الجمهورية الجزائرية الديمقراطية الشعبية
People's Democratic Republic of Algeria
وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education and Scientific Research

ACADEMIC LICENSE

NATIONAL PROGRAM

Establishment	Faculty / Institute	Department

Domain	Sector	Speciality
Science And Technologies	***Telecommunications***	***Telecommunications***

Semester 3

Teaching unit	Modules	Credits	Coefficient	Weekly hourly volume			Half-yearly Hourly Volume (15 weeks)	Additional Work in Consultation (15 weeks)	Evaluation mode	
	Titled			**Course**	**T.D.**	**TP**			**Continuous monitoring**	**Exam**
Fundamental EU Code: UEF 2.1.1 Credits: 10 Coefficients: 5	Mathematics 3	6	3	3:00	1h30		67h30	82h30	40%	60%
	Waves and vibrations	4	2	1h30	1h30		45:00	55:00	40%	60%
Fundamental EU Code: UEF 2.1.2 Credits: 8 Coefficients: 4	Fundamental Electronics 1	4	2	1h30	1h30		45:00	55:00	40%	60%
	Fundamental electrical engineering 1	4	2	1h30	1h30		45:00	55:00	40%	60%
Methodological EU Code: UEM 2.1 Credits: 9 Coefficients: 5	Probability and statistics	4	2	1h30	1h30		45:00	55:00	40%	60%
	Computer science 3	2	1			1h30	10:30	27:30	100%	
	Electronics and electrical engineering TP	2	1			1h30	10:30	27:30	100%	
	TP Waves and vibrations	1	1			1h00	3:00	10:00	100%	
EU Discovery Code: UED 2.1 Credits: 2 Coefficients: 2	State of the art of electrical engineering	1	1	1h30			10:30	02:30		100%
	Energy and environment	1	1	1h30			10:30	02:30		100%
Transversal EU Code: UET 2.1 Credits: 1 Coefficients: 1	Technical English	1	1	1h30			10:30	02:30		100%
Total semester 3		**30**	**17**	**1:30**	**7:30**	**4:00**	**375h00**	**375h00**		

Semester 4

Teaching unit	Modules	Credits	Coefficient	Weekly hourly volume			Half-yearly Hourly Volume (15 weeks)	Additional Work in Consultation (15 weeks)	Evaluation mode	
	Titled			**Course**	**T.D.**	**TP**			**Continuous monitoring**	**Exam**
Fundamental EU Code: UEF 2.2.1 Credits: 10 Coefficients: 5	Fundamental Telecommunications	6	3	3:00	1h30		67h30	82h30	40%	60%
	Combinatorial logic and sequential	4	2	1h30	1h30		45:00	55:00	40%	100%
Fundamental EU Code: UEF 2.2.2 Credits: 8 Coefficients: 4	Numerical methods	4	2	1h30	1h30		45:00	55:00	40%	60%
	Signal theory	4	2	1h30	1h30		45:00	55:00	40%	60%
Methodological EU Code: UEM 2.2 Credits: 9 Coefficients: 5	Electrical measurements and electronic	3	2	1h30		1h00	37:30	37:30	40%	60%
	Basic Telecommunications TP	2	1			1h30	10:30	27:30	100%	
	Combinatorial logic TP and sequential	2	1			1h30	10:30	27:30	100%	
	TP Numerical methods	2	1			1h30	10:30	27:30	100%	
EU Discovery Code: UED 2.2 Credits: 2 Coefficients: 2	Telecommunications and applications	1	1	1h30			10:30	02:30		100%
	Telecommunications Law	1	1	1h30			10:30	02:30		100%
Transversal EU Code: UET 2.2 Credits: 1 Coefficients: 1	Expression, information and communication techniques	1	1	1h30			10:30	02:30		100%
Total semester 4		**30**	**17**	**1:30**	**6:00**	**5:30**	**375h00**	**375h00**		

III - Detailed program by subject

Semester:3
Teaching unit: UEF 2.1.1
Subject 1:Mathematics 3
VHS: 67h30 (Class: 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 convergence conditions as well as the different types of convergence.

Recommended prior knowledge

Mathematics 1 and Mathematics 2

Content of the material:

Chapter 1: Simple and multiple integrals **3 weeks**

1.1 Reminders on the Riemann integral and on 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 weeks**

2.1 Integrals of functions defined on an unbounded interval. 2.2 Integrals of functions defined on a bounded interval, infinite at one of the ends.

Chapter 3: Differential equations **2 weeks**

3.1 Reminder 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 Integer series, Fourrier series.

Chapter 5: Fourier Transform **3 weeks**

5.1 Definition and properties. 5.2 Application to the resolution of differential equations.

Chapter 6: Laplace Transformation **2 weeks**

6.1 Definition and properties. 6.2 Application to the resolution of differential equations.

Evaluation mode:

Continuous monitoring: 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. Piskounov, Differential and integral calculus, Volume 1, Moscow edition
6- J. Quinet, Elementary course of higher mathematics 3- Integral calculation and series, Dunod.
7- J. Quinet, Elementary course of higher mathematics 4- Differential equations, Dunod.

Semester: 3
Teaching unit: UEF 2.1.1
Subject 2:Waves and Vibrations
VHS: 45h00 (Class: 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 to 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 split into two parts, the Waves part and the Vibrations part, which can be approached independently of the 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 sectors (Group A). While for students of Groups B and C (Civil Engineering, Mechanical Engineering and Process Engineering), it is wise 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 go over all the parts of the course which require demonstrations or theoretical developments and to focus only on the application aspects. Furthermore, demonstrations can be the subject of auxiliary work to be asked of students as activities within the framework of the student's personal work. On this subject, consult the paragraph ''G- Student evaluation through continuous assessment and personal work'' present in this training offer.*

Part A: Vibration

Chapter 1: Introduction to Lagrange equations **2 weeks**

1.1 Lagrange equations for a particle
1.1.1 Lagrange equations
1.1.2 Case of conservative systems
1.1.3 Case of speed-dependent friction forces
1.1.4 Case of an external force depending on time
1.2 System with several degrees of freedom.

Chapter 2: Free oscillations of systems with one degree of freedom **2 weeks**

2.1 Undamped oscillations
2.2 Free oscillations of damped systems

Chapter 3: Forced oscillations of systems with one degree of freedom 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 systems with two degrees of freedom **1 week**

4.1 Introduction
4.2 Systems with two degrees of freedom

Chapter 5: Forced oscillations of systems with two degrees of freedom 2 weeks
5.1 Lagrange equations
5.2 Mass-spring-damper 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 2 weeks
1.1 General and basic definitions
1.2 Propagation equation
1.3 Solution of the propagation equation
1.4 Sinusoidal traveling wave
1.5 Superposition of two progressive sinusoidal waves

Chapter 2: Vibrating strings 2 weeks
2.1 Wave equation
2.2 Harmonic traveling waves
2.3 Free oscillations of a string of finite length
2.4 Reflection and transmission

Chapter 3: Acoustic waves in fluids 1 week
3.1 Wave equation
3.2 Speed of sound
3.3 Sinusoidal traveling wave
3.4 Reflection-Transmission

Chapter 4: Electromagnetic waves 2 weeks
4.1 Wave equation
4.2 Reflection-Transmission
4.3 Different types of electromagnetic waves

Evaluation mode:
Continuous monitoring: 40%; Final exam: 60%.

Bibliographic references:

1. H. Djelouah; Vibrations and Mechanical Waves – Courses & Exercises (USTHB University website: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.
7. H. Djelouah; Electromagnetism ; Office of University Publications, 2011.

Semester:3
Teaching unit: UEF 2.1.2
Subject 1:Fundamental Electronics 1
VHS: 45h00 (Class: 1h30, tutorial: 1h30)
Credits:4
Coefficient:2

Teaching objectives:

Explain the calculation, analysis and interpretation of electronic circuits. Know the properties, electrical models and characteristics of electronic components: diodes, bipolar transistors and operational amplifiers.

Recommended prior knowledge

Notions of materials physics and fundamental electricity.

Content of the material:

The number of weeks displayed are indicated for information purposes only. It is obvious that the course manager is not required to strictly respect this dimensioning or the arrangement of the chapters.

Chapter 1. Continuous regime and Fundamental theorems 3 weeks

Definitions (dipole, branch, node, mesh), voltage and current generators (ideal, real), voltage-current relationships (R, L, C), voltage divider, current divider. Fundamental theorems: superposition, Thévenin, Norton, Millmann, Kennelly, Equivalence between Thévenin and Norton, Maximum power transfer theorem.

Chapter 2. Passive quadrupoles 3 weeks

Representation of a passive network by a quadrupole. Quantities characterizing the behavior of a quadrupole in an assembly (input and output impedance, voltage and current gain), application to adaptation. Passive filters (low pass, high pass, etc.), Gain curve, Phase curve, Cutoff frequency, Bandwidth.

Chapter 3. Diodes 3 weeks

Basic reminders of the physics of semiconductors: Definition of a semiconductor, Crystalline Si, Doping concepts, N and P semiconductors, PN junction, Constitution and operation of a diode, direct and reverse polarization, Current characteristic -voltage, static and variable regime, Equivalent diagram. Applications of diodes: Single and double alternation rectification. Voltage stabilization by the Zener diode. Clipping, Other types of diodes: Varicap, LED, Photodiode.

Chapter 4. Bipolar Transistors 3 weeks

Bipolar transistors: Transistor effect, operating modes (blocking, saturation, etc.), Static characteristics network, Polarizations, Load line, Rest point, etc. Study of the three fundamental assemblies: EC, BC, CC, Equivalent diagram, Gain in voltage, Gain in decibels, Bandwidth, Current gain, Input and output impedances. Study of multi-stage LF amplifiers in static and dynamic conditions, connection capacitors, decoupling capacitors. Other uses of the transistor: Darlington assembly, switching transistor, etc.

Chapter 5- Operational amplifiers: 3 weeks

Principle, Equivalent diagram, Ideal op-amp, Feedback, Characteristics of the op-amp,Basic configurations of the operational amplifier: Inverter, Non-inverter, Adder, Subtractor, Comparator, Follower, Derivator, Integrator, Logarithmic, Exponential, etc.

Evaluation mode:
Continuous monitoring: 40%; Final exam: 60%.

Bibliographic references:

1. A. Malvino, Principle of Electronics, 6th Edition Dunod, 2002.
2. T. Floyd, Electronic Components and Application Systems, 5th Edition, Dunod, 2000.
3. F. Milsant, Electronics course (and problems), Volumes 1 to 5, Eyrolles.
4. M. Kaufman, Electronics: The Components, Volume 1, McGraw-Hill, 1982.
5. P. Horowitz, Treatise on Analogue and Digital Electronics, Volumes 1 and 2, Publitronic-Elektor, 1996.
6. M. Ouhrouche, Electric circuits, Presses international Polytechnique, 2009.
7. Neffati, General Electricity, Dunod, 2004
8. D. Dixneuf, Principles of electrical circuits, Dunod, 2007
9. Y. Hamada, Electronic circuits, OPU, 1993.
10. I. Jelinski, All Electronics in Exercises, Vuibert, 2000.

Semester:3
Teaching unit: UEF 2.1.2
Subject 2:Fundamental electrical engineering 1
VHS: 45h00 (Class: 1h30, tutorial: 1h30)
Credits:4
Coefficient:2

Teaching objectives:

Know the basic principles of electrical engineering. Understand the operating principle of transformers and electrical machines.

Recommended prior knowledge:

Basic electricity concepts.

Content of the subject:

Chapter 1. Mathematical reminders about complex numbers (NC) (1Week)

Cartesian form, conjugated NCs, Module, Arithmetic operations on NCs (addition, etc.), Geometric representation, Trigonometric form, Moivre formula, root of NCs, Representation by an exponential of an NC, Trigonometric application of Euler's formulas, Application to NC electricity.

Chapter 2. Reminders on the fundamental laws of electricity (2 weeks)

Continuous regime: electric dipole, association of dipoles R, C, L.
Harmonic regime: representation of sinusoidal quantities, average and effective values, Fresnel representation, complex notation, impedances, powers in sinusoidal regime (instantaneous, active, apparent, reactive), Boucherot's theorem.
Transient regime: RL circuit, RC circuit, RLC circuit, charging and discharging of a capacitor.

Chapter 3. Electrical circuits and powers (3 weeks)

Single-phase circuits and electrical powers. Three-phase systems: Balanced and unbalanced (symmetrical components) and electrical powers.

Chapter 4.Magnetic circuits (3 weeks)

Magnetic circuits in sinusoidal alternating regime. Self and mutual inductances. Magnetic electrical analogy.

Chapter 5. Transformers (3 weeks)

Ideal single-phase transformer. Real single-phase transformer. Other transformers (insulation, impulse, autotransformer, three-phase transformers).

Chapter 6.Introduction to electrical machines (3 weeks)

General information on electrical machines. Principle of operation of the generator and the engine. Power balance and efficiency.

Evaluation mode:

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

Bibliographic references:

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

1. JP Perez, Electromagnetism Foundations and Applications, 3rd Edition, 1997.
2. A. Fouille,Electrotechnics for the Use of Engineers, 10th edition, Dunod, 1980.
3. C. François, Electrical engineering, Ellipses, 2004
4. L. Lasne, Electrotechnique, Dunod, 2008

5. J. Edminister, Theory and Applications of Electric Circuits, McGraw Hill, 1972
6. D. Hong, Electrical circuits and measurements, Dunod, 2009
7. M. Kostenko, Electric Machines - Volume 1, Volume 2, Editions MIR, Moscow, 1979.
8. M. Jufer, Electromechanics, Presses polytechniques et universitaire romandes- Lausanne, 2004.
9. A. Fitzgerald, Electric Machinery, McGraw-Hill Higher Education, 2003.
10. J. Lesenne, Introduction to in-depth electrical engineering. Technique and Documentation, 1981.
11. P. Maye, Industrial electric motors, Dunod, 2005.
12. S. Nassar, Electric circuits, Maxi Schaum.

Semester:3
Teaching unit: UEM2.1
Subject 1:Probability and statistics
VHS: 45h00 (Class: 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 over a finite universe and random variables.

Recommended prior knowledge

Mathematics 1 and Mathematics 2

Material content:

Part A: Statistics

Chapter 1: Basic Definitions **(1 week)**

A.1.1 Concepts of population, sample, variables, modalities
A.1.2 Different types of statistical variables: qualitative, quantitative, discrete, continuous.

Chapter 2: One-variable statistical series **(3 weeks)**

A.2.1 Number, Frequency, Percentage.
A.2.2 Cumulative number, Cumulative frequency.
A.2.3 Graphical representations: bar chart, circular chart, bar chart. Polygon of numbers (and frequencies). Histogram. Cumulative curves.
A.2.4 Position characteristics
A.2.5 Dispersion characteristics: extent, variance and standard deviation, coefficient of variation.
A.2.6 Shape characteristics.

Chapter 3: Statistical series in two variables **(3 weeks)**

A.3.1 Data tables (contingency table). A cloud of dots.
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 fit.

Part B: Probabilities

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

B.1.1Arrangements
B.1.2Combinations
B.1.3Permutations.

Chapter 2: Introduction to Probability **(2 weeks)**

B.2.1Algebra of events
B.2.2Definitions
B.2.3Probable spaces
B.2.4General probability theorems

Chapter 3: Conditioning and independence **(1 week)**

B.3.1Conditioning,
B.3.2Independence,
B.3.3Bayes formula.

Chapter 4: Random variables **(1 week)**
B.4.1Definitions and properties,
B.4.2Distribution function,
B.4.3Expectation,
B.4.4Covariance and moments.

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

Evaluation mode:

Continuous monitoring: 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 calculation and statistics. Handout ENSTA, 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. Mathematical statistics course. Economica, 1988.
7. A. Montfort. Introduction to statistics. Polytechnic School, 1991

Semester:3
Teaching unit: UEM2.1
Subject 2:Computer science 3
VHS: 10:30 p.m. (TP: 1:30 a.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 digital 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.)

Lab 2: Script Files and Types of Data and Variables (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)

Lab 6: Function files (2 weeks)

TP 7: Graphics (Management of graphic windows, plot) (2 weeks)

TP 8: Using toolbox (2 weeks)

Evaluation mode:

Continuous control: 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 scientific calculation in Python and Scilab scientific preparatory classes 1st and 2nd years, Ellipses, 2010.

Semester:3
Teaching unit: UEM 2.1
Subject 3:Electronics and electrical engineering TP
VHS: 10:30 p.m. (TP: 1:30 a.m.)
Credits:2
Coefficient:1

Teaching objectives:

Consolidation of knowledge acquired in fundamental electronics and electrical engineering subjects to better understand and assimilate the fundamental laws of electronics and electrical engineering.

Recommended prior knowledge

Fundamental electronics. Fundamental electrical engineering.

Content of the material:

The TP teacher is required to carry out at least 3 Electronics TPs and 3 Electrical Engineering TPs from the list of TPs offered below:

Electronics TP 1
TP 1: Fundamental theorems
TP 2: Characteristics of passive filters
TP 3: Diode/Rectifier Characteristics
TP 4: Stabilized power supply with Zener diode
TP 5: Characteristics of a transistor and operating point
TP 6: Operational amplifiers.

Electrotechnical TP 1
TP 1: Single-phase voltage and current measurement
TP 2: Three-phase voltage and current measurement
TP 3: Three-phase active and reactive power measurement
TP 4: Magnetic circuits (hysteresis cycle)
TP 5: Transformer testing
TP 6: Electrical machines (demonstration).

Evaluation mode:

Continuous control: 100%

Bibliographic references:

Semester:3
Teaching unit: UEM 2.1
Subject 4:TP Waves and vibrations
VHS: 3:00 p.m. (TP: 1:00 a.m.)
Credits:1
Coefficient:1

Teaching objectives

The objectives assigned by this program concern the initiation of students to put 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: Spring mass
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: Groove pulley according to Hoffmann
TP8: Electromechanical systems (The electrodynamic loudspeaker)
TP9: Pohl's pendulum
TP10: Propagation of longitudinal waves in a fluid.

Noticed: It is recommended to choose at least 5 TPs among the 10 offered.

Evaluation mode:

Continuous control: 100%.

Bibliographic references:

Semester:3
Teaching unit: UED 2.1
Subject 1:State of the art of electrical engineering
VHS: 10:30 p.m. (Class: 1h30)
Credits:1
Coefficient:1

Teaching objectives
Give the student a general overview of the different existing sectors in Electrical Engineering while highlighting the impact of electricity in improving human daily life.

Recommended prior knowledge
None

Content of the subject:

1- The Electrical Engineering family: Electronics, Electrotechnics, Automatics, Telecommunications, … etc.

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

Evaluation mode: 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 2:Energy and environment
VHS: 10:30 p.m. (Class: 1h30)
Credits:1
Coefficient:1

Teaching objectives:

To introduce the student to the different existing energies, their sources and the impact of their uses on the environment.

Recommended prior knowledge:

Concepts of energy and environment.

Content of the subject:

Chapter 1: The different energy resources

Chapter 2: Energy storage

Chapter 3: Consumption, reserves and developmentsResourceenergy

Chapter 4: The different types of pollution

Chapter 5: Detection and treatmentof thepollutants and waste

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

Evaluation mode:

Final exam: 100%.

Bibliographic references:

1. Jenkins et al., Electrotechnics of renewable energies and cogeneration, Dunod, 2008
2. Pinard, Renewable energies for electricity production, Dunod, 2009
3. Crastan, Power plants and alternative electricity production, Lavoisier, 2009
4. Labouret and Villoz, Photovoltaic solar energy, 4th ed., Dunod, 2009-10.

Semester:3
Teaching unit: UET 2.1
Subject 1:Technical English
VHS: 10:30 p.m. (Class: 1h30)
Credits:1
Coefficient:1

Teaching objectives:

This course must allow the student to acquire a fairly significant level of language capable of allowing him to use a scientific document and talk about his specialty and his sector in English, at least, with a certain ease and clarity. .

Recommended prior knowledge:

English 1 and English 2

Content of the material:

- Oral comprehension and oral expression, vocabulary acquisition, grammar, etc.

-Nouns and adjectives, comparisons, following and giving instructions, identifying things.

-Use of numbers, symbols, equations.

- Measurements: Length, surface, volume, power, etc.

- Describe scientific experiments.

- VScharacteristics of scientific texts.

Evaluation mode:

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
Matter:Fundamental telecommunications
VHS: 67h30 (Class: 3h00, tutorial: 1h30)
Credits: 6
Coefficient: 3

Teaching objectives:

The course aims to provide a global vision of the basic principles of analog and digital telecommunications systems and to deduce the minimum characteristics.

Recommended prior knowledge:

Mathematics 3,Waves and vibrations, Fundamental electronics 1

Content of the subject:

Chapter 1. General information on Telecommunications (3 weeks)
History and evolution of telecommunications, Services offered by telecommunications, Telecommunications norms and standards

Chapter 2. Communication systems (4 weeks)
Sources and signals of telecommunications, Basic diagram and principles of a communication system, Transmission medium (Transmission lines: two-wire line, coaxial cable, printed lines, Waveguides, Optical fibers, Free space)

Chapter 3. Analog transmission techniques (4 weeks)
Mathematical reminders: Classes of signals, Examples of elementary signals, Principle of analog transmission, Filtering, Amplification, Modulation, Mixing.

Chapter 4. Digital transmission techniques (4 weeks)
Principle of digital transmission, Sampling, Quantification, Coding, Transmission channel.

Evaluation method:

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

Bibliographic references:

1. D. Battu, Introduction to Telecoms: Technologies and Applications, Dunod, Paris, 2002.
2. P. Clerc, P. Xavier, Fundamental Principles of Telecommunications, Ellipses, Paris, 1998.
3. G. Barué, Telecommunications and Infrastructure, Ellipses, 2002.
4. E. Altman, A. Ferreira and J. Galtier, Satellite Telecommunications Networks: Technology and Services, Dunod, Paris, 1999.
5. PG Fontolliet, Telecommunications Systems, Electricity Treatise, Vol. XVIII, PPUR, Lausanne, 1999 (Chapters 12 & 13).
6. C. Servin, Networks & Telecoms, 2nd ed., Dunod, Paris, 2006.
7. G. Baudoin, Digital Radiocommunications T1: Principles, Modeling and Simulation, Dunod, Paris, 2007

Semester:4
Teaching unit: UEF 2.2.1
Subject 2:Combinatorial and sequential logic
VHS: 45h00 (Class: 1h30, tutorial: 1h30)
Credits:4
Coefficient:2

Teaching objectives:

Know the usual combinational circuits. Know how to design some applications of combinatorial circuits using standard tools such as truth tables and Karnaugh tables. Introduce sequential circuits through flip-flop circuits, counters and registers.

Recommended prior knowledge

None.

Content of the material:

The number of weeks displayed are indicated for information purposes only. It is obvious that the course manager is not required to strictly respect this dimensioning or the arrangement of the chapters.

Chapter 1: Boolean Algebra and Simplification of Logical Functions 2 weeks

Logic variables and functions (OR, AND, NOR, NAND, XOR). Laws of Boolean algebra. De Morgan's theorem. Complete and incomplete logic functions. Representation of logical functions: truth tables, Karnaugh tables. Simplification of logical functions: Algebraic method, Karnaugh method.

Chapter 2: Number Systems and Information Coding 2 weeks

Representation of a number by codes (binary, hexadecimal, DCB, signed and unsigned binary, etc.), base change or conversion, unweighted codes (Gray code, error detector and corrector codes, ascii code, etc.) , arithmetic operations in binary code.

Chapter 3: Combinatorial transcoder circuits 2 weeks

Definitions, decoders, priority encoders, transcoders, Cascading, Applications, Analysis of the technical sheet of a decoder integrated circuit, List of decoding integrated circuits.

Chapter 4: Combinatorial switching circuits 2 weeks

Definitions, multiplexers, demultiplexers, Cascading, Applications, Analysis of the technical sheet of a switching integrated circuit, List of integrated circuits.

Chapter 5: Combinatorial comparison circuits 2 weeks

Definitions, 1-bit, 2-bit and 4-bit comparison circuit, Cascading, Applications, Datasheet analysis of a comparison integrated circuit, List of integrated circuits.

Chapter 6: Flip-flops 2 weeks

Introduction to sequential circuits. The RS flip-flop, The RST flip-flop, The D flip-flop, The Master-slave flip-flop, The T flip-flop, The JK flip-flop. Examples of applications with flip-flops: Frequency divider by n, Pulse train generator, etc.
It is advisable to present the truth table, examples of timing diagrams as well as the limits and imperfections for each flip-flop.

Chapter 7: Counters 2 weeks

Definition, Classification of counters (synchronous, regular, irregular, asynchronous, complete and incomplete cycles). Creation of complete and incomplete synchronous binary counters, Excitation

tables of JK, D and RS flip-flops, Creation of modulo (n) asynchronous binary counters: complete, incomplete, regular and irregular. Programmable counters (start from any state).

Chapter 8. The Registers **1 week**

Introduction, classic registers, shift registers, loading and recovering data in a register (PIPO, PISO, SIPO, SISO), shifting data in a register, a universal register, the 74LS194A, available integrated circuits, Applications: classic registers, special counters, queues.

Evaluation mode:

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

Bibliographic references:

1- J. Letocha, Introduction to logic circuits, McGraw Hill Edition.
2- JC Lafont, Courses and problems in digital electronics, 124 exercises with solutions, Ellipses.
3- R. Delsol, Digital electronics, Volumes 1 and 2, Edition Berti
4- P. Cabanis, Digital electronics, Edition Dunod.
5- M. Gindre, Combinatorial logic, Edition Ediscience.
6- H. Curry, Combinatory Logic II. North Holland, 1972
7- R. Katz, Contemporary Logic Design, 2nd ed. Prentice Hall, 2005.
8- M. Gindre, Digital electronics: combinatorial logic and technology, McGraw Hill, 1987
9- C. Brie, Combinatorial and sequential logic, Ellipses, 2002.
10-JP. Ginisti, Combinatorial logic, Paris, PUF (coll. “Que sais-je?” n°3205), 1997.
11-JL. Krivine, Lambda-calculus, types and models, Masson, 1990, chap. Combinatorial logic, English translation available on the author's website.

Semester:4
Teaching unit: UEF 2.2.2
Subject 1:Numerical methods
VHS: 45h00 (Class: 1h30, tutorial: 1h30)
Credits: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 **(2 weeks)**
1. General introduction, 2. Lagrange polynomial, 3. Newton polynomials.

Chapter 3.Function approximation: **(2 weeks)**
1. Approximation method and root mean square. 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 method, 4. Quadrature formulas.

Chapter 5.Solving ordinary differential equations
(Problem of the initial condition or of Cauchy) (2 weeks)
1. General introduction, 2. Euler method, 3. Improved Euler method, 4. Runge-Kutta method.

Chapter 6.Direct solution method for systems of linear equations (2 Weeks)
1. Introduction and definitions, 2. Gauss method and pivot, 3. LU factorization method, 4. ChoeleskiMMt factorization method, 5. Thomas algorithm (TDMA) for three-diagonal systems.

Chapter 7.Approximate solution method for systems of linear equations
(2 weeks)
1. Introduction and definitions, 2. Jacobi method, 3. Gauss-Seidel method, 4. Use of relaxation.

Evaluation mode:

Continuous monitoring: 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, Digital 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. Presses Universitaires de Grenoble, 1996.
8. E. Hairer, SP Norsett and G. Wanner, Solving Ordinary Differential Equations, Springer, 1993.
9. PG Ciarlet, Introduction to matrix numerical analysis and optimization,
Masson, Paris, 1982.

Semester:4
Teaching unit: UEF 2.2.2
Subject 2:Signal theory
VHS: 45h00 (Class: 1h30, tutorial: 1h30)
Credits:4
Coefficient:2

Teaching objectives:

Acquire the basic notions of the mathematical tools used in signal processing.

Recommended prior knowledge:

Basic mathematics course.

Content of the subject:

Chapter 1. General information about signals (3 weeks)

Objectives of signal processing. Areas of use. Classification of signals (morphological, spectral, etc.). Deterministic signals (periodic and non-periodic) and random signals (stationary and non-stationary). Causality. Concepts of power and energy. Basic functions in signal processing (measurement, filtering, smoothing, modulation, detection, etc.). Examples of basic signals (rectangular, triangular pulse, ramp, step, sign, Dirac, etc.)

Chapter 2. Fourier analysis (4 weeks)

Introduction, Mathematical reminders (dot product, Euclidean distance, linear combination, orthogonal base, etc.). Approximation of signals by a linear combination of orthogonal functions. Fourier series, Fourier transform, Properties. Parseval's theorem. Fourier spectrum of periodic (discrete spectrum) and non-periodic (continuous spectrum) signals.

Chapter 3. Laplace Transform (3 weeks)

Definition. Properties of the Laplace Transform. Signal/system relationship. Application to linear and translation invariant systems or SLIT (Temporal and Frequency Analysis).

Chapter 4. Convolution Product (2 weeks)

Formulation of convolution product, Properties of convolution product, Convolution product and Dirac momentum.

Chapter 5. Signal Correlation (3 weeks)

Finite total energy signals. Finite total average power signals. Cross-correlation between signals, Autocorrelation, Properties of the correlation function. Spectral energy density and power spectral density. Wiener-Khintchine theorem. Case of periodic signals.

Evaluation mode:

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

Bibliographic references:

1. S. Haykin, “Signals and systems”, John Wiley & Sons, 2nd ed., 2003.
2. AV Oppenheim, “Signals and systems”, Prentice-Hall, 2004.
3. F. de Coulon, “Theory and processing of signals”, Edition PPUR.
4. F. Cottet, “Signal processing and data acquisition, Courses and solved exercises”, Dunod.
5. B. Picinbono, “Theory of signals and systems with solved problems”, Edition Bordas.
6. Mr. Benidir,“Signal Theory and Processing, volume 1: Representation of signals and systems - Courses and corrected exercises, Dunod, 2004.
7. Mr. Benidir,“Signal Theory and Processing, volume 2: Basic methods for signal analysis and processing - Courses and corrected exercises, Dunod, 2004.
8.J. Max, Signal processing

Semester:4
Teaching unit: UEM 2.2
Subject 1:Electrical and electronic measurements
VHS: 37h30 (Class: 1h30, TP: 1h00)
Credits:3
Coefficient:2

Teaching objectives:

Introduce the student to techniques for measuring electrical and electronic quantities. Familiarize them with the use of analog and digital measuring devices.

Recommended prior knowledge

General Electricity, Fundamental Laws of Physics.

Content of the material:

The number of weeks displayed are indicated for information purposes only. It is obvious that the course manager is not required to strictly respect this dimensioning or the arrangement of the chapters.

Chapter 1. Measurements, quantities and uncertainties 5 weeks

Introduction, Quantity, Standard, Systems of units, Table of multiples and submultiples, Equations with dimensions, Useful formulas, Measurement precision, Measurement error, Classification of errors, Uncertainties in indirect measurements, Qualities of measuring devices, Calibration of measuring devices, Graphic symbols of measuring devices, General measuring methods (deviation, zero, resonance methods), Application exercises.

Chapter 2. Measurement methods 6 weeks

1. Voltage measurements: Direct methods of voltage measurements, Alternative voltage measurements, Indirect method of voltage measurements using the opposition method.
2. Measurement of currents: Direct method of measuring currents, Use of simple Shunt.
3. Resistance measurements: Classification of resistances, Voltammetric method, Zero method: The Wheatstone Bridge, Measurement of very large resistances by the pressure loss method.
4. Impedance measurements: Capacitance measurements, Inductance measurement, AC bridges.
5. Continuous Power Measurements: Fundamental relationship, Ammeter and voltmeter method, Continuous electrodynamic wattmeter.
6. AC Power Measurements: Instantaneous power and average power, Complex power, apparent power, active power and reactive power, AC electrodynamic watt meter, 3 voltmeter method for active power, Method of direct measurement of reactive power, Method of indirect reactive power measurements
7. Phase shift measurements: Direct measurement of phase shifts with the oscilloscope, Measurement of phase shifts with Lissajous figures.
8. Measurements of frequencies and periods: Direct measurement of frequency with an oscilloscope, Measurement of frequencies with Lissajous figures, Measurement of frequencies by the frequency meter method, Measurement of frequencies by the period meter method, Application exercises.

Chapter 3. Measuring devices 4 weeks

Introduction
Analog measuring devices: Classification of deflection devices, The moving frame galvanometer, Structure of the magnetoelectric ammeter, Structure of the magnetoelectric voltmeter, Operation of the alternating electrodynamic wattmeter
Digital measuring devices: Analog-to-digital converters (ADC), Principle of operation of a digital measuring device, Examples of digital measuring devices (The multimeter, the oscilloscope, etc.).

TP Electrical and electronic measurements:

TP No. 1: Resistance measurement:

Measure resistances using the following 5 methods: voltammetric, ohmmeter, Wheatstone bridge, comparison and substitution.
Compare these methods with each other and establish an error calculation.

TP No. 2: Inductance measurement:

Measure inductances using the following 3 methods: voltammetric, Maxwell bridge, resonance.
Compare these methods with each other and establish an error calculation.

TP No. 3: Capacity measurement:

Carry out the capacitance measurement using the following 3 methods: voltammetric, Sauty bridge, resonance.
Compare these methods with each other and establish an error calculation.

TP No. 4: Phase shift measurement:

Measure the resistances using the following 2 methods: Phasemeter and oscilloscope.

TP No. 5: Single-phase power measurement:

Measure the resistances using the following 5 methods: wattmeter, Cosφmeter, three voltmeters, three ammeters, power sensor.
Compare these methods with each other and establish an error calculation.

TP No. 6: Three-phase power measurement:

Carry out the resistance measurement using the following methods: Star system and triangle system, balanced and unbalanced.

Evaluation mode:

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

Bibliographic references:

1- M. Cerr, Industrial instrumentation: T.1, Edition Tec and Doc.
2- M. Cerr, Industrial instrumentation: T.2, Edition Tec and Doc.
3- P. Oguic, Measurements and PC, ETSF Edition.
4- D. Hong, Electrical circuits and measurements, Dunod, 2009.
5- W. Bolton, Electrical and Electronic Measurement and Testing, 1992.
6- A. Fabre, Electrical and electronic measurements, OPU, 1996.
7- G. Asch, Sensors in industrial instrumentation, Dunod edition, 2010.
8- L. Thompson, Electrical Measurements and Calibration: Fundamentals and Applications, Instrument Society of America, 1994.
9- JP Bentley, Principles of Measurement Systems, Pearson Education, 2005.
10- J. Niard, Electrical measurements, Nathan, 1981.
11- P. Beauvilain, Electrical and Electronic Measurements.
12-M. Abati, Applied electronic measurements, Delagrave Techniques and Standardization Collection.
13- P. Jacobs, Electrical measurements, Edition Dunod.
14-A. Leconte, Measurements in electrotechnics (Document D 1 501), Engineering techniques.

SourcesInternet :

- http://sitelec.free.fr/cours2htm
- http://perso.orange.fr/xcotton/electron/coursetdocs.ht
- http://eunomie.u-bourgogne.fr/elearning/physique.html
- http://www.technique-ingenieur.fr/dossier/apparatusdemesure

Semester:4
Teaching unit: UEM 2.2
Subject2:TPFundamental telecommunications
VHS: 10:30 p.m. (TP: 1:30 a.m.)
Credits: 2
Coefficient: 1

Teaching objectives:
Consolidate the knowledge acquired during the subjects of fundamental electronics 1 and fundamental telecommunications through practical work sessions, to better understand and assimilate thedifferent types of Modulation, Demodulation and converters.

Recommended prior knowledge:
Fundamental telecommunications

Content of the subject:

TP No. 1: Study of basic circuits for rectification and filtering

TP No. 2: Principles of AM Amplitude Modulation and Demodulation

TP No. 3: Principles of FM Frequency Demodulation Modulation

TP No. 4: Principles of Modulation of PM phase demodulation

TP No. 5: Analog/digital and digital/analog converters

Evaluation mode:
Continuous control: 100%.

Bibliographic references:
1. D. Battu, Introduction to Telecoms: Technologies and Applications, Dunod, Paris, 2002.
2. P. Clerc, P. Xavier, Fundamental Principles of Telecommunications, Ellipses, Paris, 1998.
3. G. Barué, Telecommunications and Infrastructure, Ellipses, 2002.
4. E. Altman, A. Ferreira and J. Galtier, Satellite Telecommunications Networks:
5. Technology and Services, Dunod, Paris, 1999.
6. PG Fontolliet, Telecommunications Systems, Electricity Treatise, Vol. XVIII,
7. PPUR, Lausanne, 1999 (Chapters 12 & 13).
8. C. Servin, Networks & Telecoms, 2nd ed., Dunod, Paris, 2006.
9. G. Baudoin, Digital Radiocommunications T1: Principles, Modeling and Simulation, Dunod, Paris, 2007

Semester:4
Teaching unit: UEM 2.2
Subject 3:TP Combinatorial and sequential logic
VHS: 10:30 p.m. (TP: 1:30 a.m.)
Credits:2
Coefficient:1

Teaching objectives:

Consolidate the knowledge acquired during the course of the material "Combinatorial and Sequential Logic" through practical work to better understand and assimilate the content of this subject.

Recommended prior knowledge

Combinatorial and Sequential Logic.

Content of the material:

The teacher chooses from this list of practical exercises between 4 and 6 practical exercises to carry out and dealing with the two types of logic circuits (combinatorial and sequential).

TP1: TTL and CMOS integrated circuit technology.
Understand and test the different logic gates

TP2: Simplification of logical equations through practice
Discover the rules for simplifying equations in Boolean algebra through practice

TP3: Study and creation of usual combinatorial logic functions
Example: switching circuits (MUX, DMUX), coding and decoding circuits, etc.

TP4: Study and creation of an arithmetic combinatorial circuit
Creation of an adder and/or subtractor circuit of 2 4-bit binary numbers.

TP5: Study and creation of a logic combinational circuit
Realization of a logic function using logic gates. Example: a 7-segment display and/or a 2's complement generator of a 4-bit number and/or a 4-bit Gray code generator, etc.

TP6: Study and creation of a logic combinational circuit
Complete study (Truth table, Simplification, Logic diagram, Practical assembly and Tests) of a combinatorial circuit based on specifications.

TP7: Study and creation of counter circuits
Incomplete asynchronous counter circuits using flip-flops, Irregular cycle synchronous counter circuits using flip-flops

TP8: Study and creation of registers

Evaluation mode:

Continuous control: 100%

Bibliographic references:

1. J. Letocha, Introduction to logic circuits, Mc-Graw Hill Edition.
2. JC Lafont, Courses and problems in digital electronics, 124 exercises with solutions, Edition Ellipses.

Semester:4
Teaching unit: UEM 2.2

Subject 4:TP Numerical methods
VHS: 10:30 p.m. (TP: 1:30 a.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 material:

Chapter 1 :Solving nonlinear equations **3 weeks**
1.Bisection method. 2. Fixed point method, 3. Newton-Raphson method

Chapter 2 :Interpolation and approximation **3 weeks**
1. Newton interpolation, 2. Chebyshev approximation

Chapter 3:Digital integrations **3 weeks**
1. Rectangle method, 2. Trapeze method, 3. Simpson method

Chapter 4:Differential equations **2 weeks**
1.Euler method, 2. Runge-Kutta methods

Chapter 5:Systems of linear equations **4 weeks**
1. Gauss-Jordon method, 2. Crout decomposition and LU factorization, 3. Jacobi method, 4. Gauss-Seidel method

Evaluation mode:

Continuous control: 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: calculation guide, programming graphic representations; compliant with the new MPSI program, Ellipses, 2015.
3. Jean-Philippe Grivet, Applied numerical methods: for the scientist and the engineer,EDP sciences, 2009.

Semester: 4
Teaching unit: UED 2.2
Subject: Telecommunications and Applications
VHS: 10:30 p.m. (Class: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:
This courts aims to paint the picture ofmain concepts and applications encountered in telecommunications

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

Content of the material:

Chapter 1: Introduction to Telecommunications Applications (3Weeks)
Electromagnetic spectrum and telecommunications, Classification of telecommunications systems,The telecommunications market: current state and future trends.

Chapter 2: Introduction to telephony (4 weeks)
Basic principle of telephony, Introduction to the switched telephone network (PSTN), Introduction to the Mobile (cellular) telephone network.

Chapter 3: Introduction to radio and television broadcasting (4 weeks)
Broadcasting, Terrestrial television networks and cable television, Satellite television.

Chapter 4: Other telecommunications applications (4 weeks)
Principle of radar, Wireless communication networks, Computer networks.

Evaluation mode:
Final exam: 100%.

Bibliographic references:

1. D. Battu, Introduction to Telecoms: Technologies and Applications, Dunod, Paris, 2002.
2. P. Clerc, P. Xavier, Fundamental Principles of Telecommunications, Ellipses, Paris, 1998.
3. G. Barué, Telecommunications and Infrastructure, Ellipses, 2002.

Semester: 4
Teaching unit: UED 3.1
Subject2:Telecommunications Law
VHS: 10:30 p.m. (Class: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:
Telecommunications law therefore constitutes one of the basic elements of the legal regime for information technologies. The course presents the foundations and essential aspects of the regulation of telecommunications networks and services. It examines in particular the rules which aim to ensure the proper functioning of the telecommunications market.

Recommended prior knowledge:
None

Content of the material:

1. Introduction: Evolution of information and communication technologies and the law relating thereto.
2. International Telecommunications Organizations.
   - International Telecommunications Union (ITU)
3. International telecommunications regulations and standards.
4. Legal framework for telecommunications in Algeria.
   - Historical
   - Main areas of telecommunications supervision.

Study of Algerian laws governing telecommunications by the supervisory ministry (MPTIC). Official Journal of the Democratic and Popular Algerian Republic, No. 48.

Evaluation method:
Final exam: 100%.

Bibliographic references:
1. MPTIC
2. ARPT
3. ITU

Semester:4
Teaching unit: UET2.2
Matter :Expression, information and communication techniques
VHS: 10:30 p.m. (Class: 1h30)
Credits:1
Coefficient:1

Teaching objectives:

This teaching aims to develop the student's skills, on a personal or professional level, in the field of communication and expression techniques. It also allows the student to know the techniques, tools and methods used to facilitate communications.

Recommended prior knowledge:

Languages (Arabic; French; English)

Material content:

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

Chapter 2 :Improve expression ability (2 weeks)
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.

Chapter 3:Develop autonomy, organizational and communication skills within the framework of a project approach (2 weeks)
Position yourself in a project and communication approach, Anticipate action, Implement a project:Presentation of a report of 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: Search, use and retrieval of information. (2weeks)
Search directories (YAHOO, GOOGLE), Search engines, Query and search language, Retrieving and printing an HTML page, Retrieving an image, Downloading a file or software, Reading 'a local HTML file, Playback of a multimedia file saved on the Web.

Chapter 6:ICT rights (2 weeks)
Computer crime, Media law, Electronic communications law, Electronic commerce law, Internet governance, …

Chapter 7: Securing sensitive information, Protection of confidential data and Preservation of nuisances. (3 weeks)
Backup of important data, “Informatics and freedoms” law, Internet dangers, 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.), Preventing data loss, Spam, Hoaxes, Cryptology, Electronic signature….

Evaluation method: