Peoples Democratic Republic of Algeria

Ministry of Higher Education and Scientific Research

TRAINING PROGRAM
L.M.D.

Bachelor's Degree

NATIONAL PROGRAM
2025 – 2026

Institution	College / Institute	Departement
Yahia Fares University Of Medea	**Technology**	**Process Engineering and Environment**

Domain	Field	Speciality
Science and Technology	***Industrial hygiene and Safety***	***Industrial hygiene and safety***

Semester Teaching Organization Sheets for the Specialization

Semester 1

Course Unit	Subjects	Credits	Coefficient	Weekly Contact Hours			Semester Contact Hours (15 weeks)	Independent Study / Guided Work (15 weeks)	Assessment Mode	
	Title			Lecture	Tutorial	PW			Continuous Assessment	Exam
Fundamental CU Code : UEF 1.1.1 Credits : 10 Coefficients : 5	Analysis 1	6	3	1h30	3h00		67h30	82h30	40%	60%
	Algebra 1	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental CU Code : UEF 1.1.2 Credits : 12 Coefficients : 6	Fundamentals of Mechanics	6	3	1h30	3h00		67h30	82h30	40%	60%
	Structure of Matter	6	3	1h30	3h00		67h30	82h30	40%	60%
Methodological CU Code : UEM 1.1 Credits : 6 Coefficients : 4	PW Fundamentals of Mechanics	2	1			1h30	22h30	22h30	100%	
	PW Structure of Matter	2	1			1h30	22h30	22h30	100%	
	Computer Architecture and Applications	2	2	1h30		1h00	37h30	22h30	40%	60%
Transversal CU Code : UET 1.1 Credits : 2 Coefficients : 2	Ethical and Deontological Dimension (Fundamental Principles)	1	1	1h30			22h30	02h30		100%
	Careers in Science and Technology	1	1	1h30			22h30	02h30		100%
Total semester 1		**30**	**17**	**9h00**	**12h00**	**4h00**	**375h00**	**375h00**		

Semester 2

Course Unit	Subjects	Credits	Coefficient	Weekly Contact Hours			Semester Contact Hours (15 weeks)	Independent Study / Guided Work (15 weeks)	Assessment Mode	
	Title			Lecture	Tutorial	PW			Continuous Assessment	Exam
Fundamental CU Code : UEF 1.2.1 Credits : 10 Coefficients : 5	Analysis 2	6	3	1h30	3h00		67h30	82h30	40%	60%
	Algebra 2	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental CU Code : UEF 1.2.2 Credits : 12 Coefficients : 6	Electricity and Magnetism	6	3	1h30	3h00		67h30	82h30	40%	60%
	Thermodynamics	6	3	1h30	3h00		67h30	82h30	40%	60%
Methodological CU Code : UEM 1.2 Credits : 6 Coefficients : 4	PW Electricity and Magnetism	2	1			1h30	22h30	22h30	100%	
	PW Thermodynamics	2	1			1h30	22h30	22h30	100%	
	Introduction to Programming	2	2	1h30		1h00	37h30	22h30	40%	60%
Transversal CU Code : UET 1.2 Credits : 2 Coefficients : 2	Free and Open-Source Software	2	2	1h30	1h30		45h00	05h00	40%	60%
Total semester 2		**30**	**17**	**9h00**	**10h30**	**5h30**	**375h00**	**375h00**		

Semester 3

Course Unit	Subjects	Credits	Coefficient	Weekly Contact Hours			Semester Contact Hours (15 weeks)	Independent Study / Guided Work (15 weeks)	Assessment Mode	
	Title			Lecture	Tutorial	PW			Continuous Assessment	Exam
Fundamental CU Code : UEF 2.1.1 Credits : 10 Coefficients : 5	Analysis 3	6	3	1h30	3h00		67h30	82h30	40%	60%
	Waves and Vibrations	4	2	1h30	1h30		45h00	45h00	40%	60%
Fundamental CU Code : UEF 2.1.2 Credits : 9 Coefficients : 5	Fluid Mechanics	5	3	1h30	1h30	1h30	67h30	82h30	40%	60%
	Mineral Chemistry	4	2	1h30	1h30		45h00	45h00	40%	60%
Methodological CU Code : UEM 2.1 Credits : 10 Coefficients : 6	Probability and Statistics	4	2	1h30	1h30		45h00	45h00	40%	60%
	Python Programming	2	2	1h30		1h30	22h30	27h30	100%	
	Technical Drawing	2	1			1h30	22h30	27h30	100%	
	PW Waves and Vibrations	2	1			1h00	15h00	17h50	100%	
Discovery CU Code : UET 2.1 Credits : 1 Coefficients : 1	IHS Industrial Installations	1	1	1h30			22h30	02h30		100%
Total semestre 3		**30**	**17**	**10h30**	**9h00**	**5h30**	**375h00**	375h00		

Semester 4

Course Unit	Subjects	Credits	Coefficient	Weekly Contact Hours			Semester Contact Hours (15 weeks)	Independent Study / Guided Work (15 weeks)	Assessment Mode	
	Title			Lecture	Tutorial	PW			Continuous Assessment	Exam
Fundamental CU Code : UEF 2.2.1 Credits : 8 Coefficients : 4	Risk Typology	6	3	3h00	1h30		67h30	82h30	40%	60%
	Cindynics	2	1	1h30			22h30	27h30		100%
Fundamental CU Code : UEF 2.2.1 Credits : 8 Coefficients : 4	Human and Equipment Reliability	4	2	1h30	1h30		45h00	50h00	40%	100%
	Regulations and Standards in HSE	4	2	1h30	1h30		45h00	50h00	40%	60%
Methodological CU Code : UEM 2.2 Credits : 12 Coefficients : 7	Numerical Methods	5	3	1h30	1h30	1h30	67h30	82h30	40%	60%
	Control and Measurement Instruments	5	3	1h30	1h30	1h00	60h00	55h00	40%	60%
	Méthods and tools in IHS	2	1			1h30	22h30	22h30	100%	
Transversal CU Code : UET 2.2 Credits : 2 Coefficients : 1	Information and Communication Techniques	2	2	1h30	1h30 d'atelier		45h00	5h00	40%	60%
Total semestre 4		**30**	**17**	**12h00**	**7h30**	**5h30**	**375h00**	**375h00**		

Semester 5

Course Unit	Subjects	Credits	Coefficient	Weekly Contact Hours			Semester Contact Hours (15 weeks)	Independent Study / Guided Work (15 weeks)	Assessment Mode	
	Title			Lecture	Tutorial	PW			Continuous Assessment	Exam
Fundamental CU Code : UEF 3.1.1 Credits : 12 Coefficients : 6	Safety and fire protection	6	3	3h00	1h30		67h30	82h30	40%	60%
	Safety of industrial installation and equipement	6	3	3h00	1h30		67h30	82h30	40%	60%
Fundamental CU Code : UEF 3.1.2 Credits : 6 Coefficients : 3	Industrial toxicology	4	2	1h30	1h30		45h00	55h00	40%	60%
	Environmental protection	2	1	1h30			22h30	27h30		100%
Methodological CU Code : UEM 3.1 Credits : 9 Coefficients : 5	Qualitative risk analysis methods	3	2	1h30	1h00		37h30	37h30	40%	60%
	Industrial acoustics	2	1	1h30			22h30	27h30		100%
	Management systems in IHS	2	1	1h30			22h30	27h30		100%
	Data analysis and statistical	2	1	1h30			22h30	27h30		100%
Discovery CU Code : UED 3.1 Credits : 2 Coefficients : 2	Sustainable development	1	1	1h30			22h30	02h30		100%
	Fundamentals of ecology	1	1	1h30			22h30	02h30		100%
Transversal CU Code : UET 3.1 Credits : 1 Coefficients : 1	Case studies in IHS	1	1	1h30			22h30	02h30		100%
Total semestre 5		**30**	**17**	**19h30**	**5h30**	**-**	**375h00**	**375h00**		

Semester 6

Course Unit	Subjects	Credits	Coefficient	Weekly Contact Hours			Semester Contact Hours (15 weeks)	Independent Study / Guided Work (15 weeks)	Assessment Mode	
	Title			Lecture	Tutorial	PW			Continuous Assessment	Exam
Fundamental CU Code : UEF 3.2.1 Credits : 10 Coefficients : 5	Quantitative Risk Analysis Methods	4	2	1h30	1h30		45h00	55h00	40%	60%
	Insurance and Risk Pricing	6	3	3h00	1h30		67h30	82h30	40%	60%
Fundamental CU Code : UEF 3.2.2 Credits : 8 Coefficients : 4	Hazard and Impact Studies	4	2	1h30	1h30		45h00	55h00	40%	60%
	Waste Treatment	4	2	1h30	1h30		45h00	55h00	40%	60%
Methodological CU Code : UEM 3.2 Credits : 9 Coefficients : 5	Final Year Project	4	2			2h30	37h30	42h30	100%	
	Crisis Management	3	2	1h30	1h30		45h00	50h00	40%	60%
	Industrial Ergonomics	2	1	1h30			22h30	27h30		100%
Discovery CU Code : UED 3.2 Credits : 2 Coefficients : 2	Occupational Health Disorders and Workplace Accidents	1	1	1h30			22h30	02h30		100%
	Fundamentals of Crisis Simulation	1	1	1h30			22h30	02h30		100%
Transversal CU Code : UET 3.2 Credits : 1 Coefficients : 1	Entrepreneurship and start-up	1	1	1h30			22h30	02h30		100%
Total semestre 6		**30**	**17**	**15h00**	**7h30**	**2h30**	**375h00**	**375h00**		

Detailed Course Syllabi by Subject

Semester: 1
Teaching Unit: UEF 1.1
Subject 1: Analysis 1
VHS: 67h30 (Lecture: 1h30, Tutorial: 3h00)
Credits: 6
Coefficient: 3

Course Objectives:
This introductory mathematics course focuses on bringing students to a consistent level upon entering university. New concepts are taught gradually in order to guide students towards more advanced mathematics. The concepts covered in this course are fundamental and among the most commonly used in science and technology.

Course Content:
Chapter 1: Properties of the set R

Chapter 2: Real number sequences

Chapter 3: Real functions with a single variable

Chapter 4: Limited development

Chapter 5: Simple integrals

Semester: 1
Teaching Unit: UEF 1.1
Subject 2: Algebra 1
VHS: 45h00 (Lecture: 1h30, Tutorial: 1h30)
Credits: 4
Coefficient: 2

Course Objectives:
This first course in Algebra I is specifically designed to standardise students' knowledge as they enter university. New concepts are taught gradually in order to guide students towards more advanced mathematics. The concepts covered in this course are fundamental and among the most widely used in the field of Science and Technology.

Course Content:
Chapter 1. Sets, relations and applications

Chapter 2: Complex numbers

Chapter 3: Vector space

Semester: 1
Teaching Unit: UEF 1.1
Subject 2: Mechanics elements
VHS: 67h30 (Lecture: 3h00, Tutorial: 1h30)
Credits: 6
Coefficient: 3

Course Objectives:

This first course in Algebra I is specifically designed to standardise students' knowledge as they enter university. New concepts are taught gradually in order to guide students towards more advanced mathematics. The concepts covered in this course are fundamental and among the most widely used in the field of Science and Technology.

Course Content:

Chapter 1. Sets, relations and applications

Chapter 2: Complex numbers

Chapter 3: Vector space

Semester: 1
Teaching Unit: UEF 1.1
Subject 2: Structure of matter
VHS: 67h30 (Lecture: 3h00, Tutorial: 1h30)
Credits: 6
Coefficient: 3

Course Objectives:

This course teaches students the basic formalisms of chemistry, particularly in relation to atoms and chemical bonds, chemical elements and the periodic table, with energy quantification. It aims to improve students' ability to solve chemistry problems.

Course Content:

Chapter 1: Fundamental concepts

Chapter 2: Main constituents of matter

Chapter 3: Radioactivity – Nuclear reactions

Chapter 4: Electronic structure of the atom

Chapter 5: Periodic classification of elements

Chapter 6: Chemical bonds

Semester: 1
Teaching Unit: UEM 1.1
Subject 1: Practical Work Mechanics Elements
VHS: 22h30 (PW : 1h30)
Credits:2
Coefficient: 1

Teaching objectives

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

Course content:

At least five practical exercises:

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

Semester: 1
Teaching Unit: UEM 1.1
Subject 2: Practical Work Structure of matter
VHS: 22h30 (PW: 1h30)
Credits: 2
Coefficient: 1

Course Objectives:
Consolidate the theoretical knowledge acquired in the structure of matter course through a number of practical experiments.

Course Content:

1. Laboratory safety

2. Preparation of solutions

3. Concepts of uncertainty calculations applied to chemistry.

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

5. Acid-base titration by conductimetry.

5. Redox titration

6. Determination of water hardness

7. Titration of ions in water: titration of chloride ions by the Mohr method.

Semester: 1
Teaching Unit: UEM 1.1
Subject 3: Computer structure and applications
VHS: 45h (Lecture: 1h30, PW: 1h00)
Credits: 2
Coefficient: 2

Course Objectives:

The objective of the subject is to enable students to learn how to program using an advanced language (Fortran, Pascal or C). The choice of language is left to the discretion of each institution. The concept of algorithms must be implicitly covered during language learning.

Subject content:

Part 1. Introduction to computer science

1- Definition of computer science

2- Evolution of computer science and computers

3- Information coding systems

4- How a computer works

5- Computer hardware

6- Computer systems

Part 2. Concepts of algorithms and programmes

1- Concept of an algorithm

2- Flowchart representation

3- Structure of a programme

4- Problem-solving approach and analysis

5- Data structure: Constants and variables, Data types

6- Operators: assignment operators, relational operators, logical operators, arithmetic operations, operation priorities

7- Input/output operations

8- Control structures: Conditional control structures, Repetitive control structures

Practical work:

The aim of the practical work is to illustrate the concepts taught during the course.

• Practical work introducing and familiarising students with computer hardware and operating systems (exploring the different features of OS)
• Practical work introducing students to the use of a programming environment (editing, assembly, compilation, etc.)
• Practical work applying the programming techniques covered in class.

Semester: 1
Teaching Unit: UED 1.1
Subject 1: Careers in Science and Technology
VHS: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Subject objective:

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

Course content:

1. What are engineering sciences?
2. Fields of electronics, telecommunications, biomedical engineering, electrical engineering, electromechanics, optics and precision mechanics
3. Automation and industrial engineering courses
4. Process engineering, hydrocarbons and petrochemical industries courses
5. Sustainable development (SD)
6. Sustainable engineering

Semester: 1
Teaching Unit: UET 3.1
Subject: Ethical and professional conduct (fundamentals)
VHS: 22h30 (Lecture: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:

The main objective of this course is to facilitate students' immersion in student life and their transition to responsible adulthood. It aims to develop students' awareness of ethical principles. It introduces them to the rules that govern life at university (their rights and obligations towards the university community) and in the world of work, raises awareness of the importance of respecting and valuing intellectual property, and explains the risks of moral evils such as corruption and how to combat them.

Course content:

1) Fundamental Concepts
2) Standards
3) University Integrity
4) University Values
5) Rights and Duties
6) University Relations
7) Practices

Semester: 2
Teaching Unit: UEF 1.2
Subject 1: Analysis 2
VHS: 67h30 (Lecture: 1h30, Tutorials: 3 h)
Credits: 6
Coefficient: 3

Objectives:

Of primary importance for scientists, this subject enables students to acquire:

- the methods for solving differential equations necessary for problems encountered in engineering and physics
- the methods for calculating the derivability and integrals of functions with several variables (surfaces, volumes), the different forms of limited development

Subject content:

Chapter 1: Ordinary differential equations

Chapter 2: Functions of several variables.

Chapter 3: Multiple integrals

Semester: 2
Teaching unit: UEF 1.2
Subject 1: Algebra 2
VHS: 45 hours (Lectures: 1.5 hours, Tutorials: 1.5 hours)
Credits: 4
Coefficient: 2

Teaching objectives

Consolidate knowledge acquired in the first semester.

- Study new concepts: sum of several vector subspaces, stable subspaces, trace, linear applications.
- Perform matrix calculations.

Course content:

Chapter 1: Vector spaces

Chapter 2: Linear applications

Chapter 3: Matrices, associated matrices and determinants

Chapter 4: Systems of linear equations

Chapter 5: Matrix reduction.

Semester: 2
Teaching unit: UEF 1.2
Subject 2: Electricity and magnetism
VHS: 67.5 hours (Lectures: 1.5 hours, Tutorials: 3 hours)
Credits: 6
Coefficient: 3

Course objectives

Introduce students to the physical phenomena underlying the laws of electricity in general.

Course content:

Mathematical review:

Chapter I. Electrostatics:

Chapter II. Electrokinetics

Chapter III. Electromagnetism

Semester: 2
Teaching unit: UEF 1.2
Subject 3: Thermodynamics
VHS: 67h30 (Lectures: 1h00, Tutorials: 3h00)
Credits: 6
Coefficient: 3

Teaching objectives

To provide the necessary foundations of classical thermodynamics for applications in combustion and thermal machines. To standardise students' knowledge. The skills to be acquired are: Acquisition of a scientific foundation in classical thermodynamics; Application of thermodynamics to various systems; Statement, explanation and understanding of the fundamental principles of thermodynamics.

Course content:

Chapter 1: General principles of thermodynamics

Chapter 2: The first law of thermodynamics:

Chapter 3: Applications of the first law of thermodynamics to thermochemistry

Chapter 4: The second law of thermodynamics

Chapter 5: The third law and absolute entropy

Chapter 6: Free energy and enthalpy – Criteria for the evolution of a system

Semester: 2
Teaching unit: UEM 1.2
Subject 1: Practical work on electricity and magnetism
VHS: 45 hours (practical work: 1 hour 30 minutes)
Credits: 2
Coefficient: 1

Teaching objectives

To consolidate the theoretical concepts covered in the Electricity and Magnetism course through practical sessions.

Subject content:

At least 5 experiments :

- Presentation of measuring instruments and tools (voltmeter, ammeter, rheostat, oscilloscopes, generator, etc.).
- Kirchhoff's laws (mesh law, node law).
- Thévenin's theorem.
- Association and measurement of inductances and capacitances
- Charging and discharging a capacitor
- Oscilloscope
- Practical work on magnetism

Semester: 2
Teaching unit: UEM 1.2
Subject 2: Practical Work on Thermodynamics
VHS: 22.5 hours (practical: 1.5 hours)
Credits: 2
Coefficient: 1
Coefficient: 1

Teaching objectives

To consolidate the theoretical concepts covered in the Thermodynamics course through practical sessions.

Subject content:

1. Ideal gas laws.
2. Water value of the calorimeter.
3. Specific heat: specific heat of liquids and solids.
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. Vapour pressure of a solution.

Semester: 2
Teaching unit: UEM 1.2
Subject 3: Introduction to programming
VHS: 45 hours (Lectures: 1.5 hours, Practical work: 1 hour)
Credits: 2
Coefficient: 2

Teaching objectives

- Acquire the fundamentals of programming
- Master the syntax and structures of the C language
- Understand basic algorithmic concepts
- Develop problem-solving skills through programming
- Implement functional programmes in C
- Acquire best practices in programming and code documentation

Subject content:

Chapter 1: Introduction to computer science and programming

Chapter 2: Structure of a C programme and types of

Chapter 3: Input/output and expressions

Chapter 4: Conditional and control structures

Chapter 5: Functions, arrays and character strings

Chapter 6: Pointers and dynamic allocation

Chapter 7: Structures and enumerations

Practical session content :

Practical session 1: Getting started with the environment

Practical session 2: Variables and expressions

Practical session 3: Conditional structures and iterative structures

Practical session 4: Functions

Practical session 5: One-dimensional and multidimensional arrays

Practical session 6: Character strings

Practical session 7: Pointers and dynamic allocation

Practical session 8: Files

Semester: 2
Teaching unit: UET 1.2
Subject 1: Free and open source software
VHS: 45 hours (Lectures: 1.5 hours; Tutorials/Practicals: 1.5 hours)
Credits: 2
Coefficient: 2

Teaching objectives:

This course aims to:

- Introduce students to the principles and philosophy of free and open source software
- Train students in the use of free alternatives to proprietary software in various fields of engineering
- Develop practical skills in installing, configuring and using free software
- Understand the legal, economic and ethical implications of open source licences
- Prepare students to contribute to the open source community and adapt to technological change

Course content:

Chapter 1: Introduction to free and open source software and its ecosystem

Chapter 2: Free software for process engineering

Chapter 3: Free software for electrical engineering

Chapter 4: Cross-functional tools for engineering

Chapter 5: Free software for civil engineering

Chapter 5: Free software for mechanical engineering I

Chapter 6: Documentation and project management

Semester: 3
Teaching unit: UEF 2.1
Subject: Analysis 3
VHS: 67.5 hours (Lectures: 1.5 hours, Tutorials: 3 hours)
Credits: 6
Coefficient: 3

Objectives:

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

- ✓ Present basic numerical methods for solving concrete engineering problems using a computer.
- ✓ Identify the difficulties associated with solving real-world problems numerically on a computer.
- ✓ Learn how to develop and implement methods for discretising continuous problems.
- ✓ Master and know how to implement basic techniques of numerical matrix analysis.
- ✓ Know how to implement basic techniques of numerical calculation.

Course content:

Chap. 1 Introduction to numerical analysis

Chap. 2 Solving non-linear equations

Chap. 3 Solving linear systems

Practical work:

1) Getting started with Matlab
2) Solving non-linear equations
3) Solving linear systems: Direct methods
4) Solving linear systems: Iterative methods

Semester: 3
Teaching unit: UEF 2.1
Subject: Fluid mechanics
VHS: 45 hours (Lectures: 1.5 hours, tutorials: 1.5 hours)
Credits: 4
Coefficient: 2

Course objective:

To introduce students to the field of fluid mechanics, with fluid statics covered in detail in the first part. The second part will then examine the motion of non-viscous fluids.

Course content:

Chapter 1: General principles of fluid mechanics.

Chapter 2: Physical properties of fluids.

Chapter 3: Hydrostatics.

Chapter 4: Conservation of mass.

Chapter 5: Ideal fluids.

Practical work:

- Practical No. 1. Viscosity meter
- Practical No. 2. Determination of linear and singular pressure losses
- Practical No. 3. Flow measurement
- Practical No. 4. Water hammer and mass oscillations
- Practical No. 5. Verification of Bernoulli's theorem
- Practical No. 6. Impact of the jet
- Practical No. 7. Flow through an orifice
- Practical No. 8. Visualisation of flows around an obstacle
- Practical No. 9. Determination of the Reynolds number: Laminar and turbulent flow

Semester: 3
Teaching unit: UEF 2.1
Subject 1: Inorganic chemistry
VHS: 45 hours (Lectures: 1.5 hours, tutorials: 1.5 hours)
Credits: 4
Coefficient: 2

Teaching objectives:

- Provide basic concepts of inorganic chemistry
- Learn a few methods

Subject content

Chapter 1: Review of a few important definitions

Chapter 2: Crystal chemistry

Chapter 3: Periodicity and in-depth study of the properties of elements

Chapter 4: Major metallurgical processes

Chapter 5: Major mineral syntheses

Semester: 3
Teaching unit: UEM 2.1
Subject: Probability and statistics
VHS: 45 hours (Lectures: 1.5 hours, Tutorials: 1.5 hours)
Credits: 4
Coefficient: 2

Course objectives

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

Course content:

Part A: Statistics

Chapter 1: Basic definitions

Chapter 2: Statistical series with one variable

Chapter 3: Statistical series with two variables

Part B: Probability

Chapter 1: Combinatorial analysis

Chapter 2: Introduction to probability

Chapter 3: Conditioning and independence

Chapter 4: Random variables

Chapter 5: Common discrete and continuous probability distributions

Semester: 3
Teaching unit: UEM2.1
Subject: Python Programming
VHS: 45 hours (1.5 hours of tutorials, 1.5 hours of practical work)
Credits: 2
Coefficient: 2

Subject objectives:

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

Course content:

Chapter 1. Installing and using Python

Chapter 2. Basic concepts

Chapter 3. Conditional structures

Chapter 4. Loops

Chapter 5. Functions

Chapter 6: Lists and tuples

Chapter 7: Dictionaries Chapter 8: Objects and classes

Chapter 9: Files

Practical work:

WP 1: Getting started with the environment

WP 2: Variables, data types and operations

WP 3: Conditional and repetitive structures

WP 4: Functions and modularity

WP 5: Data structures

WP 6: File manipulation and final project

Semester: 3
Teaching unit: UEM 2.1.4
Subject: Practical work on waves and vibrations
VHS: 22:30 (Practical work: 1 hour)
Credits: 1
Coefficient: 1

Teaching objectives

The objectives of this programme are to introduce students to the practical application of their knowledge of mechanical vibrations limited to low-amplitude oscillations for one or two degrees of freedom, as well as the propagation of mechanical waves.

Course content:

TP1: Mass–spring

TP2: Simple pendulum

TP3: Torsion pendulum

TP4: Free and forced oscillating electrical circuit

TP5: Coupled pendulums

TP6: Transverse oscillations in vibrating strings

TP7: Hoffmann groove pulley

TP8: Electromechanical systems (electrodynamic loudspeaker)

TP9: Pohl's pendulum

TP10: Propagation of longitudinal waves in a fluid.

Semester: 3
Teaching unit: UEM2.1
Subject 3: Technical drawing
VHS: 22.5 hours (practical work: 1.5 hours)
Credits: 2
Coefficient: 1

Teaching objectives

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

Subject content

Chapter 1: General information.

Chapter 2: Elements of descriptive geometry

Chapter 3: Perspectives

Chapter 4: Cross-sections

Chapter 5: Dimensioning

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

Semester: 3
Teaching unit: UED2.1
Subject 1: HSE Industrial Installations
VHS: 22.5 hours (lectures: 1.5 hours)
Credits: 1
Coefficient: 1

Teaching objectives

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

Subject content

Chapter 1: Introduction to risk assessment and control, accident analysis

Chapter 2: Introduction to occupational health and environmental protection

Semester: 4
Teaching Unit: UEF 2.2.1
Subject 1: Types of risks
VHS: 67.5 hours (Lectures: 3 hours; Tutorials: 1.5 hours)
Credits: 6
Coefficient: 3

Course objective:

To learn about the risks that may arise in any professional activity according to the different categories of aggressors. To assess and quantify all types of risk.

Course content:

Chapter 1: General information on industrial risks

Chapter 2: Risks related to physical aggressors

Chapter 3: Risks related to chemical aggressors

Chapter 4: Risks related to biological aggressors

Chapter 5: Risks related to environmental aggressors

Semester: 4
Teaching Unit: UEF 2.2.1
Subject 2: Cindynique
VHS: 22:30, (Lecture: 1:30)
Credits: 2
Coefficient: 1

Teaching objective:

Cindynique aims to identify sources of danger, understand the mechanisms that can lead to accidents, and implement more effective preventive measures. It can be applied in various fields, such as natural risks, technological risks, health risks, etc.

Course content:

Chapter 1. Understanding cindynics

Chapter 2. The usefulness of the cindynic approach and method

Chapter 3. The usefulness of cindynic tools

Chapter 4. Reducing sources of risk

Chapter 5. A comparative look at operational safety and cindynics

Semester: 4
Teaching Unit: UEF 2.2.1
Subject 2: Human and Material Reliability
VHS: 45 hours (Lectures: 1.5 hours; Tutorials: 1.5 hours)
Credits: 4
Coefficient: 2

Course objectives:

Introduce students to maintenance techniques and methods, as well as ways to improve the reliability of industrial facilities.

Course content:

Chapter 1: Introduction

Chapter 2: Systems theory

Chapter 3: Probability – Concepts of dependence

Chapter 4: Human errors: work constraints

Chapter 5: Modelling and calculating human reliability

Chapter 6: Machine reliability

Chapter 7: Applications in reliability: diagrams, graphs

Semester: 4
Teaching Unit: UEF 2.2.2
Subject 1: Regulations and standards in HSI
VHS: 45 hours (Lectures: 1.5 hours, Tutorials: 1.5 hours)
Credits: 4
Coefficient: 2

Course objectives:

This course enables students to acquire basic knowledge of labour regulations and standards, as well as to analyse and identify inconsistencies in regulations and propose optimal solutions to problems in the industrial sector.

Course content:

Chapter 1: Legislation, regulation and standardisation of occupational risks

Chapter 2: Legislation, regulation, standardisation and organisation of major industrial risks and accidents

Chapter 3: Compliance and certification

Semester: 4
Teaching unit: UEM 2.2
Subject 1: Numerical methods
VHS: 67.5 hours (Lectures: 1.5 hours, tutorials: 1.5 hours; practicals: 1.5 hours)
Credits: 5
Coefficient: 3

Teaching objectives:

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

Subject content:

Chapter 1. Solving non-linear equations f(x)=0

Chapter 2. Polynomial interpolation

Chapter 3. Function approximation:

Chapter 4. Numerical integration

Chapter 5. Solving ordinary differential equations

Chapter 6. Direct method for solving systems of linear equations

Chapter 7. Approximate method for solving systems of linear equations

Practical work:

Chapter 1: Solving nonlinear equations

Chapter 2: Interpolation and approximation

Chapter 3: Numerical integration

Chapter 4: Differential equations

Chapter 5: Systems of linear equations

Semester: 4
Teaching Unit: UEM 2.2
Subject 1: Control and measurement devices
VHS: 60 hours (Lectures: 1.5 hours, Tutorials: 1.5 hours, Practical work: 1 hour)
Credits: 5
Coefficient: 3

Course objectives:

Introduce students to maintenance techniques and methods, as well as ways to improve the reliability of industrial installations.

Course content:

Chapter 1: General introduction

Chapter 2: Choosing a measuring instrument, measurement accuracy

Chapter 3: Analogue devices

Chapter 4: Digital devices

Chapter 5: Measuring quantities

Chapter 6: Measuring physical quantities:

Chapter 7: Measuring velocity. Measuring displacement

Chapter 8: Measuring position. Measuring temperature. Measuring pressure. Measuring flow rate. Measuring level. Measuring vibration. Measuring viscosity. Optical measurement.

Semester: 4
Teaching Unit: UEM 2.2
Subject 2: Methods and tools in HSI
Lecture hours: 22.5 hours, (Practical work: 1.5 hours)
Credits: 2
Coefficient: 1

Teaching objectives:

Develop methodological approaches and tools for identifying, analysing and managing technological and natural risks.

Course content:

Chapter 1: Relational methods and tools

Chapter 2: Technical methods and tools

Chapter 3: Legal methods and tools

Semester: 4
Teaching unit: UET 2.2
Subject 1: ICT
VHS: 45 hours (Lecture: 1.5 hours; Workshop: 1.5 hours)
Credits: 2
Coefficient: 2

Teaching objectives:

This course aims to develop the cross-disciplinary skills students need to communicate scientific knowledge. It aims to teach students how to master documentary research and the use of digital tools (ICT) to collect and organise information, write clear and well-structured scientific documents, give convincing oral presentations tailored to the audience, and comply with the rules of ethics and integrity.

Course content:

Chapter 1: Introduction to scientific communication

Chapter 2: Documentary research and ICT

Chapter 3: Referencing and bibliography

Chapter 4: Structure of a scientific document

Chapter 5: Writing a scientific document

Chapter 6: Introduction to oral presentations and presentation techniques

Chapter 7: Visual aids and ICT for presentations

Chapter 8: Professional written expression

Chapter 9: Interpersonal communication and listening

Chapter 10: Ethics and integrity

Chapter 11: Standards and practices

Semester: 5
Teaching unit: UEF 3.1.1
Subject: Fire safety
VHS: 67.5 hours (lectures: 3 hours, tutorials: 1.5 hours)
Credits: 6
Coefficient: 3

Course objectives:

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

Course content

Chapter 1. Fire risk overview

Chapter 2. Fundamental principles of fire safety:

Chapter 3. Fire detection

Chapter 4. Fire extinguishing

Chapter 5. Smoke extraction

Chapter 6. Maintenance of fire safety systems

Chapter 7. The new fire risk management standard (rule R6)

Semester: 5
Teaching unit: UEF 3.1.2
Subject: Safety of industrial facilities and equipment
VHS: 67.5 hours (Lectures: 3 hours, Tutorials: 1.5 hours)
Credits: 6
Coefficient: 3

Course objectives:

Diagnose hazardous situations in facilities or when using machinery, define safety zones, understand how machinery works and how to use it.

Course content

Chapter 1: Review of the context of the regulatory framework for the safety of industrial facilities and equipment

Chapter 2: Terminology and definitions

Chapter 3: Facility safety

Chapter 4: Machinery and equipment safety

Chapter 5: Machinery operational safety

Semester: 5
Teaching unit: UEF 3.1.2
Subject: Industrial toxicology
VHS: 45 hours (lectures: 1.5 hours, tutorials: 1.5 hours)
Credits: 4
Coefficient: 2

Teaching objectives:

Be able to identify the dangers associated with toxic substances and be able to make use of toxicology data sheets.

Course content

Chapter 1 : Basic concepts of industrial toxicology

Chapter 2 : Parameters influencing the behaviour of a substance

Chapter 3: Toxicological effects

Chapter 4: Toxicological thresholds

Chapter 5: Study of toxicological data sheets

Semester: 5
Teaching unit: UEF 3.1.2
Subject: Environmental protection
VHS: 22:30, Course: 1:30
Credits: 2
Coefficient: 1

Teaching objectives:

Be able to understand the complexity of environmental issues and learn about pollution control methods and techniques.

Subject content

Chapter 1: Reminder of natural risks and impacts

Chapter 2: Environmental issues

Chapter 3: Pollution indices

Chapter 4: Means of combating pollution: Physical means, Biological means

Chapter 5: Actors in environmental protection

Chapter 6: Environmental audit

Semester: 5
Teaching unit: UEM 3.1
Subject: Qualitative approaches to risk analysis
Total hours: 37.5 (Lectures: 1.5 hours, tutorials: 1 hour)
Credits: 3
Coefficient: 2

Course objectives:

Identify risks and assess their consequences, control unacceptable risks.

Course content

Chapter 1 : Risk analysis approach

Chapter 2 : Qualitative risk assessment methods

Chapter 3 : Formalisms of certain qualitative risk analysis methods

Chapter 4 : Decision support tools: Risk matrix, Risk graphs.

Chapter 5 : Software associated with qualitative risk analysis methods

Semester: 5
Teaching unit: UEM 3.1
Subject: Industrial acoustics
VHS: 22:30, Lecture: 1:30
Credits: 2
Coefficient: 1

Teaching objectives:

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

Course content

Chapter 1 : Fundamentals of industrial acoustics

Chapter 2: Sound transmission and absorption

Chapter 3: Elements of physiological acoustics

Chapter 4: Noise pathology: Short term, long term.

Chapter 5 : Effects of noise on work

Chapter 6 : Protection against the effects of noise

Chapter 7 : Technical and medical prevention against the effects of noise

Semester: 5
Teaching unit: UEM 3.1
Subject: Integrated management system in HSI
VHS: 22:30, Course: 1:30
Credits: 2
Coefficient: 1

Course objectives:

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

Course content

Chapter 1.

Fundamentals of management systems

Chapter 2.

Systemic approach

Chapter 3.

Reminder of QHSE management systems

Chapter 4.

Integration of management systems

Chapter 5.

Implementation of the integrated management system (IMS)

Semester: 5
Teaching unit: UEM 3.1
Subject: Data analysis and statistical tools
VHS: 22:30, Course: 1:30
Credits: 2
Coefficient: 1

Course objectives:

Be able to synthesize HSE data and capitalize on it to aid decision-making in HSI.

Course content

Chapter 1.

ANOVA analysis of variance

Chapter 2.

Multiple linear regression

Chapter 3.

Principal component analysis

Chapter 4.

Correspondence factor analysis

Chapter 5.

Discriminant analysis and hierarchical classification

Chapter 6.

Data analysis software and statistical tools

Semester: 5
Teaching unit: UED 3.1
Subject: Sustainable development
VHS: 22:30, Course: 1:30
Credits: 1
Coefficient: 1

Course objectives:

Help students understand the need to maintain environmental integrity while ensuring economic, social, and environmental efficiency.

Course content

Chapter 1.

Historical overview of the concept of sustainable development

Chapter 2.

Principles and practices of sustainable development (Agenda 21)

Chapter 3.

Main dimensions of sustainable development

Chapter 4.

Tools for analyzing sustainable development

Chapter 5.

Regulatory tools for sustainable development

Chapter 6.

Actors and institutions involved in sustainable development

Semester: 5
Teaching unit: UED 3.1
Subject: Ecology concepts
VHS: 22:30, Course: 1:30
Credits: 1
Coefficient: 1

Course objectives:

Understand the fundamental concepts used to describe and understand the structure and dynamics of ecosystems, as well as the approach to addressing ecological issues.

Course content

Chapter 1.

Context and issues in ecology

Chapter 2.

Operational objectives and fields of ecology

Chapter 3.

Transfer mechanisms in ecosystems

Chapter 4.

Industrial metabolism

Chapter 5.

Industrial maturation

Semester: 5
Teaching unit: UET 3.1
Subject: Case studies in HSI
VHS: 22:30, Course: 1:30
Credits: 1
Coefficient: 1

Teaching objectives:

Carry out case studies to capitalize on the knowledge acquired.

Subject content

Chapter 1: The role of case studies in HSI

Chapter 2: Components of case studies

Chapter 3: Types of cases

Chapter 4: General procedure

Chapter 5: Appropriate methods

Semester: 6
Teaching unit: UEF 3.2.1
Subject: Quantitative approaches to risk analysis
Total hours: 45, Lectures: 1.5 hours, Tutorials: 1.5 hours
Credits: 4
Coefficient: 2

Course objectives:

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

Course content

Chapter 1.

Benefits of quantitative risk analysis methods

Chapter 2.

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

Chapter 3.

Formalisms of certain risk analysis methods: Cause tree (failure) method; Event tree method; Butterfly node; Markovian method

Chapter 4.

Software associated with qualitative risk analysis methods

Semester: 6
Teaching unit: UEF 3.2.1
Subject: Insurance and risk pricing
Total hours: 67.5, Lectures: 3 hours, Tutorials: 1.5 hours
Credits: 6
Coefficient: 3

Course objective:

To discover the concepts of risk transfer and learn about the principles of insurance.

Course content

Chapter 1.

Objectives of risk insurance

Chapter 2.

Fundamentals of risk insurance

Chapter 3.

Conditions for insurability of risks

Chapter 4.

Insurable risks: Risks of direct damage to assets; Civil liability risks

Offshore and special risks.

Chapter 5.

Actors and organizations involved in the insurability of risks

Semester: 6
Teaching unit: UEF 3.2.2
Subject: Hazard and impact studies
Total hours: 45, Lectures: 1.5 hours, Tutorials: 1.5 hours
Credits: 4
Coefficient: 2

Course objective:

Be able to conduct a regulatory hazard and/or impact assessment; Be able to critique an existing assessment.

Course content

Chapter 1.

The role of hazard and impact assessments in risk management

Chapter 2.

Regulatory framework for hazard and impact assessments

Chapter 3.

Administrative procedure for hazard and impact studies

Chapter 4.

Technical procedure for hazard and impact studies

Chapter 5.

Software most commonly used in hazard and impact studies

Semester: 6
Teaching unit: UEF 3.2.2
Subject: Waste treatment
VHS: 45 hours, Lectures: 1.5 hours, Tutorials: 1.5 hours
Credits: 4
Coefficient: 2

Course objective:

To acquire a basic understanding of waste management

Subject content

Chapter 1.

General framework for waste treatment

Chapter 2.

Types and statistics of waste

Chapter 3.

Regulatory context of waste treatment

Chapter 4.

Waste management and treatment

Chapter 5.

Waste planning

Chapter 6.

Waste transport and transfer

Semester: 6
Teaching unit: UEM 3.2
Subject: End-of-cycle project
VHS: 45 hours, VHH: 3 hours
Credits: 4
Coefficient: 2

Course objectives:

To assimilate knowledge of the various subjects in a comprehensive and complementary manner. To put the concepts taught during the course into practice in a concrete way. To encourage a sense of autonomy and initiative in students. To teach them to work in a collaborative environment by stimulating their intellectual curiosity.

Course content:

The topic of the End-of-Cycle Project must be chosen jointly by the supervising instructor and a student (or group of students: pairs or even trios). The subject matter must be consistent with the objectives of the program and the student's actual abilities (bachelor's degree level). It is also preferable that the topic take into account the social and economic environment of the institution. When the nature of the project requires it, it may be subdivided into several parts.

Finally, the student or group of students present their work (in the form of a brief oral presentation or poster) to their teacher-tutor and an examiner, who may ask questions and assess the work accomplished from a technical standpoint and in terms of the presentation.

Semester: 6
Teaching unit: UEM 3.2
Subject: Crisis management
VHS37h30, Lecture: 1.5 hours, Tutorial: 1 hour
Credits: 3
Coefficient: 2

Course objective:

Be able to detect the early signs of a crisis; Know how to communicate and, above all, know how to control communication in times of crisis.

Subject content

Chapter 1.

About a crisis: Definition and concepts; Crisis cycles; Detection, challenges, and value creation; Examples of a crisis.

Chapter 2.

Administrative organization in crisis management: Crisis unit; Warning signs of a crisis; Crisis prevention; Contribution of crisis management training.

Chapter 3.

Strategic crisis management and leadership: Activating the crisis unit; Effective communication during a crisis; Operational management of a crisis unit; Accelerating the return to normal; Reassessing practices.

Chapter 4.

Examples of cooperation

Semester: 6
Teaching unit: UEM 3.2
Subject: Industrial ergonomics
VHS: 22.5 hours, Lectures: 1.5 hours
Credits: 2
Coefficient: 1

Course objective:

Discover the fundamentals of ergonomics and workplace safety; Be able to successfully analyze workstations.

Course content

Chapter 1.

Introduction to ergonomics: Definitions and fundamentals of ergonomics; General characteristics of ergonomics; Roles and objectives of ergonomics; The place of ergonomics in a company; General methodology of ergonomics.

Chapter 2.

Work analysis: Characteristics of work; Work strain; Ergonomic analysis of work focused on the study of workstations.

Chapter 3.

Human-machine systems: Elements of the H-M system; Interactions in the H-M system; Performance of the H-M system.

Semester: 6
Teaching unit: UED 3.2
Subject: Occupational diseases and accidents at work
VHS: 22:30, Course: 1:30
Credits: 1
Coefficient: 1

Course objective:

To learn the principles and procedures for analyzing and reporting accidents at work and occupational diseases.

Subject content

Chapter 1: Definitions and general principles of workplace accidents and occupational illnesses

Chapter 2: Regulatory framework for workplace accidents and occupational illnesses

Chapter 3: Procedures for reporting workplace accidents and occupational illnesses

Chapter 4: Compensation procedures for workplace accidents and occupational illnesses

Chapter 5: Methods for studying occupational accidents and illnesses: Statistical methods; Systemic methods: Fact tree

Semester: 6
Teaching unit: UED 3.2
Subject: Crisis simulation concepts
VHS: 22:30, Course: 1:30
Credits: 1
Coefficient: 1

Teaching objective:

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

Subject content

Chapter 1.

Benefits and challenges of crisis simulation

Chapter 2.

Crisis simulation procedure

Chapter 3.

Simulating crisis communication

Chapter 4.

Using crisis simulation to design a crisis management plan

Semester: 6
Teaching unit: UET 3.2
Subject: Entrepreneurship and start-ups
VHS: 22.5 hours (Classes: 1.5 hours)
Credits: 1
Coefficient: 1

Course objectives:

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

Course content:

Chapter 1: Introduction to entrepreneurship

Chapter 2: Identifying innovative opportunities

Chapter 3: Business Model Canvas

Chapter 4: Introduction to the business plan

Chapter 5: Financing start-ups

Chapter 6: Communication and leadership

Chapter 7: Legal and administrative aspects

Chapter 8: From concept to realization - Implementing the innovative project