat them.

Recommended prior knowledge:

None

Content of the material:

I. Fundamentals – ÿÿÿÿÿÿ ÿÿÿÿÿ) 2 weeks)

Definitions:

1. Moral:
2. Ethics:
3. Ethics “Theory of Duty”:
4. The right:
5. Distinction between the different concepts

A. Distinction between ethics and morality
B. Distinction between ethics and deontology

II. The Reference Materials – 2 weeks)

Philosophical references
The religious reference
The evolution of civilizations
The institutional reference

III. The University Franchise – ÿÿÿÿÿÿÿ ÿÿÿÿÿ) 3 weeks)

The Concept of University Franchises
Regulatory Texts
University franchise fees University campus
stakeholders

IV. University Values – ÿÿÿÿÿÿÿÿ ÿÿÿÿÿ) 2 weeks)

Social Values
Community Values
Professional Values

V. Rights and Duties **(2 weeks)**

Student Rights
Student's duties
Teachers' Rights
Obligations of the professor-researcher
Obligations of administrative and technical staff

VI. University Relations (2 weeks)

Definition of the concept of university relations
Student-teacher relations
Student-student relations
Student-staff relations Student-
member relations

VII. Practices (2 weeks)

Best practices for the teacher
Best practices for the student

Bibliographic references

1. Collection of ethics and professional conduct courses from Algerian universities.
2. BARBERI (J.-F.), 'Morality and corporate law', *Les Petites Affiches,* no. 68, June 7, 1995.
3. J. Russ, *Contemporary Ethical Thought,* Paris, puf, *Que sais-je?,* 1995.
4. LEGAULT, GA, Professionalism and Ethical Deliberation, Quebec, Presses de University of Quebec, 2003.
5. SIROUX, D., 'Ethics', in M. Canto-Sperber (ed.), Dictionary of Ethics and moral philosophy, Paris, Quadrige, 2004.
6. Prairat, E. (2009). Teaching professions in the age of ethics. *Education and Companies, 23.*
7. https://elearning.univ-annaba.dz/pluginfile.php/39773/mod_resource/content/1/Cours%20Ethique%20et%20la%20ethics.pdf .

Semester: 1

Teaching unit: UET 1.1

Subject 1: French language1

VHS: 10:30 p.m. (Class: 1.5 hours)

Credits: 1

Coefficient: 1

Teaching objectives:

In this subject, the aim is to develop the following four skills: Oral comprehension, Written comprehension and Oral expression, Written expression through reading and studying texts.

Recommended prior knowledge:

Basic French.

Content of the material:

Below we offer a set of themes that deal with fundamental sciences, technologies, economics, social issues, communication, sport, health, etc.
The teacher can choose texts from this list to develop them during the course. Otherwise, they are free to address other themes of their choice. The texts can be borrowed from various communication media: daily newspapers, sports or entertainment magazines, specialized or popular magazines, books, websites, audio and video recordings, etc.
For each text, the teacher helps the student develop their linguistic skills: listening, comprehension, and oral and written expression. In addition, they must use this text to identify the grammatical structures that they will develop during the same class session. Here, as an illustration, we recall a set of grammatical structures that can be developed as examples. Of course, it is not a question of developing them all or in the same way. Some can be recalled and others detailed.

Examples of themes	Grammatical structures
Climate change Pollution The electric car The robots Artificial intelligence The Nobel Prize The Olympic Games Sport { school The Sahara The currency Assembly line work Ecology Nanotechnologies Optical fiber The engineering profession The power plant Energy efficiency The smart building Wind energy Solar energy	Punctuation. Proper nouns, Articles. Grammatical functions: The noun, The verb, The pronouns, The adjective, The adverb. The complement pronoun "le, la, les, lui, leur, y, en, me, te, … The agreements. The negative sentence. Don't … not, Don't … not yet, Don't … anymore, Don't … never, Don't … point, … The interrogative sentence. Question with "Who, What, What", Question with "When, Where, How much, Why, How, Which, Which". The exclamatory sentence. Reflexive verbs. Impersonal verbs. The indicative tenses: Present, Future, Past Perfect, Simple Past, Imperfect. …

Assessment method:

Review: 100%.

Bibliographic references:

1. M. Badefort, Objective: International French Test, Edulang, 2006.
2. O. Bertrand, I. Schaffner, Passing the TCF, Exercises and training activities, Les éditions de l'école polytechnique, 2009.
3. M. Boulares, J.-L. Frerot, Progressive French Grammar with 400 exercises, Level advanced, CLE International.
4. Collective, Besherelles: Grammar for all, Hatier.
5. Collective, Besherelles: Conjugation for all, Hatier.
6. M. Grégoire, Progressive French Grammar with 400 exercises, Beginner Level, CLE International, 1997.
7. A. Hasni et al., Training in the teaching of science and technology in secondary schools, Presses de l'université du Québec, 2006.
8. J.-L. Lebrun, Practical guide to scientific writing, EDP Sciences, 2007.
9. JM Robert, Difficulties of French, Hachette, 10. C.
Tisset, Teaching the French language at school: Grammar, Spelling and Conjugation, Hachette Education, 2005.
11. J. Bossé-Andrieu, Summary of the Rules of Grammar and Spelling, University Press of Quebec, 2001.
12. J.-P. Colin, French made simple, Eyrolles, 2010.
13. Collective, French Assessment Test, Hachette, 2001.
14. Y. Delatour et al., Practical French grammar in 80 cards with corrected exercises, Hachette, 2000.
15. Ch. Descotes et al., The Exerciser: French Expression for the Intermediate Level, Presses Grenoble University, 1993.
16. H. Jaraush, C. Tufts, On the Vif, Heinle Cengage Learning, 2011.
17. J. Dubois et al., The Essentials – Spelling, Larousse, 2009.

Semester: 1

Teaching Unit: UET 1.1 Subject 1: English Language 1 VHS: 10:30 p.m. (Course: 1.5 hours)
Credit: 1
Coefficient: 1

Objective:

Develop the reading, writing, listening and speaking abilities of the students.

Recommended prior Knowledge: Basic English.

Contents:

The English syllabus consists of a set of texts containing scientific and technical parts. The chosen texts must be used to study scientific and technical English and Grammar acquisition.

The texts must be selected according to the vocabulary built up, familiarization with both scientific and matters in English for further understanding. Therefore, each text will be defined by a set of vocabulary concepts, a set of special sentences (idioms) and comprehension questions.

The texts must also contain a terminology which means the translation of some words from English to French one. , the activity at the end of each session must include a translation of long statements which are selected from the texts.

Examples for some readings: Examples	**of Word Study: Patterns** Iron and Steel Make
+ Noun + Adjective Heat Treatment of Steel.	
	Quantity, Contents
Lubrication of Bearings.	Enable, Allow, Make, etc. + Infinitive The Lathe.
	Comparative, Maximum and Minimum Welding.
	The Use of Will, Can and May Steam
Boilers.	Prevention, Protection, etc., Steam Locomotives
Classification.	The Impersonal Passive
Condensation and Condensers.	Passive Verb + By + Noun (agent)
Centrifugal Governors.	Too Much or Too Little
Impulse Turbines.	Instructions (Imperative)
The Petro Engine.	Requirements and Necessity
The Carburetion System.	Means (by + Noun or –ing)
The Jet Engine.	Time Statements
The Turbo-Prop Engine.	Function, Duty
Aerofoil.	Alternatives

Evaluation mode:

Exam: 100%.

References:

1. J. Upjohn, S. Blattes, V. Jans, Minimum Competence in Scientific English, Office of University Publications, 1994.
2. AJ Herbert, The Structure of Technical English, Longman, 1972.
3. S. Berland-Delepine, Methodical grammar of modern English with exercises, Ophrys, 1982.
4. Test of English as a Foreign Language – Preparation Guide, Cliffs, 1991.
5. R. Fowler, The Little, Brown Handbook, Little, Brown Company, 1980.
6. Cambridge – First Certificate in English, Cambridge books, 2008.
7. K. Wilson, Th. Healy, First Choice, Oxford, 2007.
8. M. Mann, S. Tayore-Knowles, Destination: Grammar & Vocabulary with Answer Key, MacMillan, 2006.
9. E. Hamby, Ph. Bedford Robinson, Special English Computer Applications, Cassell, 1980.

10. P. Charles Brown, Norma D. Mullen, English for Computer Science, Oxford University Press, 1989.
11. Graeme Kennedy, Structure and Meaning in English: A Guide for Teachers, Pearson, 2004.
12. Anne M. Hanson, Brain-Friendly Strategies for Developing Student Writing Skills, 2nd Edition, Corwin Press, 2008.
13. Ann Bridges, How to Pass Higher English, Hodder Gibson-Hachette, 2009.
14. Claude Renucci, English: 1000 Words and Expressions from the Press: Vocabulary and Expressions from the Economic, Social and Political World, Fernand Nathan, 2006.

Semester: 2

Teaching unit: UEF 1.2

Subject 1: Mathematics 2

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

Credits: 6

Coefficient: 3

Teaching objectives

Students are led, step by step, towards understanding mathematics useful for their university studies. At the end of the course, the student should be able to: solve first and second degree differential equations; solve integrals of rational, exponential, trigonometric and polynomial functions; solve systems of linear equations using several methods.

Recommended prior knowledge

Basic concepts of mathematics (differential equation, integrals, systems of equations, etc.)

Content of the material:

Chapter 1: Matrices and Determinants 1-1 **(3 Weeks)**
Matrices (Definition, Operation). 1-2 Matrix associated with a linear map. 1-3 Linear map associated with a matrix. 1-4 Change of basis, transition matrix.

Chapter 0: Systems of linear equations 2-1 Generalities. **(2 Weeks)**
2-2 Study of the set of solutions. 2-3 Methods for solving a
linear system. Resolution by Cramer's method. Resolution by the inverse matrix method. Resolution by Gauss's method

Chapter 3: The Integrals (4 Weeks)
3-1 Indefinite Integral, Property. 3-2 Integration of Rational Functions. 3-3 Integration of Exponential and Trigonometric Functions. 3-4 The Integral of Polynomials. 3-5 Definite Integration

Chapter 4: Differential Equations 4-1 Ordinary **(4 Weeks)**
Differential Equations. 4-2 First-Order Differential Equations. 4-3 Second-Order Differential Equations. 4-4 Second-Order Ordinary Differential Equations
constant coefficient.

Chapter 5: Functions of Several Variables 5-1 Limit, **(2 Weeks)**
Continuity, and Partial Derivatives of a Function. 5-2 Differentiability. 5-3 Double and Triple Integrals.

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

1- F. Ayres Jr, Theory and Applications of Differential and Integral Calculus - 1175 corrected exercises, McGraw-Hill.

2- F. Ayres Jr, Theory and Applications of Differential Equations - 560 corrected exercises, McGraw-Hill.

3- J. Lelong-Ferrand, JM Arnaudiès, Mathematics Course - Differential Equations, Multiple Integrals, Volume 4, Dunod University.

4- M. Krasnov, Collection of problems on ordinary differential equations, Moscow Edition

5- N. Piskunov, Differential and Integral Calculus, Volume 1, Moscow Edition
6- J. Quinet, Elementary course in higher mathematics 3- Integral calculus and series, Dunod.

7- J. Quinet, Elementary course in higher mathematics 4- Differential equations, Dunod.

8- J. Quinet, Elementary course in higher mathematics 2- Usual functions, Dunod.
9- J. Quinet, Elementary course in higher mathematics 1- Algebra, Dunod.
10- J. Rivaud, Algebra: Preparatory Classes and University Volume 1, Exercises with Solutions, Vuibert.

11- N. Faddeev, I. Sominski, Collection of exercises in higher algebra, Moscow Edition.

Semester: 2
Teaching unit: UEF 1.0
Subject 2: Physics 2
VHS: 67h30 (Lecture: 3h00, Tutorial: 1h30)
Credits: 6
Coefficient: 3

Teaching objectives

To introduce the student to the physical phenomena underlying the laws of electricity in general.

Recommended prior knowledge

Mathematics 1, Physics 1.

Subject content:

Mathematical reminders: (1 week)

1- Elements of length, surface, volume in Cartesian, cylindrical, spherical coordinate systems. Solid angle, Operators (gradient, rotational, Nabla, Laplacian and divergence).

2- Multiple derivatives and integrals.

Chapter I. Electrostatics: (6 Weeks)

1- Electrostatic charges and fields. Electrostatic interaction force - Coulomb's law.
2- Electrostatic potential. 3- Electric dipole. 4- Electric field flux. 5- Gauss's theorem. 6- Conductors in equilibrium.
7- Electrostatic pressure. 8- Capacitance of a conductor and a capacitor.

Chapter II. Electrokinetics: (4 Weeks)

1- Electrical conductor. 2- Ohm's law. 3- Joule's law. 4- Electrical circuits. 5-
Application of Ohm's Law to networks. 6- Kirchhoff's Laws. Thevenin's Theorem.

Chapter III. Electromagnetism: (4 Weeks)

1- Magnetic field: Definition of a magnetic field, Biot and Savart's law, Ampere's theorem, Calculation of magnetic fields created by permanent currents.
2- Induction phenomena: Induction phenomena (circuit in a variable magnetic field and moving circuit in a permanent magnetic field), Lorentz force, Laplace force, Faraday's law, Lenz's law, Application to coupled circuits.

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

1. J.-P. Perez, R. Carles, R. Fleckinger; Electromagnetism Foundations and Applications, Ed. Dunod, 2011.
2. H. Djelouah; Electromagnetism; Office of University Publications, 2011.
3. P. Fishbane et al. ; Physics For Scientists and Engineers with Modern Physics, 3rd ed. ; 2005.
4. PA Tipler, G. Mosca; Physics For Scientists and Engineers, 6th ed., WH Freeman Company, 2008.

Semester: 2

Teaching unit: UEF 1.2

Subject 3: Thermodynamics

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

Credits: 6

Coefficient: 3

Teaching objectives

To provide the necessary foundations of classical thermodynamics for applications to combustion and thermal machines. To standardize students' knowledge. The skills to be acquired are: The acquisition of a scientific basis of classical thermodynamics; The application of thermodynamics to various systems; The statement, explanation and understanding of the fundamental principles of thermodynamics.

Recommended prior knowledge

Basic mathematics.

Content of the material:

Chapter 1: Generalities on thermodynamics 1- **(3 Weeks)**
Fundamental properties of state functions. 2- Definitions of thermodynamic systems and the external environment. 3- Description of a thermodynamic system. 4- Evolution and thermodynamic equilibrium states of a system. 5- Possible transfers between the system and the external environment. 6- Transformations of the state of a system (operation, evolution). 7- Reminders of the laws of ideal gases.

Chapter 2: The 1st principle of thermodynamics: 1. Work, **(3 weeks)**
heat, internal energy, concept of conservation of energy. 2. The 1st principle of thermodynamics: statement, concept of internal energy of a system, application to ideal gas, enthalpy function, heat capacity, reversible transformations (isochoric, isobaric, isothermal, adiabatic).

Chapter 3: Applications of the first principle of thermodynamics to thermochemistry
(3 weeks)
Heats of reaction, standard state, standard enthalpy of formation, enthalpy of dissociation, enthalpy of change of physical state, enthalpy of a chemical reaction, Hess's law, law of Kirchoff.

Chapter 4: The 2nd Law of Thermodynamics 1- The 2nd law **(3 weeks)**
for a closed system. 2. Statement of the 2nd law: Entropy of a closed isolated system. 3. Calculation of the variation of entropy: reversible isothermal transformation, reversible isochoric transformation, reversible isobaric transformation, adiabatic transformation, during a change of state, during a chemical reaction.

Chapter 5: The 3rd Principle and Absolute Entropy **(1 week)**

Chapter 6: Free Energy and Enthalpy – Criteria for the Evolution of a System (2 weeks)
1- Introduction. 2- Free energy and enthalpy. 3- Chemical equilibria

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

1. C. Coulon, S. Le Boiteux S. and P. Segonds, Thermodynamics Physics - Course and exercises with solutions, Dunod Edition.
2. HB Callen, Thermodynamics, Course, Edition John Wiley and Sons, 1960

3. R. Clerac, C. Coulon, P. Goyer, S. Le Boiteux & C. Rivenc, Thermodynamics, Course and tutorials in thermodynamics, University of Bordeaux 1,
2003 4. O. Perrot, Thermodynamics Course IUT of Saint-Omer Dunkerque, 2011
5. CL Huillier, J. Rous, Introduction to thermodynamics, Dunod Edition.

Semester: 2

Teaching unit: UEM 1.0

Subject 1: Physics 2 Practical Work

VHS: 45h00 (TP: 1h30)
Credits: 2

Coefficient: 1

Teaching objectives

Consolidate through practical work sessions the theoretical concepts covered in the Physics 2 course.

Recommended prior knowledge

Mathematics 1, Physics 1.

Content of the material:

5 manipulations minimum **(3h00 / 15 days)**

- Presentation of measuring instruments and tools (Voltmeter, Ammeter, Rheostat, Oscilloscopes, Generator, etc.).
- Kirchhoff's laws (mesh law, knot law).
- Thévenin's theorem.
- Association and Measurement of inductances and capacities
- Charging and discharging a capacitor
- Oscilloscope
- Practical work on magnetism

Assessment method:

Continuous assessment: 100%

Semester: 2

Teaching unit: UEM 1.2

Subject 2: Chemistry 2 VHS:

10:30 p.m. (practical work: 1.5 hours)

Credits: 2

Coefficient: 1

Teaching objectives

Consolidate the theoretical concepts covered in the Thermodynamics course through practical work sessions.

Recommended prior knowledge

Thermodynamics.

Content of the material:

1. Ideal gas laws.
2. Water value of the calorimeter.
3. Specific heat: specific heat of liquid and solid bodies.
4. Latent heat: Latent heat of fusion of ice
5. Heat of reaction: Determination of the energy released by a chemical reaction (HCl/NaOH)
6. Hess's Law
7. Vapor pressure of a solution.

Assessment method:

Continuous assessment: 100%

Semester: 2

Teaching unit: UEM 1.2

Subject 3: Computer Science 2

VHS: 45h00 (Course: 1h30, Practical work: 1h30)

Credits: 4

Coefficient: 2

Teaching objectives

Master basic programming and algorithmic techniques. Acquire fundamental computer science concepts. The skills to be acquired are: Programming with a certain degree of autonomy; Designing algorithms from the simplest to the relatively complex.

Recommended prior knowledge

Know how to use the university website, file systems, Windows user interface, programming environment.

Content of the material:

Chapter 1: Indexed Variables **(4 Weeks)**

1- One-dimensional arrays: Representation in memory, Operations on arrays

2- Two-dimensional arrays: Representation in memory, Operations on two-dimensional arrays

Chapter 2: Functions and Procedures **(6 Weeks)**

1- Functions: Types of functions, declaration of functions, function calls

2- Procedures: Concepts of global variables and local variables, simple procedure, procedure with arguments

Chapter 3: Recordings and Files **(5 Weeks)**

1- Heterogeneous data structure

2- Structure of a record (notion of fields)

3- Manipulation of record structures

4- Concept of file

5- File access modes

6- Reading and writing to a file

Computer Science 2:

Plan a certain number of practical exercises to put into practice the programming techniques seen during the course.

- Practical work on applying programming techniques seen in class.

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

1- Algorithms for Dummies large format Book by John Paul Mueller (Informatiker, USA) and Luca Massaron 2017

2- Algorithmics: course with 957 exercises and 158 problems Book by Charles E. Leiserson, Clifford Stein and Thomas H. Cormen 2017

3- Algorithms: Basic Notions Book by Thomas H. Cormen 2013.

Semester: 2

Teaching unit: UEM 1.2

Subject 4: Presentation Methodology

VHS: 3:00 p.m. (Class: 1 hour)

Credits: 1

Coefficient: 1

Teaching objectives

Provide the basics for a successful oral presentation. Skills to acquire include: Knowing how to prepare a presentation; Knowing how to deliver a presentation; Knowing how to capture the audience's attention; Understanding the pitfalls of plagiarism and understanding intellectual property regulations.

Recommended prior knowledge

Expression and communication techniques and writing methodology.

Content of the material:

Chapter 1: The Oral Presentation (3 Weeks)
Communication. Preparing an Oral Presentation. Different Types of Plans.

Chapter 2: Presenting an Oral Presentation (3 Weeks)
Structure of an Oral Presentation. Presenting an Oral Presentation.

Chapter 3: Plagiarism and Intellectual Property (3 Weeks)
1- Plagiarism: Definitions of plagiarism, sanctions for plagiarism, how to borrow other authors' work, quotes, illustrations, how to be sure to avoid plagiarism?
2- Writing a bibliography: Definition, objectives, how to present a bibliography, writing the bibliography

Chapter 4: Presenting Written Work - (6 Weeks)
Presenting Written Work. Applications: Presenting an Oral Presentation.

Assessment method:

Review: 100%.

Bibliographic references:

1. M. Fayet, Methods of written and oral communication, 3rd edition, Dunod, 2008.
2. M. Kalika, Master's thesis – Managing a thesis, Writing a report, Preparing a defense, Dunod, 2016.

3. M. Greuter, Succeeding in your dissertation and internship report, l'Etudiant, 2014
4. B. Grange, Making a Successful Presentation. Preparing Powerful Slides and Communicating Effectively in Public. Eyrolles, 2009.
5. H. Biju-Duval, C. Delhay, All speakers, Eyrolles, 2011.
6. C. Eberhardt, Practical work with PowerPoint. Creating and laying out slides, Dunod, 2014.

7. F. Cartier, Written and oral communication, Edition GEP- Groupe Eyrolles, 2012.
8. L. Levasseur, 50 exercises for public speaking, Eyrolles, 2009.
9. S. Goodlad, Speaking technically – A Handbook for Scientists, Engineers, and Physicians on How to Improve Technical Presentations, Imperial College Press, 2000.
10. M. Markel, Technical communication, eleventh edition, Bedford/St Martin's, 2015.

Semester: 2

Teaching unit: UED 1.2

Subject 1: Careers in Science and Technology 2

VHS: 10:30 p.m. (Class: 1.5 hours)

Credits: 1

Coefficient: 1

Objective of the subject:

To introduce the student, in a first step, to all the sectors covered by the Science and Technology Field and in a second step to a range of careers that these sectors lead to. In the same context, this subject introduces the student to the new challenges of sustainable development as well as the new careers that can result from it.

Recommended prior knowledge

None.

Content of the subject:

1. Industrial Hygiene and Safety (IHS) and Mining Engineering courses : (2 weeks)

- Definitions and areas of application (Safety of property and people, Environmental problems, Exploration and exploitation of mining resources, etc.)
- Role of the specialist in these areas.

2. Climate Engineering and Transport Engineering courses: (2 weeks)

- Definitions, areas of application (Air conditioning, Smart buildings, Transport safety, Traffic management and road, air, naval transport, etc.)
- Role of the specialist in these areas.

3. Civil Engineering, Hydraulics and Public Works courses: (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 use planning, Smart cities, etc.)

- Role of the specialist in these areas.

4. Aeronautics, Mechanical Engineering, Maritime Engineering and Metallurgy: (2 weeks)

- Definitions and fields of application (Aeronautics, Avionics, Automotive industry, Ports, Dikes, Production of industrial equipment, Steel industry, Metal transformation, etc.)
- Role of the specialist in these areas.

5. Approaches to sustainable production: (2 weeks)

Industrial ecology, remanufacturing, ecodesign.

6. Measure the sustainability of a process/product/service: (2 weeks)

Environmental analysis, Life cycle analysis (LCA), Carbon footprint, case studies/applications.

7. Sustainable Development and Business: (3 weeks)

Definition of the company as an economic entity (notions of profit, costs, performance) and social entity (notion of corporate social responsibility), Impact of activities

economic on the environment (examples), Challenges/benefits of SD for the company, Means of engagement in a SD approach (e.g. ISO 14001 certification, labeling (e.g. energy labeling, Ecolabel, Organic/AB Label, FSC Label, etc.), SD strategic plan, Global Reporting Initiative (GRI)…), World rankings of the most sustainable companies (Dow Jones Sustainable Index, Global 100, etc.), Case studies of successful/eco-responsible companies in the ST sectors (e.g. SIEMENS, Cisco, Henkel AG & Co, TOTAL, Peugeot, Eni SPA, etc.).

Personal work of the student for this subject: - **Work in groups/pairs:** Reading articles on sustainable development and/or reports from successful and sustainable companies and preparation of summaries of the main actions undertaken in the field of sustainable development.

Examples of documents for reading and summarizing:
- Case of ONA and ENIEM: Kadri, Mouloud, 2009, Sustainable development, business and ISO 14001 certification, Market and organizations vol. 1 (No. 8), p. 201-215 (free online access: http://www.cairn.info/revue-marche-et-organisations-2009-1-page-201.htm)
- Mireille Chiroleu-Assouline. Sustainable development strategies for businesses. Ideas, The Review of Economic and Social Sciences, CNDP, 2006, pp. 32-39 (free online access: http://halshs.archives-ouvertes.fr/hal-00306217/document)
- Web page on TOTAL 's environmental and societal commitments : https://www.total.com/fr/engagement

- Sustainable mobility innovations from the PSA group: http://www.rapportannuel.groupe-psa.com/rapport-2015/engagements/dessolutions-innovantes-pour-des-transports-durables/

Assessment method:
100% exam

Bibliographic references:
1- V. Maymo and G. Murat, The Sustainable Development and CSR Toolbox - 53 tools and methods, Edition: Dunod, 2017.
2- P. Jacquemot and V. Bedin, The encyclopedic dictionary of sustainable development, Edition: Sciences Humaines, 2017.
3- Y. Veyret, J. Jalta and M. Hagnerelle, Sustainable development: All the issues in 12 lessons, Edition: Autrement, 2010.
4- L. Grisel and Ph. Osset, Life Cycle Analysis of a Product or Service: Applications and Practical Implementation, 2nd Edition: AFNOR, 2008.
5- Sh. Shaked, N. Jolliet-Gavin, P. Crettaz, M. Saadé-Sbeih and O. Jolliet, Life Cycle Analysis: Understanding and Carrying Out an Eco-Assessment, 3rd Edition: PPUR, 2017.
6- G. Pitron and H. Védrine, The rare metals war: The hidden face of the energy and digital transition, Edition: Liens qui libèrent, 2018.
7- Environmental and sustainable development professions, Collection: Parcours, Edition: ONISEP, 2015.

Semester: 2

Teaching unit: UET 1.2

Subject 1: French language 2

VHS: 10:30 p.m. (Class: 1.5 hours)

Credits: 1

Coefficient: 1

Teaching objectives:

In this subject, the aim is to develop the following four skills: Oral comprehension, Written comprehension, Oral expression, Written expression through reading and studying texts.

Recommended prior knowledge:

Basic French.

Content of the material:

Below we offer a set of themes that deal with fundamental sciences, technologies, economics, social issues, communication, sport, health, etc.

The teacher can choose texts from this list to develop them during the course. Otherwise, they are free to address other themes of their choice. The texts can be borrowed from various communication media: daily newspapers, sports or entertainment magazines, specialized or popular magazines, books, websites, audio and video recordings, etc.

For each text, the teacher helps the student develop their linguistic skills: listening, comprehension, and oral and written expression. In addition, they must use this text to identify the grammatical structures that they will develop during the same class session. Here, as an illustration, we recall a set of grammatical structures that can be developed as examples. Of course, it is not a question of developing them all or in the same way. Some can be recalled and others detailed.

Examples of themes	Grammatical structures
The pharmaceutical industry	The subjunctive. The conditional. The imperative.
The food industry	The past participle. The passive form.
The National Employment Agency ANEM	Possessive adjectives, possessive pronouns.
Sustainable development	Demonstratives, Demonstrative pronouns.
Renewable energies	The expression of quantity (several, a few, enough, many, more, less, as much, etc.).
Biotechnology	Numbers and measurements.
Stem cells	The pronouns "who, that, where, whose".
Road safety	Subordinate preposition of time.
The dams	The cause, The consequence.
Water – Water resources	The goal, the opposition, the condition.
Avionics	Comparatives, superlatives.
Automotive electronics	…
Electronic newspapers	
Carbon 14 dating	
Violence in stadiums	
Drugs: a social scourge	
Smoking	
School failure	
The Algerian War	
Social networks	
China, an economic power	
Superconductivity	
Cryptocurrency	
Advertising	
Autism	

Assessment method:

Review: 100%.

Bibliographic references:

1. M. Badefort, Objective: International French Test, Edulang, 2006.
2. O. Bertrand, I. Schaffner, Passing the TCF, Exercises and training activities, Les éditions de l'école polytechnique, 2009.
3. M. Boulares, J.-L. Frerot, Progressive French Grammar with 400 exercises, Level advanced, CLE International.
4. Collective, Besherelles: Grammar for all, Hatier.
5. Collective, Besherelles: Conjugation for all, Hatier.
6. M. Grégoire, Progressive French Grammar with 400 exercises, Beginner Level, CLE International, 1997.
7. A. Hasni et al., Training in the teaching of science and technology in secondary schools, Presses de l'université du Québec, 2006.
8. J.-L. Lebrun, Practical guide to scientific writing, EDP Sciences, 2007.
9. JM Robert, Difficulties of French, Hachette, 10. C.

Tisset, Teaching the French language at school: Grammar, Spelling and Conjugation, Hachette Education, 2005.

11. J. Bossé-Andrieu, Summary of the Rules of Grammar and Spelling, University Press of Quebec, 2001.
12. J.-P. Colin, French made simple, Eyrolles, 2010.
13. Collective, French Assessment Test, Hachette, 2001.
14. Y. Delatour et al., Practical French grammar in 80 cards with corrected exercises, Hachette, 2000.
15. Ch. Descotes et al., The Exerciser: French expression for the intermediate level, Presses Grenoble University, 1993.
16. H. Jaraush, C. Tufts, On the Vif, Heinle Cengage Learning, 2011.
17. J. Dubois et al., The Essentials – Spelling, Larousse, 2009.

Semester: 2

Teaching unit: UET 1.2 Subject 1: English Language 2 VHS: 10:30 p.m. (Course: 1:30 p.m.)
Credits: 1
Coefficient: 1

Objective:
Develop the reading, writing, listening and speaking abilities of the students.

Recommended prior Knowledge: Basic English.

Contents:
The English syllabus consists of a set of texts containing scientific and technical parts. The chosen texts must be used to study scientific and technical English and Grammar acquisition.
The texts must be selected according to the vocabulary built up, familiarization with both scientific and matters in English for further understanding. Therefore, each text will be defined by a set of vocabulary concepts, a set of special sentences (idioms) and comprehension questions.
The texts must also contain a terminology which means the translation of some words from English to French one. , the activity at the end of each session must include a translation of long statements which are selected from the texts.

Examples for some lectures: Examples of Word Study: Patterns Radioactivity.	
Chain Reaction. Reactor Cooling System. Conductor and Conductivity. Induction Motors. Electrolysis. Flow and Metering. Liquid Pumps. Petroleum. Road Foundations. Rigid Pavements. Piles for Foundations. Suspension Bridges.	Explanation of Cause Result Conditions (if), Conditions (Restrictive) Eventuality Manner When, Once, If, etc. + Past Participle Liquid It is + Adjective + to As It is + Adjective or Verb + that… Similarity, Difference In Spite of, Although Formation of Adjectives Phrasal Verbs

Evaluation mode:
Exam: 100%.

References:

1. J. Upjohn, S. Blattes, V. Jans, Minimum Competence in Scientific English, Office of University Publications, 1994.
2. AJ Herbert, The Structure of Technical English, Longman, 1972.
3. S. Berland-Delepine, Methodical grammar of modern English with exercises, Ophrys, 1982.
4. Test of English as a Foreign Language – Preparation Guide, Cliffs, 1991.
5. R. Fowler, The Little, Brown Handbook, Little, Brown Company, 1980.
6. Cambridge – First Certificate in English, Cambridge books, 2008.
7. K. Wilson, Th. Healy, First Choice, Oxford, 2007.
8. M. Mann, S. Tayore-Knowles, Destination: Grammar & Vocabulary with Answer Key, MacMillan, 2006.
9. E. Hamby, Ph. Bedford Robinson, Special English Computer Applications, Cassell, 1980.
10. P. Charles Brown, Norma D. Mullen, English for Computer Science, Oxford University Press, 1989.

11. Graeme Kennedy, Structure and Meaning in English: A Guide for Teachers, Pearson, 2004.
12. Anne M. Hanson, Brain-Friendly Strategies for Developing Student Writing Skills, 2nd Edition, Corwin Press, 2008.
13. Ann Bridges, How to Pass Higher English, Hodder Gibson-Hachette, 2009.
Claude Renucci, English: 1000 Words and Expressions from the Press: Vocabulary and Expressions from the Economic, Social and Political World, Fernand Nathan, 2006.

Semester: 3

Teaching unit: UEF 2.1.1

Subject 1: Mathematics 3

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

Credits: 6

Coefficient: 3

Teaching objectives:

At the end of this course, the student should be able to know the different types of series and their conditions of convergence as well as the different types of convergence.

Recommended prior knowledge

Mathematics 1 and Mathematics 2

Content of the subject:

Chapter 1: Simple and Multiple Integrals 1.1 **3 weeks**
Reminders on the Riemann integral and the calculation of primitives. 1.2 Double and Triple Integrals.

1.3 Application to the calculation of areas, volumes, etc.

Chapter 2: Improper Integrals 2.1 **2 weeks**
Integrals of functions defined on an unbounded interval. 2.2 Integrals of functions defined on a bounded interval, infinite at one end.

Chapter 3: Differential Equations 3.1 **2 weeks**
Review of ordinary differential equations. 3.2 Partial differential equations. 3.3 Special functions.

Chapter 4: Series **3 weeks**
4.1 Numerical series. 4.2 Sequences and series of functions. 4.3 Power series, Fourier series.

Chapter 5: Fourier Transform 5.1 Definition **3 weeks**
and properties. 5.2 Application to the resolution of differential equations.

Chapter 6: Laplace Transform 6.1 Definition **2 weeks**
and properties. 6.2 Application to the resolution of differential equations.

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1- F. Ayres Jr, Theory and Applications of Differential and Integral Calculus - 1175 corrected exercises, McGraw-Hill.

2- F. Ayres Jr, Theory and Applications of Differential Equations - 560 corrected exercises, McGraw-Hill.

3- J. Lelong-Ferrand, JM Arnaudiès, Mathematics Course - Differential Equations, Multiple Integrals, Volume 4, Dunod University.

4- M. Krasnov, Collection of problems on ordinary differential equations, Moscow Edition

5- N. Piskunov, Differential and Integral Calculus, Volume 1, Moscow Edition

6- J. Quinet, Elementary course in higher mathematics 3- Integral calculus and series, Dunod.

7- J. Quinet, Elementary course in higher mathematics 4- Differential equations, Dunod.

8- MR Spiegel, Laplace Transforms, Course and Problems, 450 Corrected Exercises, McGraw-Hill.

Semester: 3

Teaching unit: UEF 0.1.1
Subject 2: Waves and Vibrations VHS:

45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4

Coefficient: 2

Teaching objectives

Introduce the student to the phenomena of mechanical vibrations restricted to low amplitude oscillations for 1 or 2 degrees of freedom as well as the study of the propagation of mechanical waves.

Recommended prior knowledge

Mathematics 2, Physics 1 and Physics 2

Content of the subject:

Preamble : *This subject is divided into two parts, Waves and Vibrations, which can be approached independently of each other. In this regard, and due to the consistency of this subject in terms of content, it is advisable to approach this subject in this order: Waves and then Vibrations for students in the Electrical Engineering (Group A) streams. While for students in Groups B and C (Civil Engineering, Mechanical Engineering and Process Engineering), it is advisable to start with Vibrations. In any case, the teacher is called upon to do his best to cover both parts. We remind you that this subject is intended for engineering professions in the Science and Technology field.*

Also, the teacher is asked to skim over all parts of the course that require demonstrations or theoretical developments and to focus only on the applied aspects. Moreover, the demonstrations can be the subject of auxiliary work to be requested from the students as activities within the framework of the student's personal work. Consult in this regard the paragraph "G- Student evaluation through continuous assessment and personal work" present in this training offer.

Part A: Vibrations

Chapter 1: Introduction to Lagrange's equations 1.1 Lagrange's equations for a particle 1.1.1 Lagrange's equations 1.1.2 Case of conservative systems 1.1.3 Case of velocity-dependent friction forces 1.1.4 Case of a time-dependent external force 1.2 System with several degrees of freedom. **2 weeks**

Chapter 2: Free Oscillations of One-Degree-of-Freedom Systems 2.1 Undamped Oscillations 2.2 Free Oscillations of Damped Systems **2 weeks**

Chapter 3: Forced Oscillations of One-Degree-of-Freedom Systems 1 week
3.1 Differential equation 3.2 Mass-spring-damper system 3.3 Solution of the differential equation 3.3.1 Harmonic excitation 3.3.2 Periodic excitation 3.4 Mechanical impedance

Chapter 4: Free oscillations of two-degree-of-freedom systems 1 week
4.1 Introduction 4.2 Two-degree-of-freedom systems

Chapter 5: Forced Oscillations of Two-Degree-of-Freedom Systems 2 weeks 5.1 Lagrange Equations

5.2 Mass-spring-shock absorber system 5.3
Impedance 5.4
Applications
5.5 Generalization to systems with n degrees of freedom

Part B: Waves

Chapter 1: One-dimensional propagation phenomena 1.1 Generalities and basic definitions 1.2 Propagation equation 1.3 Solution of the propagation equation 1.4 Progressive sinusoidal wave 1.5 Superposition of two progressive sinusoidal waves — **2 weeks**

Chapter 2: Vibrating Strings 2.1 Wave Equation 2.2 Harmonic Progressive Waves 2.3 Free Oscillations of a String of Finite Length 2.4 Reflection and Transmission — **2 weeks**

Chapter 3: Acoustic Waves in Fluids 3.1 Wave Equation
3.2 Speed of sound
3.3 Progressive sinusoidal wave
3.4 Reflection-Transmission — **1 week**

Chapter 4: Electromagnetic Waves 4.1 Wave Equation
4.2 Reflection-Transmission
4.3 Different types of electromagnetic waves — **2 weeks**

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. H. Djelouah; Vibrations and Mechanical Waves – Courses & Exercises (University of USTHB: perso.usthb.dz/~hdjelouah/Coursvom.html)
2. T. Becherrawy; Vibrations, waves and optics; Hermes science Lavoisier, 2010
3. J. Brac; Propagation of acoustic and elastic waves; Hermès science Publ. Lavoisier, 2003.
4. R. Lefort; Waves and Vibrations; Dunod, 2017
5. J. Bruneaux; Vibrations, waves; Ellipses, 2008.
6. J.-P. Perez, R. Carles, R. Fleckinger; Electromagnetism Foundations and Applications, Ed. Dunod, 2011.
5. H. Djelouah; Electromagnetism; Office of University Publications, 2011.

Semester: 3

Teaching unit: UEF 2.1.2
Subject 1: Fluid mechanics
VHS: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Teaching objective:

Introduce the student to the field of fluid mechanics, fluid statics will be detailed in the first part. Then in the second part the study of the movement of inviscid fluids will be considered.
Recommended prior knowledge: mathematics, integral calculus,

Chapter 1: Generalities on Fluid Mechanics. (2 weeks)

I.1 What is Fluid Mechanics?; I.2 Description of movement.; I.3 Streamlines and trajectories.; I.4 Flow configurations: velocity profiles.; I.5 Reminders of vector analysis and elements of index calculation.

Chapter 2: Physical properties of fluids. (2 weeks)

II.1 Density; II.2 Isothermal compressibility; II.3 Surface tension; II.4 Viscosity; II.5

Mathematical problem of fluid mechanics; II.6 Particle derivative; II.7 Boundary conditions; II.8 Dimensions, dimensional equations and units.

Chapter 3: Hydrostatics. (03 weeks)

III.1 Fundamental law of hydrostatics; III.2 Hydrostatic pressure in an incompressible fluid.

III.3 Compressible fluid: perfect gas, III.4 Resultant of hydrostatic pressure forces; III.5 Force exerted on a wall by a fluid; III.6 Archimedes' thrust.

Chapter 4: Conservation of mass. (2 weeks)

IV.1 Leibniz's Theorem; IV.2 Continuity Equation; IV.3 Conservation of Flow.

Chapter 5: Perfect Fluid. (05 weeks)

V.1 Mechanics Reminders; V.2 Momentum Theorem. V.3 Euler's Equations.; V.4 Bernoulli's Theorem., V.5. Examples of application of Bernoulli's Theorem: Pitot probe; Venturi nozzle; Unsteady emptying of a tank; V.6 Air escape from a pressure tank: compressibility limit.

Assessment method: Continuous assessment : 40%; Final exam: 60%

Bibliographic references:

R. Comolet, 'Experimental Fluid Mechanics', Volumes 1, 2 and 3, Ed. Masson et Cie. R. Ouziaux, 'Applied Fluid Mechanics', Ed. Dunod, 1978

BR Munson, DF Young, TH Okiishi, 'Fundamentals of fluid mechanics', Wiley & sons.RV

Gilles, 'Fluid Mechanics and Hydraulics: Courses and Problems', Schaum Series, Mc Graw Hill, 1975.

CT Crow, DF Elger, JA Roberson, RW Engineering fluid mechanics', Wiley & sons

Fox, AT Mc Donald, 'Introduction to fluid mechanics', fluid mechanics' V.

L. Streeter, BE Wylie, 'Fluid mechanics', McGraw Hill

FM White, ''Fluid mechanics'', McGraw Hill

S. Amiroudine, JL Battaglia, 'Fluid Mechanics Course and Corrected Exercises', Ed. Dunod

-N. Midoux, Mechanics and rheology of fluids in chemical engineering, Ed. Lavoisier, 1993.

- M. Fourar, General equations, elastic solids, fluids, turbomachines, similarity, Ed. Ellipses, 2nd Edition 2015.

Semester: *3*

Teaching unit: UEF 2.1.2
Subject 1: Mineral chemistry

VHS: 45h00 (Lecture: 1h30; Tutorial: 1h30)
Credits: 4

Coefficient: 2

Teaching objectives:

Provide the basic concepts of mineral chemistry

Learning some methods such as crystal chemistry and synthesis.

Recommended prior knowledge

Basic notions of general chemistry

Content of the material

Chapter 1: Reminders of some important definitions: 1 week

Mole, Molar mass, molar volume, Mole fraction, mass fraction, volume fraction; Density, density;
Relationship between mass fraction and mole fraction;
Material balance: Concept of reactant and excess reactant, Concept of percentage excess, Concept of percentage conversion

Chapter 2: Crystal Chemistry **3 weeks**

Polyhedral description of structures, connectivity.

Chapter 3: Periodicity and in-depth study of the properties of the elements: 3 weeks
Halogens, Chalcogens, Nitrogen and Phosphorus, Boron.

Chapter 4: The major metallurgies **4 weeks**
(Fe, Ti, Cu, Mg)

Chapter 5: The major mineral syntheses **4 weeks**
(H2SO4, H3PO4, NH3, HNO3)

Assessment method: Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

Ouahès, R, Devallez, B. General Chemistry. Exercises and Problems for Undergraduate Higher Education . Publisud Edition.
Winnacker Karl 1903. Mineral Technology. Edition Eyrolles 1962, copy 1958. Treatise on applied chemistry: Inorganic chemistry, Industrial chemistry, Chemical industries, Chemical engineering.

Semester: 3

Teaching unit: UEM2.1

Subject 1: Probability and Statistics

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

Credits: 4

Coefficient: 2

Subject objectives

This module allows students to see the essential notions 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

Content of the material:

Part A: Statistics

Chapter 1: Basic definitions A.1.1 **(1 week)**

Concepts of population, sample, variables, modalities A.1.2 Different types of statistical variables: qualitative, quantitative, discrete, continuous.

Chapter 2: Single-variable statistical series A.2.1 **(3 weeks)**

Number, Frequency, Percentage.

A.2.2 Cumulative workforce, Cumulative frequency.

A.2.3 Graphical representations: bar chart, pie chart, stick chart.

Polygon of numbers (and frequencies). Histogram. Cumulative curves.

A.2.4 Position characteristics A.2.5

Dispersion characteristics: range, variance and standard deviation, coefficient of variation.

A.2.6 Shape characteristics.

Chapter 3: Two-variable statistical series A.3.1 Data **(3 weeks)**

tables (contingency table). Scatter plot.

A.3.2 Marginal and conditional distributions. Covariance.

A.3.3 Linear correlation coefficient. Regression line and Mayer line.

A.3.4 Regression curves, regression corridor and correlation ratio.

A.3.5 Functional adjustment.

Part B: Probabilities

Chapter 1: Combinatorial Analysis **(1 Week)**

B.1.1 Arrangements

B.1.2 Combinations

B.1.3 Permutations.

Chapter 2: Introduction to Probability B.2.1 **(2 weeks)**

Algebra of Events

B.2.2 Definitions

B.2.3 Probability spaces

B.2.4 General probability theorems

Chapter 3: Conditioning and Independence B.3.1 **(1 week)**

Conditioning,

B.3.2 Independence,

B.3.3 Bayes formula.

Chapter 4: Random Variables B.4.1 **(1 Week)**
Definitions and Properties, B.4.2
Distribution Function, B.4.3
Mathematical Expectation,
B.4.4 Covariance and moments.

Chapter 5: Common discrete and continuous probability laws **(3 Weeks)**
Bernoulli, binomial, Poisson, ...; Uniform, normal, exponential, ...

Assessment method:
Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. D. Dacunha-Castelle and M. Duflo. Probability and Statistics: Fixed-Time Problems. Masson, 1982.

2. J.-F. Delmas. Introduction to probability calculus and statistics. ENSTA handout, 2008.
3. W.Feller. an Introduction to Probability Theory and its Applications, Volume 1. Wiley & Sons, Inc., 3rd edition, 1968.
4. G. Grimmett, D. Stirzaker, Probability and Random Processes, Oxford University Press, 2nd edition, 1992.

5. J. Jacod and P. Protter, Probability Essentials, Springer, 2000.
6. A. Montfort. Course in mathematical statistics. Economica, 1988.
7. A. Montfort. Introduction to Statistics. Ecole Polytechnique, 1991

Semester: 3

Teaching unit: UEM2.1

Subject 2: Computer Science 3

VHS: 10:30 p.m. (TP: 1:30 p.m.)

Credits: 2

Coefficient: 1

Subject objectives:

Teach the student programming using easy-to-access software (mainly: Matlab, Scilab, Mapple, etc.). This subject will be a tool for carrying out practical work on numerical methods in S4.

Recommended prior knowledge:

The basics of programming acquired in computer science 1 and 2.

Content of the subject:

TP 1: Presentation of a scientific programming environment (1 Week)

(Matlab, Scilab, etc.)

TP 2: Script files and Data and variable types (2 Weeks)

TP 3: Reading, displaying and saving data (2 Weeks)

TP 4: Vectors and matrices (2 Weeks)

TP 5: Control instructions (for and while loops, if and switch instructions) (2 weeks)

TP 6: Function files (2 Weeks)

TP 7: Graphics (Management of graphics windows, plot) (2 Weeks)

TP 8: Using toolbox (2 Weeks)

Assessment method:

Continuous assessment: 100%.

Bibliographic references:

1. Jean-Pierre Grenier, Getting Started in Algorithms with MATLAB and SCILAB, Ellipses, 2007.

2. Laurent Berger, Scilab from theory to practice, 2014.

3. Bégyn Arnaud, Gras Hervé, Grenier Jean-Pierre, Programming and simulation in Scilab, 2014.

4. Thierry Audibert, Amar Oussalah, Maurice Nivat, Computer Science: Programming and Calculation scientist in Python and Scilab scientific preparatory classes 1st and 2nd years, Ellipses, 2010.

Semester: *3*

Teaching unit: UEM 2.1

Subject 1: Technical drawing

VHS: 10:30 p.m. (TP: 1:30 p.m.)

Credits: 2

Coefficient: 1

Teaching objectives

This course will allow students to acquire the principles of representing parts in industrial design. Furthermore, this subject will allow the student to represent and read plans.

Recommended prior knowledge (brief description of the knowledge required to follow this course – Maximum 2 lines).

In order to follow this course, basic knowledge of the general principles of drawing is required.

Content of the material

Chapter 1: General Information. **2 weeks**

1.1 Usefulness of technical drawings and different types of drawings.

1.2 Drawing materials.

1.3 Standardization (Types of lines, Writing, Scale, Drawing format and folding, Title block, etc.).

Chapter 2: Elements of descriptive geometry 2.1 **6 Weeks**

Notions of descriptive geometry.

2.2 Orthogonal projections of a point - Drawing of a point - Orthogonal projections of a straight line (any and particular) - Drawing of a straight line - Traces of a straight line- Projections of a plane (Any and particular positions) - Traces of a plane.

2.3 Views: Choice and arrangement of views – Dimensioning – Slope and taper – Determination of the 3rd view from two given views.

2.4 Method of executing a drawing (layout, 45° line, etc.)

Application exercises and assessment (TP)

Chapter 3: Perspectives **2 weeks**

Different types of perspectives (definition and purpose).

Application exercises and assessment (TP).

Chapter 4: Sections and Cuts **2 weeks**

4.1 Sections, standardized representation rules (hatching).

4.2 Projections and sections of simple solids (Projections and sections of a cylinder, a prism, a pyramid, a cone, a sphere, etc.).

4.3 Half-cut, Partial cuts, Broken cuts, Sections, etc.

4.4 Technical vocabulary (terminology of machined shapes, profiles, piping, etc.

Application exercises and assessment (TP).

Chapter 5: Quotation **2 weeks**

5.1 General principles.

5.2 Dimensioning, tolerance and adjustment.

Application exercises and assessment (TP).

Chapter 6: Concepts on definition and assembly drawings and nomenclatures.

1 Week

Application exercises and assessment (TP).

Assessment method: Continuous assessment: 100%.

Bibliographic references:

(Depending on the availability of documentation at the establishment level, websites, etc.)

1. Industrial designer's guide Chevalier A. Hachette Technique Edition;
2. Technical drawing 1st part descriptive geometry Felliachi d. and Bensaada s. Edition OPU Algiers;
3. Technical drawing 2nd part industrial drawing Felliachi d. and bensaada s. Edition OPU Algiers;
4. First notions of technical drawing AndreRicordeau Edition AndreCasteilla;

ÿÿÿÿÿÿ ÿÿÿ ÿÿÿÿÿ ÿÿÿÿÿÿÿÿÿÿ ÿÿÿ ÿÿÿÿÿÿ ÿÿÿÿÿ ÿÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿ 5.

ÿÿÿÿÿ ÿÿÿÿÿÿ ÿÿ ÿÿÿÿÿ ÿÿÿÿÿÿÿ ÿÿÿ ÿÿÿ ÿÿÿÿ ÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿ 6.

ÿÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿÿ ÿÿÿÿÿÿÿ

Recommendation : A large part of the practical work should be in the form of personal work at home.

Semester: 3

Teaching unit: UEM 2.1

Subject 4: Practical work on waves and vibrations

VHS: 3:00 p.m. (TP: 1:00 p.m.)

Credits: 1

Coefficient: 1

Teaching objectives

The objectives assigned by this program focus on introducing students to putting into practice the knowledge received on the phenomena of mechanical vibrations restricted to low amplitude oscillations for one or two degrees of freedom as well as the propagation of mechanical waves.

Recommended prior knowledge

Vibrations and waves, Mathematics 2, Physics 1, Physics 2.

Content of the subject:

TP1: Mass – spring

TP2: Simple pendulum

TP3: Torsion pendulum

TP4: Oscillating electrical circuit in free and forced mode

TP5: Coupled pendulums

TP6: Transverse oscillations in vibrating strings

TP7: Grooved pulley according to Hoffmann

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 TPs from the 10 offered.

Assessment method:

Continuous assessment: 100%.

Bibliographic references:

Semester: *3*

Teaching unit: UED 2.1
Subject 1: HSE Industrial Installations

VHS: 10:30 p.m. (Class: 1.5 hours)
Credits: 1

Coefficient: 1

Teaching objectives

- Identify and assess the risk;
- Implement appropriate prevention methods;
- Check the reality and effectiveness of the systems put in place.

Recommended prior knowledge

Content of the material

Chapter 1: Introduction to risk assessment and control, Accident analysis 1.1 Understand the basic concepts (danger, risk) and **7 weeks**
identify the prevention stakeholders;

1.2 Master the indicators relating to work accidents (frequency rate, severity rate, etc.) and occupational diseases;
1.3 Observe and analyze the risks associated with a work situation;
1.4 Develop a cause tree;

Chapter 2: Introduction to occupational health and environmental protection 8 weeks

2.1 Identify the main aspects of hygiene and public health;
2.2 Know the concepts of home hygiene;
2.3 Know the main areas of environmental protection;
2.4 Understand the issue of sustainable development;
2.5 identify the role and mission of the different organizations in matters of occupational health and safety and public health.

Assessment method: Final exam: 100%.

Bibliographic references:
(Depending on the availability of documentation at the establishment level, websites, etc.)

Semester: *3*

Teaching unit: UED 2.1

Subject 1: Regulations and standards

VHS: 10:30 p.m. (Class: 1.5 hours)

Credits: 1

Coefficient: 1

Teaching objectives

This course aims to introduce students to regulations and standardization and instill in them the importance of both in the industrial field. Students will thus be prepared to comply with regulations and use standards.

Recommended prior knowledge

Content of the material

Chapter 1: Introduction 1.1 **3 weeks**
Regulations and regulatory texts.
1.2 Economic development and standardization.

Chapter 2: Standardization **4 weeks**
2.1 Purpose and development. Association and standards bodies.
2.2 International standardization. Standardization in Algeria: INAPI.

Chapter 3: Production Standardization 3.1 **4 weeks**
Normative Parameters. Product Interchangeability. Tolerances and Adjustments.
3.2 Methods of conformity control, certification.

Chapter 4: Classification **4 weeks**
Classification of products. Classification of standards and their codification.

Assessment method: Final exam: 100%.

Bibliographic references:

(Depending on the availability of documentation at the establishment level, websites, etc.)

Semester: 3

Teaching unit: UET 2.1

Subject 1: Technical English

VHS: 10:30 p.m. (Class: 1.5 hours)

Credits: 1

Coefficient: 1

Teaching objectives:

This course should enable the student to acquire a sufficiently significant level of language to enable him to use a scientific document and speak about his specialty and his field in English,
at least, with a certain ease and clarity.

Recommended prior knowledge:

English 1 and English 2

Content of the subject:

- Oral comprehension and oral expression, vocabulary acquisition, grammar, etc.
- Nouns and adjectives, comparatives, following and giving instructions, identifying things.
- Use of numbers, symbols, equations.
- Measurements: Length, area, volume, power, etc.
- Describe scientific experiments.
- Characteristics of scientific texts.

Assessment method:

Final exam: 100%.

Bibliographic references:

1. J. Upjohn, S. Blattes, V. Jans, Minimum Competence in Scientific English, Office of University Publications, 1994.
2. AJ Herbert, The Structure of Technical English, Longman, 1972.
3. Test of English as a Foreign Language – Preparation Guide, Cliffs, 1991.
4. Cambridge – First Certificate in English, Cambridge books, 2008.
5. K. Wilson, Th. Healy, First Choice, Oxford, 2007.
6. M. Mann, S. Tayore-Knowles, Destination: Grammar & Vocabulary with Answer Key, MacMillan, 2006.
7. P. Charles Brown, Norma D. Mullen, English for Computer Science, Oxford University Press, 1989.
8. Graeme Kennedy, Structure and Meaning in English: A Guide for Teachers, Pearson, 2004.
9. Anne M. Hanson, Brain-Friendly Strategies for Developing Student Writing Skills, 2nd Edition, Corwin Press, 2008.
10. Ann Bridges, How to Pass Higher English, Hodder Gibson-Hachette, 2009.

Semester: 4

Teaching Unit: UEF 2.2.1

Subject 1: Typology of VHS risks: 67h30,

(Lecture: 3h00; Tutorial: 1h30)

Credit: 6

Coefficient: 3

Teaching objective:

Understand the risks that may arise in any professional activity according to the different categories of aggressors. Evaluate and quantify all types of risk.

Recommended prior knowledge: Electricity, magnetism, resistance of materials, acoustics, analytical chemistry, biochemistry.

Content of the subject :

Introduction

Chapter 1: General information on industrial risks Definition of a risk. **3 Weeks**

Chapter 2: Risks Associated with Physical Aggressors 3 Weeks

Electrical risk, Pressure and explosion risk, Handling risk, Vibration and acoustic risk.

Chapter 3: Risks Associated with Chemical Aggressors 3 Weeks

Dangerous chemical reactions, Dangerous aerosols, Dangerous gases and vapors, Dangerous liquids and solids.

Chapter 4: Risks associated with biological aggressors Pathogenic microorganisms, Toxicology. **3 Weeks**

Chapter 5: Risks from Environmental Aggressors 3 Weeks

Ionizing and non-ionizing radiation, environmental pollution and ecotoxicology.

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

References:

1- Levalois P.; Gauvin D.: Review of standards and recommendations for exposure to electromagnetic fields. 1996.

2- Niosh: Manual of Analytical Methods, vol 1-3, 4th edition, CDC 1994.

3- Aiha: The occupational environment – its Evaluation and control, 1997.

4- Dyevre P.; Merelan P.: Health effects of occupational exposure to ultraviolet radiation. 1994.

Semester: 4

Teaching Unit: UEF 2.2.1
Subject 2: Human and material reliability
VHS: 45h00, (Lecture: 1h30; Tutorial: 1h30)
Credit: 4
Coefficient: 2

Teaching objectives: To present to the student the techniques and methods of maintenance as well as the improvement of the reliability of industrial installations.

Recommended prior knowledge:
Statistical analysis, probability and industrial installations and systems

Content of the subject:

Chapter 1: Introduction	**1 Week**
Chapter 2: Systems Theory	**2 weeks**
Chapter 3: Probability – Notions of Dependence	**2 weeks**
Chapter 4: Human Errors: Work Constraints	**1 Week**
Chapter 5: Modeling and Calculating Human Reliability	**3 Weeks**
Chapter 6: Machine Reliability	**3 Weeks**
Chapter 7: Reliability applications: diagram, graph	**3 Weeks**

Assessment method:
Continuous assessment: 40%; Final exam: 60%.

References:

- Villemeur, operational safety of industrial systems. Dunod.
- IEC 61025:1990 standard “fault tree analysis (app)”

Semester: 4

Teaching Unit: UEF 2.2.2

Subject 1: Regulations and standards in HSI VHS: 45 hours,

(Lecture: 1 hour 30 minutes, Tutorial: 1 hour 30 minutes)

Credit: 4

Coefficient: 2

Teaching objectives:

This course allows students to acquire basic notions on labor regulation and standardization, as well as to analyze and locate inconsistencies in terms of regulation and propose optimal solutions to solve problems in the industrial sector.

Recommended prior knowledge: The glossary and definitions of certain terms used in legal sciences and standardization.

Content of the subject:

Chapter 1: Legislation, regulation and standardization of occupational risks

5 weeks

History and labor legislation, The Labor Code and Social Security, Standardization, Regulations for improving the health and safety of workers exposed to various risks.

Chapter 2: Legislation, regulation, standardization and organization of major industrial risks and accidents 5 weeks

Guidelines and other international texts, Official texts and those from other ministries and sectors, Standardization;

Chapter 3: Compliance and Certifications 5 weeks

Certification, The different types of certifications, The safety standards according to the different ones (references, ISO9001, 14001, 22000, OHSAS 18100, ISO 19011, quality and environmental, etc.), Certification and accreditation procedures.

Assessment method:

Continuous assessment: 40%; Exam: 60%.

References:

-Legal documents, categories of legal rules (national, international, European) JORADP and hierarchy of legal standards.

- Sources of law: written sources; non-state sources (general risk prevention provisions, collective agreements)

-National and European institutions: role of the main institutions.

- Administrations linked to the implementation of state policies in HSE: support, inspection and control of companies: SGS, ISGA, etc.

- A. Lannoy. Risk management and operational safety. Publishers: Tec et Doc

Semester: S4

Teaching Unit: UEF 2.2.2 Subject 2:

Numerical Methods

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

Credit: 4

Coefficient: 2

Teaching objectives:

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

Recommended prior knowledge:

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

Content of the subject:

Chapter 1. Solving nonlinear equations f(x)=0 (3 Weeks)

1. Introduction to calculation errors and approximations, 2. Introduction to methods for solving nonlinear equations, 3. Bisection method, 4. Method of successive approximations (fixed point), 5. Newton-Raphson method.

Chapter 2. Polynomial Interpolation 1. General **(2 Weeks)**
Introduction, 2. Lagrange Polynomial, 3. Newton Polynomials.

Chapter 3. Function Approximation: (2 Weeks)

1. Approximation method and quadratic mean. 2. Orthogonal or pseudo-Orthogonal systems. Approximation by orthogonal polynomials, 3. Trigonometric approximation.

Chapter 4. Digital Integration (2 Weeks)

1. General introduction, 2. Trapezoid method, 3. Simpson's method, 4. Quadrature formulas.

Chapter 5. Solving Ordinary Differential Equations (Initial Condition or Cauchy Problem) (2 Weeks)

1. General Introduction, 2. Euler's Method, 3. Improved Euler's Method, 4. Runge's Method-Kutta.

Chapter 6. Direct method of solving systems of linear equations (2 weeks)

1. Introduction and definitions, 2. Gaussian method and pivoting, 3. LU factorization method, 4. Choeleski factorization method MMt , 5. Thomas algorithm (TDMA) for diagonal sorting systems.

Chapter 7. Method of approximate solution of systems of linear equations

(2 Weeks)

1. Introduction and definitions, 2. Jacobi method, 3. Gauss-Seidel method, 4. Use of relaxation.

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. C. Brezinski, Introduction to the practice of numerical calculation, Dunod, Paris 1988.
2. G. Allaire and SM Kaber, Numerical Linear Algebra, Ellipses, 2002.
3. G. Allaire and SM Kaber, Introduction to Scilab. Corrected practical exercises in linear algebra, Ellipses, 2002.

4. G. Christol, A. Cot and C.-M. Marle, Differential Calculus, Ellipses, 1996.
5. M. Crouzeix and A.-L. Mignot, Numerical Analysis of Differential Equations, Masson, 1983.
6. S. Delabrière and M. Postel, Approximation Methods. Differential Equations. Scilab Applications, Ellipses, 2004.
7. J.-P. Demailly, Numerical Analysis and Differential Equations. Grenoble University Press, 1996.
8. E. Hairer, SP Norsett and G. Wanner, Solving Ordinary Differential Equations, Springer, 1993.
9. PG Ciarlet, Introduction to numerical matrix analysis and optimization, Masson, Paris, 1982.

Semester: 4

Teaching Unit: UEM 2.2

Subject 1: Control and measuring devices

VHS: 60h00, (Class: 1h30, TD: 1h30, TP: 1h00)

Credit: 5

Coefficient: 3

Teaching objectives : To present to the student the techniques and methods of maintenance as well as the improvement of the reliability of industrial installations.

Recommended prior knowledge: Statistical analysis, probability and industrial installations and systems.

Content of the subject:

Chapter 1: General Introduction **1 week**

Chapter 2: Choosing a measuring instrument, measuring accuracy Absolute error, Relative error, Law of composition of errors. **1 week**

Chapter 3: Analog Devices 1 week
Construction and types of devices. Specifications of instruments. Measurement accuracy.

Chapter 4: Digital Devices Principle and measurement possibilities. Main characteristics. Accuracy of digital devices. **1 Week**

Chapter 5: Measurement of Electrical Quantities Definitions, quantities provided. **2 weeks**

Chapter 6: Measurement of Physical Quantities: 2 Weeks
Definitions, quantities provided. Classification and types of sensors. Physical principles implemented (phenomena). Metrological characteristics of sensors. Parameters for choosing a sensor.

Chapter 7: Measuring Speeds. Measuring Displacement **3 Weeks**

Chapter 8: Position measurement. Temperature measurement. Pressure measurement. Flow measurement. Level measurement. Vibration measurement. Viscosity measurement. Optical measurement.
4 Weeks

Applications : -

Calibration of a measuring instrument.
- Measurement of electrical intensity and voltage - Measurement of electrical resistance - Measurement of electrical power - Measurement of temperature - Measurement of pressure - Measurement of level - Measurement of vibration - Measurement of flow rate

Assessment method:

Continuous Assessment: 40%, Exam: 60%

References: 1-

Villain and Bar. Measurement and Measuring Instrument. Dunod Edition.
2- Michel Grout and Patrick Salaun. Industrial Instrumentation. Edition: Dunod

Semester: 4

Teaching Unit: UEM 2.2
Subject 2: Methods and tools in HSI VHS:

10:30 p.m., (TP: 1:30 p.m.)
Credit: 2

Coefficient: 1

Teaching objectives:

Develop methodological approaches and tools for identifying, analyzing and controlling technological and natural risks.

Recommended prior knowledge: Mathematics.

Content of the subject:

Chapter 1: Relational Methods and Tools **4 Weeks**

- Psychosociological communication expression

Chapter 2: Methods and technical tools **6 Weeks**

- Reliability element,
- Preliminary risk analysis (PRA)
- Inductive and deductive methods

Chapter 3: Legal Methods and Tools **5 Weeks**

- Social law
- Environmental law

Assessment method:

Continuous assessment: 100%.

References:

- D.Jacob: Methods in HSI, Dunod 2011.
- E.Hubert/ Analysis techniques, Hachette 2010

Semester: 4

Teaching unit: UEM 2.2

Subject 3: Practical work on numerical methods

VHS: 10:30 p.m. (TP: 1:30 p.m.)

Credits: 2

Coefficient: 1

Teaching objectives:

Programming of different numerical methods with a view to their applications in the field of mathematical calculations using a scientific programming language (Matlab, Scilab, etc.).

Recommended prior knowledge: Numerical Method, Computer Science 2 and Computer Science 3.

Content of the subject:

Chapter 1: Solving Nonlinear Equations 1. Bisection Method. 2. Fixed Point Method, 3. Newton-Raphson Method — **3 weeks**

Chapter 2: Interpolation and Approximation 1. Newton's Interpolation, 2. Chebyshev's Approximation — **3 weeks**

Chapter 3: Numerical Integrations 1. Rectangle Method, 2. Trapezoid Method, 3. Simpson Method — **3 weeks**

Chapter 4: Differential Equations 1. Euler's Method, 2. Runge-Kutta Methods — **2 weeks**

Chapter 5: Systems of Linear Equations 1. Gauss-Jordon Method, 2. Crout Decomposition and LU Factorization, 3. Jacobi Method, 4. Gauss-Seidel method — **4 weeks**

Assessment method:

Continuous assessment: 100%.

Bibliographic references:

1. José Ouin, Algorithmics and numerical calculation: Solved practical work and programming with Scilab and Python software, Ellipses, 2013.

2. Bouchaib Radi, Abdelkhalak El Hami, Mathematics with Scilab: guide to calculation, programming, graphic representations; conforms to the new MPSI program, Ellipses, 2015.

3. Jean-Philippe Grivet, Applied digital methods: for scientists and engineers, sciences, 2009. EDP

Semester: 4

Teaching Unit: UED 2.2:

Subject 1: Management system

VHS: 10:30 p.m. (Class: 1.5 hours)

Credit: 1

Coefficient: 1

Teaching objectives:

This course provides students with the basics of management systems and the tools to find and propose optimal solutions to industry problems.

Recommended prior knowledge

Probability and statistics

Content of the subject:

Chapter 1: Introduction **3 Weeks**

ISO 9001 (Quality), ISO 14001 (Environmental), HSAS 18001 (Occupational Health and Safety)

Chapter 2: The various types of FMEA: **3 Weeks**

Product FMEA, Process FMEA, Average FMEA

Chapter 3: Place of AMDEC in a design approach: **3 Weeks**

- AMDEC, a tool for preventing non-quality risks

- Complementarity between functional analysis and AMDEC

Chapter 4: AMDEC methodology: Functional tree **6 Weeks**

structure, Inventory of possible elementary failures, Evaluation of effects, Calculation of criticality, Determination of objective criticality and associated means of prevention, Monitoring of performance and corrective actions.

Assessment method:

Final exam: 100%.

References:

AMDEC/AMDE/AEEL - "A SAVOIR" collection - AFNOR. Authors: Alain Palsky and Raphaël Fiorentino

Semester: 4

Teaching Unit: UED 2.2

Subject 2: Environment and hygiene

VHS: 10:30 p.m., (Class: 1.5 hours)
Credit: 1

Coefficient: 1

Teaching objectives:

Introduce methods of analysis and prevention, discover the different fields of action in HSI

Recommended prior knowledge:

Probability and statistics

Content of the subject:

Chapter 1: Prevention: 1 week

analysis of data on accidents and nuisances, study of some specific risks, introduction to the prevention approach, security stakeholders.

Chapter 2: Accident analysis: the cause tree method. **1 week**

Chapter 3: Introduction to Risk Analysis: 1 week

concept of risk, concept of target, preliminary risk analysis (methods and simple examples in the different areas).

Chapter 4: Identify and analyze pollution and environmental nuisances, study risk prevention and control. **2 weeks**

Chapter 5: Ecology - Ecotoxicology: **2 weeks**

characterization and evolution of biotopes and biocenoses, threats to ecosystems.

Chapter 6: Natural and technological risks: identification, major risks. **2 weeks**

Chapter 7: Studies of waste, discharges and nuisances: **2 weeks**

water quality and treatment sector, waste treatment and recovery sector, atmospheric pollution,

Chapter 8: Noise pollution. **1 Week**

Chapter 9: Environmental Audit - Impact Studies. **2 weeks**

Chapter 12: Information and documentation in HSE **1 Week**

Assessment method:

Final exam: 100%.

References:

1- Perkins JL, Modern Industrial Hygiene Volume I Van Nostrand Reinhold, NY 1997.
2- Dinard SR, Occupational Environment. Its Evaluation and Control 3- , 2003.
Administrations linked to the implementation of state policies in HSE: support,
Inspection and control of companies: SGS, ISGA, etc.

Semester: 4

Teaching unit: UET2.2

Subject: Expression, information and communication techniques

VHS: 10:30 p.m. (Course: 1 hour 30 minutes)

Credits: 1

Coefficient: 1

Teaching objectives:

This course aims to develop the student's skills, both personal and professional, in the field of communication and expression techniques. It also allows the student to learn the techniques, tools and methods used to facilitate communications.

Recommended prior knowledge:

Languages (Arabic; French; English)

Content of the material:

Chapter 1: Research, analyze and organize information Identify and use **(2 weeks)**
locations, tools and documentary resources, Understand and analyze documents, Create and update documentation.

Chapter 2: Improving the ability to express oneself Take into account the communication situation, Produce a written message, Communicate orally, Produce a visual and audiovisual message, Improve the ability to communicate in a group. **(2 weeks)**

Chapter 3: Developing autonomy, organizational and communication skills within the framework of a project approach
Positioning oneself in a project and **(2 weeks)**
communication approach, Anticipating action, Implementing a project: Presentation of a report on practical work (Homework).

Chapter 4: ICT - Definition and Evolution **(2 weeks)**
Definition, Activities using ICT, Mastery of ICT skills, Evolution of ICT,
Information and Communication Services

Chapter 5: Searching, Using, and Retrieving Information. **(2 weeks)**
Search directories (YAHOO, GOOGLE), Search engines, Query and search language, Retrieving and printing an HTML page, Retrieving an image, Downloading a file or software, Playing an HTML file locally, Playing a multimedia file saved on the Web.

Chapter 6: ICT Rights Computer **(2 weeks)**
Crime, Media Law, Electronic Communications Law, Electronic Commerce Law, Internet Governance, etc.

Chapter 7: Securing Sensitive Information, Protecting Confidential Data and Preventing Nuisances.
(3 weeks)

Backup of important data, "Informatique et Libertés" law, Dangers of the Internet, Computer hacking, Machine protection, Protection against viruses, Protection against
Cyber threats or online threats (Phishing, spam emails, spyware, malware, ransomware,

viruses and trojan horses, man-in-the-middle attacks, etc.), Prevent data loss, Spam, Hoaxes, Cryptology, Electronic signature….

Assessment method:
Final exam: 100%.

Bibliographic references:
(Books and handouts, websites, etc.)

1. Jean-Denis Commeignes, 12 methods of written and oral communication – 4th edition, Michelle Fayet and Dunod 2013.
2. Denis Baril, Sirey, Techniques of written and oral expression, 2008.
3. 3- Matthieu Dubost, Improving your written and oral expression: all the keys, Edition Ellipses 2014.
4. Allegrezza Serge and Dubrocard Anne (edited by). Internet Econometrics. Palgrave Macmillan Ltd, 2011. ISBN-10: 0230362923; ISBN-13: 9780230362925
5. Anduiza Eva, Jensen J. Michael and Jorba Laja (edited by). Digital Media and Political Engagement Worldwide. Cambridge UniversityPress - MUA, 2012. ISBN-10: 1107668492; ISBN-13: 9781107668492
6. Baron GL, and Bruillard E. Computing and its users in education. Paris, PUF, 1996. ISBN-10: 2130474926; ISBN-13: 978-2130474920
7. Online Chantepie P. and Le Diberder A. Digital revolution and cultural industries. Landmarks. Paris, La Découverte, 2010. ISBN-10: 2707165050; ISBN-13: 978-2707165053
8. Dawn Medlin B. Integrations of Technology Utilization and Social Dynamics in Organizations. Information Science Reference (Isr), 2012. ISBN-10: 1-4666-1948-1; ISBN-13: 978-1-4666-1948-7
9. Devauchelle B. How digital technology transforms places of knowledge. FYP Editions, 2012. ISBN-10: 2916571612; ISBN-13: 978-2916571614
10. GreenfieldDavid. “The Addictive Properties of Internet Usage.” In Internet Addiction, 133?153. & Sounds, 2007. John Wiley Inc., ISBN: 9780470511165. http://dx.doi.org/10.1002/9781118013991.ch8.
11. Kurihara Yutaka and [Al.]. Information technology and economic development. Information Science Reference (Isr), 2007. ISBN 10: 1599045818; ISBN 13: 9781599045818
12. Paquelin D. The appropriation of digital training devices. From prescription to use. Paris, L'Harmattan, 2009. ISBN-10: 2296085563; ISBN-13: 978-2296085565
13. Tansey Stephen D. Business, information technology and society. Routledge Ltd, 2002. ISBN-10: 0415192137; ISBN-13: 978-0415192132

Semester: 5

Teaching unit: UEF 3.1.1

Subject: Fire safety VHS: 67h30,

(Lecture: 3h00, Tutorial: 1h30)

Credits: 6

Coefficient: 3

Teaching objectives:

Use basic fire safety concepts, define safety zones, understand the operation and use of fire safety equipment.

Recommended prior knowledge :

Risk typology

Content of the material

Chapter 1. ***(2 weeks)***

Reminders on fire risks

Chapter 2. ***(2 weeks)***

Fundamental principles of fire safety: Phenomenology of combustion-explosion, phenomenology of fire (birth, development, propagation) and fire intervention teams (1st, 2nd and 3rd EII).

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

Fire detection: Principles of fire detection, fire detectors, the fire detection system fire detection.

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

Fire extinguishing: Principles of fire extinguishing, extinguishing agents, fire extinguishers (mobile and fixed), fire extinguishing system.

Chapter 5. ***(2 weeks)***

Smoke extraction : Smoke production phenomena, Natural smoke extraction.

Chapter 6. ***(3 weeks)***

Maintenance of fire safety systems: Maintenance of detection installations-extinguishing, maintenance of mobile fire extinguishers.

Chapter 7. ***(2 weeks)***

The new fire risk control benchmark (rule R6)

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

1. *Detection, extinction and instruction plans,* Editions CNPP-France, 15th edition, 2014, 224 pages.
2. *Fire safety instructions: instructions for use.* Editions CSTB-France, 2013, 218 pages.

Semester: 5

Teaching unit: UEF 3.1.2

Subject: Safety of industrial installations and equipment VHS: 67h30,

(Lecture: 3h00, Tutorial: 1h30)

Credits: 6

Coefficient: 3

Teaching objectives:

Diagnose dangerous situations in installations or when using machines, define safety zones, understand the operation and use of machines.

Recommended prior knowledge :

Standards and regulations

Content of the material

Chapter 1. ***(2 weeks)***

Reminder of the context of the regulatory system for the safety of industrial installations and equipment

Chapter 2. ***(2 weeks)***

Terminology and definitions

Chapter 3. ***(3 weeks)***

Facility security

Chapter 4. ***(4 weeks)***

Machine and equipment safety: Safety distances, guards, other safety devices (detectors, emergency stops, etc.)

Chapter 5. ***(4 weeks)***

Machine operational safety: Control circuits, programmable controllers, safety instrumented systems.

Assessment method:

Continuous assessment: 40%; Exam: 60%.

Bibliographic references:

1. *Machine safety.* URL: http://www.schneider-electric.fr/sites/france/fr/solutions-ts/oem/securite-machine/guide-securite.page

Semester: 5

Teaching unit: UEF 3.1.2

Subject: Industrial toxicology

VHS: 45H00, (Lecture: 1H30, Tutorial: 1H30)

Credits: 4

Coefficient: 2

Teaching objectives: To be able

to detect the dangers linked to toxic substances, to be able to capitalize on toxicological data sheets.

Recommended prior knowledge:

Typology of risks (particularly chemical)

Content of the material

Chapter 1. ***(2 weeks)***

Basic Concepts of Industrial Toxicology

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

Parameters influencing the behavior of a substance: Physicochemical properties, route of administration, target population.

Chapter 3. ***(3 weeks)***

Toxicological effects: Effects: local, mutagenic and carcinogenic, effects: chronic, acute and subacute

Chapter 4. ***(4 weeks)***

Toxicological thresholds: Methods of developing thresholds, regulatory thresholds, use of toxicological thresholds.

Chapter 5. ***(3 weeks)***

Study of toxicological data sheets

Assessment method:

Continuous assessment: 40%; Final exam: 60 %.

Bibliographic references:

1. R.Lauwerys, D. Lison, *Industrial toxicology and occupational poisoning.* Editions Masson-Elsevier.2007, 1268 pages.

Semester: 5

Teaching unit: UEF 3.1.2
Subject: Environmental protection

VHS: 10:30 p.m., Class: 1 hour 30 minutes
Credits: 2
Coefficient: 1

Teaching objectives : To be able to

understand the complexity of environmental issues and to know the means and techniques of decontamination.

Recommended prior knowledge :

Risk typology
ISO 14001 standard

Content of the material

Chapter 1. ***(2 weeks)***

Reminders of Natural Risks and Impacts

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

Environmental issues (in Algeria) : Air, Water, Soil, Fauna, Flora.

Chapter 3. ***(3 weeks)***

Pollution indices : Different types of indices, Standardization of pollution indices

Chapter 4. ***(3 weeks)***

Means of combating pollution: Physical means, Biological means

Chapter 5. ***(2 weeks)***

Environmental protection stakeholders

Chapter 6. ***(2 weeks)***

Environmental audit

Assessment method: Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. **Jean-Bernard Leroy.** *Water Pollution,* 1999. Paperback Edition, What do I know?
2. **Emilian** KollerTreatment of industrial pollution: Water, air, waste, soil, sludge. 2009. Ed. Dunod.
3. **Françoise Nési** Soil Pollution, 2010
4. **Michel-Claude Girard and Christian** Walter Soils and Environment -2011 2nd edition - Courses, exercises and case studies - Book + online supplements: Courses, exercises... Ed Dunod
5. **Louise Schriver-MazzuoliIndoor** Air Pollution: Sources, Health Effects, Ventilation, 2009. Ed. Dunod

Semester: 5

Teaching unit: UEM 3.1

Subject: Qualitative methods of VHS risk analysis: 37.5 hours, (Lecture: 1.5 hours, Tutorial: 1 hour)

Credits: 3

Coefficient: 2

Teaching objectives: Identify risks and assess their consequences, control unacceptable risks.

Recommended prior knowledge : Probability and statistics, risk management processes.

Content of the material

Chapter 1. ***(2 weeks)***
Risk analysis approach

Chapter 2. **(3 *weeks)***
Approaches to qualitative risk methods: Deterministic approach, Probabilistic approach, mixed approach.

Chapter 3. **(5 *weeks)***
Formalisms of certain qualitative methods of risk analysis: What-if method, Hazop method, APR method, AMDEC method.

Chapter 4. (3 *weeks)*
Decision-making support tools: Risk matrix, Risk graphs.

Chapter 1. ***(2 weeks)***
Software associated with qualitative risk analysis methods

Assessment method: Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. Villemeur, *Operational safety of industrial systems,* Edition Eyrolles-EDF, 1987, 822 pages.

Semester: 5

Teaching unit: UEM 3.1

Subject: Industrial acoustics

VHS: 10:30 p.m., Class: 1:30 p.m.

Credits: 2

Coefficient: 1

Teaching objectives:

Identify the risks of noise pollution and their effects on people,
Control the risks of noise pollution.

Recommended prior knowledge :

Risk typologies, Waves and vibrations.

Content of the material

Chapter 1. ***(3 weeks)***

Fundamental elements of industrial acoustics: Basic parameters (pressure, vibration speed, density, sound speed, impedance, etc.), Sound waves, Sound levels (noise map).

Chapter 2. ***(2 weeks)***

Transmission and absorption of sound: Case of an atmosphere without obstacles, Case of an atmosphere in the presence of obstacles.

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

Elements of physiological acoustics: Perception, Discomfort, Nuisance.

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

Noise Pathology: The Short Term, The Long Term.

Chapter 5. ***(2 weeks)***

Effects of noise on work

Chapter 6. ***(2 weeks)***

Protection against the effects of noise

Chapter 7. ***(2 weeks)***

Technical and medical prevention against the effects of noise

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. P. Liénard & P. François, *Industrial acoustics and environment.* Editions Eyrolles, 1983.

Semester: 5

Teaching unit: UEM 3.1

Subject: Integrated management system in HSI VHS:
10:30 p.m., Course: 1:30 p.m.

Credits: 2

Coefficient: 1

Teaching objectives:

Identify similarities between normative systems (quality, safety and environment), understand the process of implementing the integrated management system in HSI.

Recommended prior knowledge:

Regulations and standards, HSE industrial installations

Content of the material

Chapter 1. ***(2 weeks)***

Foundations of management systems

Chapter 2. ***(2 weeks)***

Systemic approach

Chapter 3. ***(3 weeks)***

Reminders of QHSE management systems

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

Integration of management systems

Chapter 5. ***(6 weeks)***

Implementation of the integrated management system (IMS): Current status; Roles, missions and functions of SMI actors; Processes; Document review; Continuous improvement.

Assessment method:

Final exam: 100%.

Bibliographic references:

(Depending on the availability of documentation at the establishment level, websites, etc.)

Semester: 5

Teaching unit: UEM 3.1

Subject: Data Analysis and Statistical Tools

VHS: 10:30 p.m., Class: 1:30 p.m.

Credits: 2

Coefficient: 1

Teaching objectives: To be able to synthesize HSE data and capitalize on it to help with HSI decision-making.

Recommended prior knowledge:

Probability and statistics

Content of the material

Chapter 1. **(2 *weeks*)**
Analysis of variance ANOVA

Chapter 2. **(3 *weeks*)**
Multiple linear regression

Chapter 3. **(3 *weeks*)**
Principal component analysis

Chapter 4. **(2 *weeks*)**
Correspondence factor analysis

Chapter 5. **(3 *weeks*)**
Discriminant analyses and hierarchical classification

Chapter 6. **(2 *weeks*)**
Dedicated software for data analysis and statistical tools

Assessment method:

Final exam: 100%.

Bibliographic references:

1. G. Saporta, *Probabilities, data analysis and statistics,* Technip Editions, 2011.

Semester: 5

Teaching unit: UED 3.1

Subject: Sustainable development

VHS: 10:30 p.m., Class: 1:30 p.m.

Credits: 1

Coefficient: 1

Teaching objectives:

To make students understand the need to maintain environmental integrity while ensuring economic, social and environmental efficiency

Recommended prior knowledge :

HSE classified installations; Standards and regulations

Content of the material

Chapter 1. ***(2 weeks)***

Historical overview of the concept of sustainable development

Chapter 2. ***(2 weeks)***

Principles and practices of sustainable development (Agenda 21)

Chapter 3. ***(3 weeks)***

Main dimensions of sustainable development

Chapter 4. ***(3 weeks)***

Sustainable development analysis tools

Chapter 5. ***(3 weeks)***

Regulatory tools for sustainable development

Chapter 6. ***(2 weeks)***

Sustainable development actors and institutions

Assessment method:

Final exam: 100%.

Bibliographic references:

(Depending on the availability of documentation at the establishment level, websites, etc.)

Semester: 5

Teaching unit: UED 3.1

Subject: Notions of ecology

VHS: 10:30 p.m., Course: 1:30 p.m.

Credits: 1

Coefficient: 1

Teaching objectives:

Understand the fundamental concepts that allow us to describe and understand the structure and dynamics of ecosystems as well as the approach to addressing an ecological problem.

Recommended prior knowledge :

HSE classified installations; Standards and regulations

Content of the material

Chapter 1. ***(2 weeks)***

Context and ecological issues

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

Operational objectives and ecological fields

Chapter 3. ***(4 weeks)***

Transfer mechanisms in ecosystems

Chapter 4. ***(3 weeks)***

Industrial metabolism

Chapter 5. ***(3 weeks)***

Industrial maturation

Assessment method:

Final exam: 100%.

Bibliographic references:

1. S. Erkman, *Towards an Industrial Ecology,* 2004, 252 pages.

2. URL: http://www.eclm.fr/travail-285.html

Semester: 5

Teaching unit: UET 3.1
Subject: Case study in HSI

VHS: 10:30 p.m., Class: 1:30 p.m.

Credits: 1

Coefficient: 1

Teaching objectives: Carry out case studies to capitalize on the knowledge acquired.

Recommended prior knowledge :

Case-based knowledge studied

Content of the material

Chapter 1. ***(2 weeks)***

Place occupied by the HSI case study

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

Constituent elements of case study: Data (documentary, statistics, etc.); Interviews; Observations.

Chapter 3. (3 *weeks)*

Types of cases: Problem discovery case; Decision case; Judgment case; Information case; Information case.

Chapter 4. ***(3 weeks)***

General procedure: Conditions of use of case study; Planning of the case study; Necessary data; Analysis and interpretation of results.

Chapter 5. ***(4 weeks)***

Appropriate methods: Checklists; Questionnaires; Case analysis; Problem-solving method.

Assessment method:

Continuous assessment: 100%.

Bibliographic references:

(Depending on the availability of documentation at the establishment level, websites, etc.)

Semester: 6

Teaching unit: UEF 3.2.1

Subject: Quantitative methods of VHS risk analysis: 45 hours, Lecture: 1.5 hours, Tutorial: 1.5 hours

Credits: 4

Coefficient: 2

Teaching objectives:

Identify risk scenarios and assess their consequences; Control unacceptable risks.

Recommended prior knowledge :

Basics of probability and statistics; Risk management process

Content of the material

Chapter 1. **(1 *week)***

Interests of quantitative methods of risk analysis

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

Approaches to quantitative risk methods: Inductive/deductive approach; Tree approach; Combinatorial approach.

Chapter 3. **(8 *weeks)***

Formalisms of certain risk analysis methods: Cause Tree Method (failures); Event Tree Method; Bow Tie; Markovian Method

Chapter 4. **(3 *weeks)***

Software associated with qualitative risk analysis methods

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. Villemeur, *Operational safety of industrial systems,* Edition Eyrolles-EDF, 1987, 822 pages.

2. L. Gilles, *Safety of equipment operation and reliability calculations,* 2011, Hermès-Lavoisier.

Semester: 6

Teaching unit: UEF 3.2.1

Subject: Insurance and risk pricing VHS: 67h30,

Lecture: 3h00, Tutorial: 1h30

Credits: 6

Coefficient: 3

Teaching objective:

Discover the concepts of risk transfer and understand the principles of insurance.

Recommended prior knowledge :

Risk management

Content of the material

Chapter 1. **(2 *weeks)***

Objectives of risk insurance

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

Fundamentals of Risk Insurance

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

Conditions of insurability of risks

Chapter 4. **(4 *weeks)***

Insurable risks: Risks of direct damage to assets; Civil liability risks Offshore and special risks.

Chapter 5. **(4 *weeks)***

Risk insurance actors and organizations

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. P. Rubise, *Technical Risk Insurance,* L'argus de l'assurance Editions. 436 pages.

Semester: 6

Teaching unit: UEF 3.2.2

Subject: Hazard studies and impact studies VHS: 45H00, Lecture: 1H30, Tutorial: 1H30

Credits: 4

Coefficient: 2

Teaching objective:

Be able to carry out a regulatory study of hazards and/or impacts; Be able to criticize an existing study.

Recommended prior knowledge : HSE Industrial installations; Risk analysis methods.

Content of the material

Chapter 1. (2 *weeks)*

Place occupied by hazard and impact studies in risk management

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

Regulatory framework for hazard and impact studies

Chapter 3. **(3 *weeks)***

Administrative procedure for hazard and impact studies

Chapter 4. **(4 *weeks)***

Technical procedure for hazard and impact studies

Chapter 5. **(3 *weeks)***

Most commonly used software in hazard and impact studies

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

(Depending on the availability of documentation at the establishment level, websites, etc.)

Semester: 6

Teaching unit: UEF 3.2.2

Subject: Waste treatment

VHS: 45H00, Course: 1H30, Tutorial: 1H30

Credits: 4

Coefficient: 2

Teaching objective:

Acquire the basic concepts of waste management

Recommended prior knowledge :

HSE Industrial Installations; Standards and Regulations

Content of the material

Chapter 1. **(2 *weeks)***

General framework for waste treatment

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

Waste typology and statistics

Chapter 3. **(3 *weeks)***

Regulatory context for waste treatment

Chapter 4. **(3 *weeks)***

Waste management and treatment

Chapter 5. **(2 *weeks)***

Waste planning

Chapter 6. **(2 *weeks)***

Transport and transfer of waste

Assessment method:

Continuous assessment: 40%; Final exam: 60%.

Bibliographic references:

1. Damien, *Waste Treatment Guide.* Engineering Techniques Collection, 2013, 464 pages

Semester: 6

Teaching unit: UEM 3.2

Subject: End of cycle *project*

VHS : **45 hours, VHH: 3 hours**

Credits: 4

Coefficient: 2

Teaching objectives:

Assimilate knowledge from different subjects in a comprehensive and complementary manner. Put into practice in a concrete way the concepts taught during training. Encourage the student's sense of autonomy and spirit of initiative. Teach them to work in a collaborative environment by arousing intellectual curiosity.

Recommended prior knowledge: The entire Bachelor's program.

Content of the subject:

The theme of the End of Cycle Project must be the result of a joint decision between the tutor and a student (or a group of students: pairs or even trios). The content of the subject must be consistent with the objectives of the course and the student's actual abilities (Bachelor's level). It is also preferable that this theme takes into account the social and economic environment of the institution. When the nature of the project requires it, it can be subdivided into several parts.

Noticed :

During the weeks when students are familiarizing themselves with the purpose of their project and its feasibility (bibliographic research, search for software or hardware necessary for the project, revision and consolidation of teaching directly related to the subject, etc.), the subject manager must use this face-to-face time to remind students of the essential content of the two subjects "Writing Methodology" and "Presentation Methodology" covered during the first two semesters of the common core.

At the end of this study, the student must submit a written report in which he must set out as explicitly as possible:

- The detailed presentation of the study theme, emphasizing its interest in its socio-economic environment.
- The means implemented: methodological tools, bibliographic references, contacts with professionals, etc.
- Analysis of the results obtained and their comparison with the initial objectives.
- Criticism of the observed deviations and possible presentation of other additional details.
- Identification of the difficulties encountered by highlighting the limits of the work carried out and the follow-up to the work carried out.

The student or group of students finally presents their work (in the form of a brief oral presentation or on a poster) in front of their tutor and an examiner who can ask questions and thus assess the work accomplished in terms of technique and presentation.

Assessment method: Continuous assessment: 100%

Bibliographic references:

Semester: 6

Teaching unit: UEM 3.2

Subject: Crisis Management

VHS37h30, Course: 1H30, Tutorial: 1h00

Credits: 3

Coefficient: 2

Teaching objective:

Being able to detect the early signs of a crisis; Knowing how to communicate and above all knowing master communication in times of crisis.

Recommended prior knowledge :

HSE Industrial Installations; Communication Principles

Content of the material

Chapter 1. (4 *weeks)*

About a crisis: Definition and concepts; Cycles of a crisis; Detection, issues and valorization; Examples of a crisis.

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

Administrative organization in crisis management: Crisis unit; Signs precursors of a crisis; Crisis prevention; Contribution of training to crisis management.

Chapter 3. (4 *weeks)*

Crisis management and strategic conduct: Activation of the crisis unit; Communicating during a crisis; Operational management of a crisis unit; Accelerating the return to normal; Reassessment of practices.

Chapter 4. **(3 *weeks)***

Examples of cooperation

Assessment method:

Final exam: 60%, continuous assessment: 40%.

Bibliographic references:

1. JD. Darsa, *Crisis management in business: understanding-addressing-reacting.* 2nd edition. Gereso Edition, 2013, 167 pages.
2. D. Heiderich, *Crisis Management Plan.* Dunod Editions, 2010.

Semester: 6

Teaching unit: UEM 3.2

Subject: Industrial Ergonomics

VHS: 10:30 p.m., Course: 1:30 p.m.

Credits: 2

Coefficient: 1

Teaching objective:

Discover the fundamentals of ergonomics and safety at work; Be able to carry out workstation analysis.

Recommended prior knowledge :

HSE Industrial Installations; Risk Analysis Methods

Content of the material

Chapter 1. (5 *weeks)*

Introduction to ergonomics: Definitions and foundations of ergonomics; General characteristics of ergonomics; Roles and objectives of ergonomics; Place occupied by ergonomics in a company; General methodologies of ergonomics.

Chapter 2. (5 *weeks)*

Job analysis: Characteristics of work; Difficulty of work; Ergonomic analysis work focused on the study of the workstation.

Chapter 3. (5 *weeks)*

Human-machine systems: Elements of the HM system; Interactions in the HM system HM system performance.

Assessment method:

Final exam: 100%.

Bibliographic references:

1. P. Cazamian, *Lessons in Industrial Ergonomics. A Global Approach.* Cujas Editions, 1980, 158 pages.
2. P. Rabrdel, N. Carlon, M. Chesnais and N. Lang, *Ergonomics: concepts and methods.* Octarès Editions, 1998.

Semester: 6

Teaching unit: UED 3.2

Subject: Occupational pathologies and work accidents

VHS: 10:30 p.m., Class: 1:30 p.m.

Credits: 1

Coefficient: 1

Teaching objective:

Know the principles and methods of analyzing and reporting work accidents and occupational diseases.

Recommended prior knowledge :

HSE Industrial Installations, Risk Analysis Methods, Standards and Regulations

Content of the material

Chapter 1. (2 *weeks)*

Definitions and general principles of work accidents and occupational diseases

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

Regulatory framework for work accidents and occupational diseases

Chapter 3. (3 *weeks)*

Procedures for reporting work accidents and occupational diseases

Chapter 4. (3 *weeks)*

Procedures for compensation for work accidents and occupational diseases

Chapter 5. (4 *weeks)*

Methods for studying work accidents and occupational diseases : Methods statistics; Systemic methods: Fact tree

Assessment method:

Final exam: 100%.

Bibliographic references:

1. G. Leray, Work accidents and occupational diseases. Gereso Editions, 2013, 448 pages.
2. Occupational diseases. Guide to accessing the general scheme and the agricultural social security system. URL: http:// www.inrs.fr/media.html?refINRS=ED%20835

Semester: 6

Teaching unit: UED 3.2

Subject: Concepts of crisis simulation VHS: 10:30 p.m., Course: 1:30 p.m.

Credits: 1

Coefficient: 1

Teaching objective:

Be able to lead a crisis simulation with a view to its prevention.

Recommended prior knowledge :

HSE Industrial installations; Risk analysis methods; Crisis management

Content of the material

Chapter 1. **(3 *weeks)***

Interests and challenges of crisis simulation

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

Crisis simulation procedure

Chapter 3. **(4 *weeks)***

Crisis Communication Simulation

Chapter 1. (4 *weeks)*

Use of crisis simulation to design a crisis management plan

Assessment method:

Final exam: 100%.

Bibliographic references:

1. S. Gaultier-Gaillard & B Varie, *Crisis Management. Simulation exercises learning to alert.* Afnor Editions, 2012, 238 pages.

Semester: 6

Teaching unit: UET 3.2

Subject: Entrepreneurship and business management

VHS: 10:30 p.m. (Class: 1.5 hours)

Credits: 1

Coefficient: 1

Teaching objectives:

- ÿ Prepare for professional integration at the end of studies;
- ÿ Develop entrepreneurial skills among students;
- ÿ Raise awareness and familiarize students with the opportunities, challenges, procedures, characteristics, attitudes and skills required by entrepreneurship;
- ÿ Prepare students so that they can, one day or another, create their own business or, at least, better understand their work in an SME.

Recommended prior knowledge:

No specific knowledge, except mastery of the language of instruction.

Targeted skills:

Ability to analyze, synthesize, work in a team, communicate well orally and in writing, be autonomous, plan and respect deadlines, be responsive and proactive. Be aware of entrepreneurship by presenting an overview of management knowledge useful for business creation.

Content of the material:

Chapter 1 – Operational preparation { employment: **(2 Weeks)**

Writing the cover letter and preparing the CV, Job interview, etc., Documentary research on the professions in the sector, Conducting interviews with professionals in the field and
Job interview simulation.

Chapter 2 - Entrepreneurship and Entrepreneurial Spirit: **(2 Weeks)**

Entrepreneurship, Companies around you, Entrepreneurial motivation, Knowing how to set goals, Knowing how to take risks

Chapter 3 - The profile of an entrepreneur and the profession of Entrepreneur: **(3 Weeks)**

The qualities of an entrepreneur, Knowing how to negotiate, Knowing how to listen, The place of SMEs and VSEs in Algeria, The main factors for success when creating a VSE/SME

Chapter 4 - Finding a Good Business Idea: **(2 Weeks)**

Creativity and innovation, Recognizing and evaluating business opportunities

Chapter 5–Starting and Running a Business : **(3 Weeks)**

Choosing a suitable market, Choosing a location for your business, Legal forms of business, Finding help and funding to start a business, Recruiting staff,
Choosing your suppliers

Chapter 6 - Development of the business project: **(3 Weeks)**

The Business Model and the Business Plan, Carry out your business project with the Business Model Canvas

Assessment method: Exam: 100%

References:

- FayolleAlain, 2017. Entrepreneurship theories and practices, applications for learning how to undertake. Dunod, 3rd ed.

- LégerJarniou, Catherine, 2013, The Entrepreneur's Big Book. Dunod, 2013.

- PlaneJean-Michel, 2016, Management of organizations: theories, concepts, performances. Dunod, 4th ed.

- LégerJarniou, Catherine, 2017, Building Your Business Plan. The Entrepreneur's Big Book. Dunod,.

- Sion Michel, 2016, Succeeding in your business Methods, tools and tips plan.Dunod, 4th ed.

- Patrick Koenblit, Carole Nicolas, Hélène Lehongre, Building your professional project, ESF, Publisher 2011.

- Lucie Beauchesne, Anne Riberolles, Building your professional project, L'Etudiant 2002.

- ALBAGLI Claude and HENAULT Georges (1996), Business creation in Africa, ed EDICEF/AUPELF, 208 p.

IV- Agreements / Conventions

STANDARD LETTER OF INTENT

(In case of a license co-sponsored by another university establishment)

(Official paper on the letterhead of the university establishment concerned)

Subject: Approval of co-sponsorship of the license entitled:

The university (or university center) hereby grants the declares co-sponsorship of the above-mentioned license for the entire period of authorization of the license.

To this end, the university (or university center) will assist this project by:

- Giving his point of view in the development and updating of teaching programs,

- Participant in seminars organized for this purpose,
- By participating in the defense juries,
- By working towards the pooling of human and material resources.

SIGNATURE of the legally authorized person:

FUNCTION :

Date :

STANDARD LETTER OF INTENT

(In case of license in collaboration with a company in the user sector)

(Official company letterhead)

SUBJECT: Approval of the project to launch a Bachelor's degree course entitled:

Provided to:

The company hereby supports declares his will to demonstrate his this training as a potential user of the product.

To this end, we confirm our support for this project and our role will consist of:

- Give our point of view in the development and updating of programs teaching,
- Participate in seminars organized for this purpose,
- Participate in defense juries,
- Facilitate as much as possible the reception of interns either within the framework of theses or end of studies, or within the framework of supervised projects.

The means necessary for the execution of the tasks incumbent upon us to achieve these objectives will be implemented on the material and human level.

Mr (or Mrs)*…….is designated as external coordinator of this project.

SIGNATURE of the legally authorized person:

FUNCTION :

Date :

STAMP OFFICIAL Or SEAL OF THE COMPANY

V - Opinions and Visas of the Administrative and Consultative Bodies

Degree title: Industrial Hygiene and Safety

Department Head + Domain Team Leader
Date and visa: **Date and visa:**
Dean of the Faculty (or Director of the Institute)
Date and visa:
Head of university establishment
Date and visa:

VI– Notice and Visa of the Regional Conference

VII – Opinion and Visa of the National Educational Committee of the Domain