



People's Democratic Republic
of Algeria
People's Democratic Republic of
Algeria
Ministry of Higher Education
and Scientific Research
Ministry of Higher Education
and Scientific Research

University Yahia Fares
of MEDEA



TRAINING OFFER

L.M.D.

ACADEMIC LICENSE

NATIONAL PROGRAM
2025- 2026
(3rd update)

Domain	Stream	Specialty:
<i>Sciences and Technologies</i>	<i>Electronics</i>	<i>Electronics</i>



**II - Semester organisation sheets for teaching
of the specialty :
Electronion**

Semester 1

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semi-Annual Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Evaluation method	
	Title			Courses	TD	TP			Continuous assessment	Review
Core UE Code: UEF 1.1.1 Credits: 10 Coefficients : 5	Analysis 1	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
	Algebra 1	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Core UE Code: UEF 1.1.2 Credits: 12 Coefficients : 6	Mechanical element	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
	Structure of matter	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
Methodological UE Code: EMU 1.1 Credits: 6 Coefficients : 4	Practical work mechanical elements	2	1			1h30	10:30 p.m.	10:30 p.m.	100%	
	Practical work structure of the material	2	1			1h30	10:30 p.m.	10:30 p.m.	100%	
	Computerand application structure	2	2	1h30		1h00	37:30 p.m.	10:30 p.m.	40%	60%
E Transversal Code: UET 1.1 Credits: 2 Coefficients : 2	Ethical and deontological dimension (the foundations)	1	1	1h30			10:30 p.m.	02:30 am		100%
	Careers in science and technologies	1	1	1h30			10:30 p.m.	02:30 am		100%
Total semester 1		30	17	9:00 a.m.	12:00 p.m.	4:00 pm	375h00	375h00		

Semester 2

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semi-Annual Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Evaluation method	
	Title			Courses	TD	TP			Continuous assessment	Review
Core UE Code: UEF 1.2.1 Credits: 10 Coefficients : 5	Analysis 2	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
	Algebra 2	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Core UE Code: UEF 1.2.2 Credits: 12 Coefficients : 6	Electricity and magnetism	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
	Thermodynamics	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
Methodological UE Code: EMU 1.2 Credits: 6 Coefficients : 4	Practical work Electricity and magnetism	2	1			1h30	10:30 p.m.	10:30 p.m.	100%	
	Thermodynamics Lab	2	1			1h30	10:30 p.m.	10:30 p.m.	100%	
	Introduction to programming	2	2	1h30		1h00	37:30 p.m.	10:30 p.m.	40%	60%
Transversal UE Code: UET 1.2 Credits: 2 Coefficients : 2	Free - open source software	2	2	1h30	1h30		45h00	05:00	40%	60%
Total semester 2		30	17	9:00 a.m.	10:30 a.m.	5:30 a.m.	375h00	375h00		

Semester 3

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semi-Annual Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Evaluation method	
	Title			Courses	TD	TP			Continuous assessment	Review
Core UE Code: UEF 2.1.1 Credits: 10 Coefficients : 5	Analysis 3	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
	Waves and vibrations	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Core UE Code: UEF 2.1.2 Credits: 8 Coefficients : 4	Fundamental Electronics 1	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
	Basic Electrical Engineering 1	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Methodological UE Code: EMU 2.1 Credits: 10 Coefficients : 6	Probability and statistics	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
	Python Programming	2	2	1h30		1h30	45h00	30:00 pm	40%	60%
	Electronics and Electrical Engineering Practical Work	2	1			1h30	10:30 p.m.	10:30 p.m.	100%	
	Waves and Vibrations	2	1			1h00	3:00 p.m.	3:00 p.m.	100%	
Discovery UE Code: UED 2.1 Credits: 2 Coefficients : 2	Energy and environment	1	1	1h30			10:30 p.m.	02:30 am		100%
	State of the art of electrical engineering	1	1	1h30			10:30 p.m.	02:30 am		100%
Total semester 3		30	17	12:00 p.m.	9:00 a.m.	4:00 pm	375h00	375h00		

Semester 4

Teaching unit	Title	Credits	Coeffice	Weekly hourly volume			Semi-Annual Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Evaluation method	
				Courses	TD	TP			Continuous assessment	Review
Core UE Code: UEF 2.2.1 Credits: 10 Coefficients : 5	Fundamental Electronics 2	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
	Combinatorial logic and sequential	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Core UE Code: UEF 2.2. Credits: 6 Coefficients : 3	Signal theory	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
	Electronic components	2	1	1h30			10:30 p.m.	27:30		100%
Methodological UE Code: EMU 2.2 Credits: 12 Coefficients : 7	Numerical methods	5	3	1h30	1h30	1h30	67h30	82:30 p.m.	40% (20%TD+20%TP)	60%
	Electrical measurements and electronics	3	2	1h30		1h00	37:30 p.m.	10:30 p.m.	40%	60%
	Fundamental Electronics Lab 2	2	1			1h30	10:30 p.m.	10:30 p.m.	100%	
	Combinatorial Logic Lab and sequential	2	1			1h30	10:30 p.m.	10:30 p.m.	100%	
Transversal UE Code: UET 2.2 Credits: 2 Coefficients : 2	Information and communication technologies	2	2	1h30	1h30 Workshop		45h00	5:00 pm	40%	60%
Total semester 4		30	17	10:30 a.m.	7:30 a.m.	7:00 pm	375h00	375h00		

Semester 5

Teaching units	Materials	Credits	Coefficient	Weekly hourly volume			Semi-Annual Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Evaluation method	
	Title			Courses	TD	TP			Continuous assessment	Review
Core UE Code: UEF 3.1.1 Credits: 10 Coefficients : 5	Microprocessor Systems	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
	Functions of Electronics	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Core UE Code: UEF 3.1.2 Credits: 8 Coefficients : 4	Signal processing	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
	Local computer networks	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Methodological UE Code: EMU 3.1 Credits: 9 Coefficients : 5	Practical work Microprocessor systems	2	1			1h30	10:30 p.m.	27:30	100%	
	Practical Functions of Electronics	2	1			1h30	10:30 p.m.	27:30	100%	
	TP Signal and Local Area Networks	2	1			1h30	10:30 p.m.	27:30	100%	
	Preliminary design work	3	2	1h30		1h00	37:30 p.m.	37:30 p.m.	40%	60%
Discovery UE Code: UED 3.1 Credits: 2 Coefficients : 2	Electronic Component Technology 2	1	1	1h30			10:30 p.m.	02:30 am		100%
	Integrated circuit technology and manufacturing	1	1	1h30			10:30 p.m.	02:30 am		100%
Transversal UE Code: UET 3.1 Credits: 1 Coefficients : 1	Wave Propagation and Antennas	1	1	1h30			10:30 p.m.	02:30 am		100%

Total semester 5		30	17	12:00 p.m.	7:30 a.m.	5:30 a.m.	375h00	375h00		
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Semester 6

Teaching units	Materials	Credits	Coefficient	Weekly hourly volume			Semi-Annual Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Evaluation method	
	Title			Courses	TD	TP			Continuous assessment	Review
Core UE Code: UEF 3.2.1 Credits: 10 Coefficients : 5	Continuous Servo Control and Control	6	3	1h30	3:00 pm		67h30	82:30 p.m.	40%	60%
	Sensors & Instrumentation	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Core UE Code: UEF 3.2.2 Credits: 8 Coefficients : 4	Power Electronics	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
	Pulse electronics	4	2	1h30	1h30		45h00	55:00 pm	40%	60%
Methodological UE Code: EMU 3.2 Credits: 9 Coefficients : 5	End of Cycle Project	4	2			2h30	37:30 p.m.	42:30 pm	100%	
	TP Servo Control and Regulation	2	1			1h30	10:30 p.m.	27:30	100%	
	Sensors and Instrumentation TP	2	1			1h30	10:30 p.m.	27:30	100%	
	TP Power Electronics and Pulses	1	1			1h30	10:30 p.m.	10:30 p.m.	100%	
Discovery UE Code: UED 3.2 Credits: 2 Coefficients : 2	Optoelectronic Devices	2	2	3:00 pm			45h00	05:00		100%
Transversal UE Code: UET 3.2 Credits: 1 Coefficients : 1	Entrepreneurship and start-ups	1	1	1h30			10:30 p.m.	02:30 am		100%
Total semester 6		30	17	10:30 a.m.	7:30 a.m.	7:00 pm	375h00	375h00		

I – Detailed programme by subject of the S1 semester Fundamental Unit

Material 1: Analysis 1

Chapter 1: Properties of the R set

Chapter 2: Real Numerical Sequences

Chapter 3: Single-variable real functions

Chapter 4: Limited Development

Chapter 5: Simple Integrals

Subject 2: Algebra 1

Chapter 1 : Sets, Relationships, and Applications (5 weeks)

Chapter 2: Complex Numbers (5 weeks)

Chapter 3: Vector Space (5 weeks)

Subject 3: Mechanical element

Chapter I: Reminder

Chapter II: Kinematics

Chapter III: Dynamics

Chapter IV: Rotational Motion

Chapter V: Work, Power, Energy

Matter 4: Structure of Matter

Chapter 1: Fundamentals (2 weeks)

Chapter 2: Main Constituents of Matter (3 Weeks)

Chapter 3: Radioactivity – Nuclear Reactions (2 Weeks)

Chapter 4: Electronic Structure of the Atom (2Weeks)

Chapter 5: Periodic Classification of Elements (3 Weeks)

Chapter 6: Chemical Bonds (3 weeks)

Methodological Unit

Subject 1: Physics Practical Work 1

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

Subject 2: Practical Work "Structure of Matter"

Lab N° 1: Preliminary lab: Safety in the chemistry laboratory and description of the equipment and glassworks.

Lab N° 2: Change of state of water: Passage from liquid to solid state and from liquid state to vapor state.

- Lab N° 3:** Determination of the quantity of material.
- Lab N° 4:** Determination of molecular weight.
- Lab N° 5:** Uncertainty calculation - Determination of ionic radius
- Lab N° 6:** Determination of partial molar volumes in a binary solution.
- Lab N° 7:** Qualitative analysis of Cations (1st, 2nd, 3rd and 4th group).
- Lab N° 8:** Qualitative analysis of Anions.
- Lab N° 9:** Identification of metal ions by the flame method
- Lab N°10:** Separation and recrystallization of benzoic acid.
- TP N°11:** Construction and study of some compact structures.
- Lab N°12:** Study of ionic structures

Subject 3 : Structure of computers and applications

Part 1. Introduction to Computer Science

- 1- Definition of computer science
 - 2- Evolution of computers and computers
 - 3- Information coding systems
 - 4- How a computer works
 - 5- Hardware part of a computer
 - 6- System part
- Basic systems (operating systems (Windows, Linux, Mac OS,...))
Programming languages, application software

Part 2. Notions of algorithm and program

- 1- Concept of an algorithm
- 2- Representation in organizational chart
- 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- Entry/exit operations
- 8- Control structures: Conditional control structures, Repetitive control structures

Computer Science 1 :

The purpose of the practical work is to illustrate the concepts taught during the course. The latter must start with the courses according to the following schedule:

- Practical work to introduce and familiarize yourself with the computer machine from a hardware and operating system point of view (exploration of the different functionalities of OS)
- Practical work to learn how to use a programming environment (Editing, Assembly, Compilation, etc.)
- Practical work of applying the programming techniques seen in class.

Transversal Unit

Subject 1: Ethical and deontological dimension (the foundations)

- I. Fundamentals – Key Concepts**
- II. The Frameworks – References**
- III. The University Franchise – Campus**
- IV. University Values – University Values**
- V. Rights and Duties**

VI. University Relations (2 weeks)

VII. Practices (2 weeks)

Discovery Unit

Subject 1: Careers in science and technology

1. What is engineering sciences?

2. Courses in Electronics, Telecommunications, Biomedical Engineering, Electrical Engineering, Electromechanics, Optics & Precision Mechanics:

3. Automation and Industrial Engineering courses: - Definitions, areas

4. Process Engineering, Hydrocarbons and Petrochemical Industries:

1. Industrial Health and Safety (HSI) and Mining Engineering sectors :

2. HVAC and Transport Engineering - Definitions, fields of application

3. Courses in Civil Engineering, Hydraulics and Public Works :(2 weeks)

4. Aeronautics, Mechanical Engineering, Marine Engineering and Metallurgy

II- Detailed programme by subject of the S1 semester

Fundamental Unit

Material 1: Analysis 2

Chapter 1: Ordinary Differential Equations

Chapter 2: Functions of several variables. Notions of limit, continuity, partial derivatives, differentiability

Chapter 3 Integrals

Subject 2: Algebra 2

Chapter 1: Electrostatic field and potential

Chapter 2: The Drivers

Chapter 3: Electric Current

Chapter 4: Magnetostatic

Matter 3 Electricity and magnetism

Chapter 1: Electrostatic field and potential

Chapter 2: The Drivers

Chapter 3: Electric Current

Chapter 4: Magnetostatic

Subject 4: Thermodynamics

Chapter I: Fundamentals of Thermodynamics

Chapter II: Thermodynamic Properties of Pure Substances

Chapter III: Fundamental Concepts of Thermodynamics

Chapter IV: Equilibrium of Physical Processes

Methodological Unit

Subject 1: Practical work Electricity and magnetism

5 manipulations at least (3h00 / 15 days)

- Presentation of the instruments and measurement tools (Voltmeter, Ammeter, Rheostat, Oscilloscopes, Generator, etc.).
- Kirchhoff's laws (law of meshes, law of knots).
- Thévenin's theorem.
- Association and measurement of inductors and capacitances
- Charging and discharging a capacitor
- Oscilloscope
- Practical work on magnetism

Subject 1: Thermodynamics

Lab N° 1: Study of the equation of state of an ideal gas.

Lab N° 2: Water value of the calorimeter.

Lab N° 3: Heat mass: heat density of liquid and solid bodies.

Practical work N° 4: Study of the solidification of pure water.

Lab N° 5: Latent heat: Latent heat of melting ice.

Lab N° 6: Determination of the latent heat of vaporization.

Lab N° 7: Heat of reaction: Determination of the energy released by a chemical reaction (HCl/NaOH).

Lab N° 8: The thermodynamic functions of an Acid–Base equilibrium.

Lab N° 9: Study of the variation of pressure as a function of the equilibrium temperature (l-g) for a pure system: water.

Lab N° 10: Vapour pressure of a solution.

Lab N° 11: Equilibrium diagram for a binary system.

Lab N° 12: Equilibrium diagram for a ternary system.

Subject 3: Introduction to programming

Chapter 1: Introduction to Computer Science and Programming (1 Weeks)

Chapter 2: Structure of a C Program and Data Types (2 Weeks)

Chapter 3 : Inputs/Outputs and Expressions (2 Weeks)

Chapter 4 : Iterative Conditional Control and Control Structures (3 Weeks)

Chapter 5 : Functions and Arrays and Strings (3 Weeks)

Chapter 6 :P Dentists and Dynamic Allocation (2 Weeks)

Chapter 7 : Structures and Enumerations (2 Weeks)

Detailed content of the practical sessions

Lab 1: Getting to grips with the environment

Lab 2: Variables and expressions

Lab 3: Conditional Structures and Iterative Structures

Lab 4: Functions

Lab 5: One-dimensional and multi-dimensional tables

Lab 6: Strings

Lab 7: Pointers and Dynamic Allocation

TP 8: Files

Transversal Unit

Subject 1: Free and Open Source Software

Chapter 1: Foundations of Free Software (2 weeks)
Chapter 2: Legal Framework and Licensing (2 weeks)
Chapter 3: Free Operating Systems (3 weeks)
Chapter 4: Free Office Solutions (3 weeks)
Chapter 5: Creative Solutions and Development (3 weeks)
Chapter 6: Prospects and Future of Free Software (2 weeks)
Workshops
Atl. 1: Discovering Linux
Atl. 2: Software Management on Linux
Atl. 3: Migration to LibreOffice
Atl. 4: Spreadsheets and free presentations
Atl. 5: Image processing and graphics
Atl. 6: Web and free databases
Atl. 7: Collaborative Development

III – Detailed programme by subject of the S1 semester **Fundamental Unit**

Material 1: Analysis 3

Chapter 1: Vector Analysis
Chapter 2: Numerical and integer series
I- Numerical series
II- Whole series
Chapter 3: Fourier series
Chapter 4: Fourier and Laplace transforms
Laplace transform

Subject 2: Waves and Vibrations

Part A: Vibration

Chapter 1: Introduction to Lagrange Equations
Chapter 2: Free Oscillations of Single-Degree of Freedom Systems
Chapter 3: Forced Oscillations of Systems at a Degree of Freedom
Chapter 4: Free Oscillations of Two-Degree-of-Freedom Systems
Chapter 5: Forced Oscillations of Two-Degrees-of-Freedom Systems

Part B: Waves

Chapter 1: Phenomena of one-dimensional propagation
Chapter 2: Vibrating Strings
Chapter 3: Acoustic waves in fluids
Chapter 4: Electromagnetic waves

Subject 3: Fundamental Electronics 1

Chapter 1. Continuous Regime and Fundamental Theorems
Chapter 2. Passive quadropoles
Chapter 3. Diodes
Chapter 4. Bipolar transistors
Chapter 5 - Operational amplifiers:

Subject 2: Basic electrical engineering 1

Chapter 1. Mathematical reminders on complex numbers (NC)
Chapter 2. Reminders of the fundamental laws of electricity
Chapter 3. Electrical circuits and powers
Chapter 4. Magnetic circuits
Chapter 5. Transformers
Chapter 6. Introduction to Electrical Machines

Methodological Unit

Subject 1: Probability and statistics

Part A: Statistics

Chapter 1: Basic Definitions
Chapter 2: Single-variable statistical series
Chapter 3: Two-variate statistical series

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

Subject 2: Python Programming

Chapter 1. Install and use Python
Chapter 2. Basics
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 :

Lab 1 : Getting started with the Python environment
Lab 2: Variables, Data Types, and Operations
Lab 3: Conditional and Repetitive Structures
Lab 4: Functions and modularity
Lab 5: Data Structures
Lab 6: File Manipulation and Final Project

Subject 3: Practical work in Electronics and Electrical Engineering

Electronics Lab 1

Lab 1: Fundamental theorems
TP 2: Characteristics of passive filters
Lab 3: Characteristics of the diode / rectifier
TP 4: Stabilized power supply with Zener diode
Lab 5: Characteristics of a transistor and operating point

TP 6: Operational amplifiers.

Electrical Engineering Practical Work 1

Lab 1: Measurement of voltages and currents in single-phase

TP 2 : Measurement of voltages and currents in three phase

TP 3: Measurement of active and reactive power in three phases

Lab 4: Magnetic circuits (hysteresis cycle)

TP 5: Transformer Testing

TP 6: Electrical machines (demonstration).

Subject 4: Practical work Waves and vibrations

TP1 :Mass – spring

TP2 :Single clock

TP3 :Torsion pendulum

TP4 : Electrical circuit oscillating in free and forced regime

TP5 : Coupled Pendulums

TP6: Transverse Oscillations in Vibrating Wires

TP7: Grooved pulley according to Hoffmann

TP8: Electromechanical Systems (The Electrodynamic Loudspeaker)

TP9: Pohl's pendulum

TP10: Propagation of longitudinal waves in a fluid.

Discovery Unit

Subject 1: State of the art of electrical engineering

1- The Electrical Engineering family: Electronics, Electrical Engineering, Automation, Telecommunications, etc. etc.

2- Impact of Electrical Engineering on the development of society: Advances in Microelectronics, Automation and Supervision, Robotics, Telecommunications Development, Instrumentation in the development of health, ...

Subject 2: Energy and environment

Chapter 1: The Different Energy Resources

Chapter 2: Energy Storage

Chapter 3: Consumption, reserves and trends in energy resources

Chapter 4: The different types of pollution

Chapter 5: Detection and treatment of pollutants and wastes

Chapter 6: Impact of pollution on health and the environment.

VI – Detailed programme by subject of the S4 semester

Fundamental Unit

Subject 1: Fundamental Electronics 2

Chapter 1: Field-effect transistors

Chapter 2: Power Amplifiers

Chapter 3: Feedback (RC)

Chapter 4: Differential Amplifiers

Chapter 5: Sinusoidal Oscillators

Subject 2: Combinatorial and sequential logic

Chapter 1: Boolean Algebra and Simplification of Logical Functions

Chapter 2: Numeral Systems and Information Coding

Chapter 3: Transcoder Combinatorial Circuits

Chapter 4: Combinatorial Switchgear Circuits

Chapter 5: Combinatorial Comparison Circuits

Chapter 6: The Seesaws

Chapter 7: Meters

Chapter 8. The Registers

Subject 3: Signal theory

Chapter 1. General information about signals

Chapter 2. Fourier analysis

Chapter 3. Laplace transform

Chapter 4. Convolution Product

Chapter 5. Signal correlation

Material 4: Electronic components

Chapter 1: Introduction to Electronic Components

Chapter 2 : Passive components

Chapter 3 : Diodes and PN junctions

Chapter 4 : Bipolar Transistors (BJT)

Chapter 5: Logic and analog integrated circuits

Chapter 6: Optoelectronic components

Methodological Unit

Subject 1: Numerical methods

Chapter 1. Solving the nonlinear equations $f(x)=0$

Chapter 2. Interpolation polynomiale

Chapter 3. Function approximation:

Chapter 4. Digital integration

Chapter 5. Solving ordinary differential equations (Initial condition or Cauchy problem)

Chapter 6. Method for the direct solution of systems of linear equations

Chapter 7. Approximate method of solving systems of linear equations

Practical work Numerical methods

Chapter 1: Solving nonlinear equations

Chapter 2: Interpolation and approximation

Chapter 3: Digital integrations

Chapter 4: Differential equations

Chapter 5: Systems of linear equations

Subject 2: Electrical and electronic measurements

Chapter 1. Measurements, quantities, and uncertainties

Chapter 2. Measurement methods

Chapter 3. Measuring devices

Practical work Electrical and electronic measurements:

Lab N° 1: Resistance measurement:

Lab N° 2: Inductance measurement:

Lab N° 3: Capacity measurement:

Lab N° 4: Phase shift measurement:

TP N° 5: Single-phase power measurement:

Lab N° 6: Three-phase power measurement:

Subject 3 : Practical work Fundamental electronics 2

Lab N° 1: Study of the FET and MOS field-effect transistor amplifier:

Lab N° 2: Power amplifiers

Lab N° 3: Sinusoidal oscillators:

Subject 4: Combinatorial and Sequential Logic Lab

TP1: TTL and CMOS integrated circuit technology.

TP2: Simplification of logical equations through practice

TP3: Study and realization of usual combinatorial logic functions

TP4: Study and realization of an arithmetic combinatorial circuit

TP5: Study and realization of a logical combinatorial circuit

TP6: Study and realization of a logical combinatorial circuit

TP7: Study and construction of meter circuits

TP8: Study and production of registers

Transversal Unit

Subject 1: ICT

Chapter 1: Introduction to Science Communication

Chapter 2: Desk Research and ICT

Chapter 3: Referencing and bibliography

- Chapter 4: Structure of a scientific document**
- Chapter 5: Writing the scientific document**
- Chapter 6: Introduction to Oral Presentation and Speaking Techniques**
- Chapter 7: Visual aids and ICT for presentation**
- Chapter 8: Professional Writing**
- Chapter 9: Interpersonal Communication and Listening**
- Chapter 10: Ethics and Academic Integrity**
- Chapter 11: Scientific Standards and Practices**

V – Detailed programme by subject of semester S5
Fundamental Unit

Subject 1: Microprocessor Systems

- Chapter 1. Solid-state memories**
- Chapter 2. History and evolution of computers**
- Chapter 3: Study of an 8-bit microprocessor**
- Chapter 4. I/O interfaces**
- Chapter 5. Interruptions**

Subject 2: Functions of Electronics

- Chapter 1. Analog Filters**
- Chapter 2. Amplitude modulation and demodulation**
- Chapter 3. Angular modulations and demodulations (FM and PM)**
- Chapter 4. Phase Locked Loop (PLL)**
- Chapter 5. Introduction to Digital Modulations**

Subject 3: Signal processing

- Chapter 1. Reminders of the main results of Signal Theory**
- Chapter 2. Random processes**
- Chapter 3. Analysis and synthesis of analog filters**
- Chapter 4. Signal Sampling**
- Chapter 5. Discrete Transforms**

Subject 4: Local computer networks

- Chapter 1. Basics of data transmission**
- Chapter 2. Local networks**
- Chapter 3. Ethernet Network**
- Chapter 4. The TCP/IP protocol**
- Chapter 5. Wireless Local Area Networks (WIFI)**

Methodological Unit

Material 1: Microprocessor Systems

TP1: Familiarization with the didactic kit dedicated to the 8-bit microprocessor studied or with the simulator of the dedicated microprocessor.

TP2: Use of transfer instructions, arithmetic and logical instructions.

TP3: Use of branching instructions and programming loop techniques.

TP4: Writing and Simulating Assembler Programs

TP5: Using the Stack and I/O Management Instructions

TP6: Assembler programming (and simulation) of I/O interface circuits

Subject 2: Practical work Functions of Electronics

TP1: Study of active filters: check and test the different active filtering functions

TP2: Study of amplitude modulation, study of amplitude demodulation

TP3: Study of frequency modulation, study of frequency demodulation

TP4: Principle of IF amplification with AM and GAC detector

Subject 3: Signal and Local Area Networks

Signal Processing Lab

TP1: Getting Started with Matlab

TP2: Generating and Displaying Signals

TP3: Fourier Series

TP4: Direct and Inverse Fast Fourier Transform (fft, ifft)

TP5: Analysis and synthesis of analog filters

TP6: Analysis and synthesis of digital filters

TP7: Random Processes

Local Computer Networks TP:

TP1: Realization and testing of RJ45 or twisted pair cables

TP2: Implementation of a peer-to-peer network between two PCs

TP3: Configuring and Implementing a Multi-Station Network with Switches

TP4: Creating a WiFi network and configuring an access point

TP5: How TCP/IP Protocols Work

Matter 4: Preliminary design work

Chapter 1. Drawing techniques in electronics

Chapter 2. Technology for the production of electronic schematics

Chapter 3. Cabling technology for electronic circuits

Chapter 4. Basic Principles of Troubleshooting Electronic Circuits

Content of the Practical Work section:

Mini project n°1: Study and construction of a conventional 12 V DC, 5A power supply.

Mini project n°2: Study and construction of an integrated circuit audio amplifier.

Mini project n°3: Study and construction of a timer and boom generator with NE555.

Mini project n°4 : Study and realization of a sequencer with logic circuits.

Mini project n°5 : Study and construction of a triac dimmer.

Mini project n°6 : Study and realization of a sound switch.

Mini project n°7 : Study and construction of a logic circuit tester.

Mini project n°8 : Study and realization of a curve plotter for passive components.

Mini project n°9 : Study and construction of a multi-stage amplifier.

Discovery Unit

Subject 1: Electronic Component Technology 2

Chapter 1. Power Supply Design

Chapter 2. Power Active Components

Chapter 3. Optoelectronic components

Chapter 4. TTL Family Circuits

Chapter 5. CMOS Family Circuits

Chapter 6. Special Logic Integrated Circuits (ICs)

Chapter 7. Other specific components and accessories

Chapter 8. Component Documentation

Subject 2: Integrated Circuit Technology and Manufacturing

Chapter 1: Introduction to Microelectronics

Chapter 2: Fabrication of Monocrystalline Silicon Substrates

Chapter 3: Silicon Doping Techniques

Chapter 4: Silicon Oxides and Nitride

Chapter 5: Thin Films

Chapter 6: Photolithography and engraving techniques

Chapter 7: The clean room and the editing room

Chapter 8: Examples of Manufacturing Processes

Transversal Unit

Topic 1: Wave Propagation and Antennas

Chapter 1. Reminders about vector analysis elements

Chapter 2. Maxwell's equations

Chapter 3. Propagation in vacuum and dielectric media

Chapter 4. Propagation of electromagnetic waves in conductive media

Chapter 5. General information about the Antennas

Chapter 6. Characteristics of some common antennas

IV – Detailed programme by subject of the S6 semester

Fundamental Unit

Topic 1: Continuous Servo Control and Control

- Chapter 1. Introduction to servo control
- Chapter 2. Reminders about the Laplace Transform
- Chapter 3. Modeling of linear servo systems
- Chapter 4. Performance of linear systems
- Chapter 5. Stability
- Chapter 6. The Precision of a Servo System
- Chapter 7. Places of Roots
- Chapter 8. Examples of capstone projects

Subject 2: Sensors and Instrumentation

- Chapter 1. Sensors and acquisition chain
- Chapter 2. Some metrological characteristics
- Chapter 3. Passive Sensor Conditioners
- Chapter 4. Signal conditioners
- Chapter 5. Some examples of sensors
- Material 3 :Power electronics

- Chapter 1. Introduction to Power Electronics
- Chapter 2. AC to DC converters
- Chapter 3. AC - AC Converters
- Chapter 4. Direct current to direct current converters
- Chapter 5. Direct current to alternating current converters

Subject 4: Pulse electronics

- Chapter 1. Definitions and characteristics of the impulse
- Chapter 2. Switching RC Circuit
- Chapter 3. Active Switching Components
- Chapter 4. Fitness circuits
- Chapter 5. A/D and D/A converters
- Chapter 6. Two-State Circuits: Multivibrators
- Chapter 7. Function generators

Methodological Unit

Subject 1: End of Cycle Project

Part A: Use of measuring devices

- Measurement of a resistor: off-circuit measurement and in-circuit measurement.
- Measurement of the variation of the resistances of a potentiometer.

- Capacitor and coil measurement.
- Measurements on a diode.
- Measurement on a diode bridge.
- Transistor measurements (conduction test, gain measurement)
- Examples of measurements on some classical transistors and comparisons.
- Measurement on a triac
- Verification of a linear or logic integrated circuit.
- Verification of a programmed component (PROM or EPROM).
- Introduction to the methodology of diagnostics and repair of electronic boards. (Students can bring back broken electronic boards).

Part B: Learning Simulation Software in Electronics

Chapter 1: Introduction to simulation software

Chapter 2: Presentation of simulation software

Chapter 3: Digital project simulation

Chapter 4: Measuring instruments

Part C: Making an electronic assembly

Material 2: TP Servo control and control

TP1: Upgrade for Matlab Toolbox Exploitation

TP2: Modeling of systems in Matlab and functional diagrams.

TP3: Temporal Analysis of LTI Systems

TP4: Frequency Analysis of Systems

TP5: Stability and accuracy of servo systems.

TP6: Synthesis of a phase advance corrector, frequency response method.

TP7: Analysis and Tuning of Real Analog Looped Systems in the Laboratory

Material 3: Sensors and Instrumentation

TP1: Presentation of a complete measurement chain (sensor/conditioner).

TP2: Study of a sensor signal conditioning circuit: Bridge mounting, AOP mounting.

TP3: Temperature measurements: PT 100, Thermocouple, CTN, CTP.

TP4: Speed measurements.

TP5: Position and displacement measurements.

TP6: Force and strain measurements.

TP7: Pressure, level and flow measurements.

TP8: Vibration measurements.

TP9: Photometric measurements: optical, solar cell or solar panel.

Subject 4: TP Power Electronics and Pulses

Power Electronics TP:

TP1: Non-Controlled Rectifiers: Single Phase and Three-Phase

TP2: Controlled rectifiers: single-phase and three-phase

TP3: Choppers: Series Chopper, Parallel Chopper

TP4: Dimmers: Single Phase and Three Phase

TP5: Inverters: Single Phase

Pulse Electronics Practical Exercise:

TP1: Integration circuit and differentiator circuit.

TP2: Limiting circuits.

TP3: Sawtooth signal generator, triangle signal generator.

TP4: Study of an example of a CAN circuit, Study of an example of a DAC circuit.

TP5: Comparators

TP6: The unstable

TP7: The monostable

TP8: Schmitt trigger threshold circuits

Discovery Unit

Material 1: Optoelectronic Devices

Chapter 1. Light-Semiconductor Interaction

Chapter 2. Electronic and optical properties of semiconductors

Chapter 3. Light emitters

Chapter 4. Light Detectors

Chapter 5. Optical Fibers

Transversal Unit

Subject 1: Entrepreneurship, Start-Up

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 et leadership

Chapter 7: Legal and Administrative Aspects

Chapter 8: From concept to implementation - Implementation of the innovative project