REPUBLIQUE ALGERIENNE DEMOCRATIQUE ET POPULAIRE

MINISTERE DE L'ENSEIGNEMENT SUPERIEUR
ET DE LA RECHERCHE SCIENTIFIQUE

Cahier des Charges
de Reconduction d'une Formation à Recrutement National

Licence

الجمهورية الجزائرية الـــديمقراطيـــة الـــشعبيـــــة

وزارة التعليـــــم العالـــــي والبحـــــث العلمـــــي

دفتر الشروط

لتجديد تكوين ذات تسجيل وطني

ليسانس

Fiche d’organisation semestrielle des enseignements

Semestre I:

Unité d'Enseignement	VHS	V.H hebdomadaire				Coeff.	Crédits	Mode d'évaluation	
	14-16 sem.	C	TD	TP	Autres			Continu	Examen
UEF11 Sciences Fondamentales I	**157.5**	**6**	**4.5**	**0**		**9**	**15**		
Mathematics I (Calculus I)	52.5	2	1.5	0		3	5	40%	60%
Chemistry I	52.5	2	1.5	0		3	5	40%	60%
Physics I	52.5	2	1.5	0		3	5	40%	60%
UEM11 TP et Sciences Fondamentales I	**18**	**0**	**0**	**1.5**		**1**	**1**		
Physics I Lab	18	0	0	1.5		1	1	100%	0%
UET11 Anglais et Bureautique	**195**	**11.5**	**0**	**1.5**		**9**	**14**		
English I	150	10	0	0		8	12	40%	60%
Office Suite (Bureautique)	45	1.5	0	1.5		1	2	40%	60%
Total Semestre I	**370.5**	**17.5**	**4.5**	**3**		**19**	**30**		

Semestre II:

Unité d'Enseignement	VHS	V.H hebdomadaire				Coeff.	Crédits	Mode d'évaluation	
	14-16 sem.	C	TD	TP	Autres			Continu	Examen
UEF21 Sciences Fondamentales II	**225**	**9**	**6**	**0**		**10**	**20**		
Mathematics II (Calculus II)	45	1.5	1.5	0		2	4	40%	60%
Mathematics III (Linear Algebra)	67.5	3	1.5	0		3	6	40%	60%
Chemistry II	45	1.5	1.5	0		2	4	40%	60%
Physics II	67.5	3	1.5	0		3	6	40%	60%
UEM21 Programmation et TP de Physique	**58.5**	**1.5**	**0**	**3**		**3**	**4**		
Introduction to C programming	40.5	1.5	0	1.5		2	3	40%	60%
Physics II Lab	18	0	0	1.5		1	1	100%	0%
UET21 Anglais Avancé	**60**	**4**	**0**	**0**		**2**	**3**		
English II	60	4	0	0		2	3	40%	60%
UED21 Electricité	**40.5**	**1.5**	**0**	**1.5**		**2**	**3**		
Electrical Engineering I	40.5	1.5	0	1.5		2	3	40%	60%
Total Semestre II	**384**	**16**	**6**	**4.5**		**17**	**30**		

Semestre III:

Unité d'Enseignement	VHS	V.H hebdomadaire				Coeff.	Crédits	Mode d'évaluation	
	14-16 sem.	C	TD	TP	Autres			Continu	Examen
UEF31 Sciences Fondamentales III	**90**	**4.5**	**1.5**	**0**		**5**	**8**		
Mathematics IV (Ordinary Differential Equations)	45	1.5	1.5	0		2	4	40%	60%
Physics III	45	3	0	0		3	4	40%	60%
UEF32 Electronique I	**180**	**9**	**3**	**0**		**9**	**16**		
Active Devices I	67.5	3	1.5	0		3	6	40%	60%
Digital Systems I with VHDL	45	3	0	0		3	4	40%	60%
Electrical Engineering II	67.5	3	1.5	0		3	6	40%	60%
UEM31 TP Electronique I	**90**	**0**	**0**	**4.5**		**3**	**5**		
Active Devices I Lab	18	0	0	1.5		1	1	100%	0%
Digital Systems I Lab	36	0	0	3		1	2	100%	0%
Electrical Engineering II Lab	36	0	0	3		1	2	100%	0%
UED31 Economie	**22.5**	**1.5**	**0**	**0**		**1**	**1**		
Introduction to Engineering Economics	22.5	1.5	0	0		1	1	40%	60%
Total Semestre III	**382.5**	**15**	**4.5**	**4.5**		**18**	**30**		

Semestre IV:

Unité d'Enseignement	VHS	V.H hebdomadaire				Coeff.	Crédits	Mode d'évaluation	
	14-16 sem.	C	TD	TP	Autres			Continu	Examen
UEF41 Sciences Appliquées	**135**	**6**	**3**	**0**		**6**	**12**		
Electromagnetic Theory	67.5	3	1.5	0		3	6	40%	60%
Linear systems I	67.5	3	1.5	0		3	6	40%	60%
UEF42 Electronique II et Machines	**157.5**	**9**	**1.5**	**0**		**9**	**14**		
Active Devices II	67.5	3	1.5	0		3	6	40%	60%
Digital Systems II with VHDL	45	3	0	0		3	4	40%	60%
Electrical Machines	45	3	0	0		3	4	40%	60%
UEM41 TP Electronique II et Machines	**72**	**0**	**0**	**6**		**3**	**4**		
Active Devices II Lab	18	0	0	1.5		1	1	100%	0%
Digital Systems II Lab	36	0	0	3		1	2	100%	0%
Electrical Machines Lab	18	0	0	1.5		1	1	100%	0%
Total Semestre IV	**364.5**	**15**	**4.5**	**6**		**18**	**30**		

Semestre V:

Unité d'Enseignement	VHS	V.H hebdomadaire				Coeff.	Crédits	Mode d'évaluation	
	14-16 sem.	C	TD	TP	Autres			Continu	Examen
UEF51 Electronique III	**135**	**9**	**0**	**0**		**9**	**12**		
Computer Architecture	45	3	0	0		3	4	40%	60%
Communications Principles	45	3	0	0		3	4	40%	60%
Microprocessor Systems Design	45	3	0	0		3	4	40%	60%
UEF52 Electronique IV	**157.5**	**9**	**1.5**	**0**		**9**	**14**		
Power Electronics	45	3	0	0		3	4	40%	60%
Linear Systems II	67.5	3	1.5	0		3	6	40%	60%
Process Control and Instrumentation	45	3	0	0		3	4	40%	60%
UEM51 TP Electronique III	**72**	**0**	**0**	**6**		**3**	**4**		
Communications Principles Lab	18	0	0	1.5		1	1	100%	0%
Power Electronics Lab	18	0	0	1.5		1	1	100%	0%
Microprocessor Sys. Design Lab	36	0	0	3		1	2	100%	0%
Total Semestre V	**364.5**	**18**	**1.5**	**6**		**21**	**30**		

Semestre VI:

Unité d'Enseignement	VHS	V.H hebdomadaire				Coeff.	Crédits	Mode d'évaluation	
	14-16 sem.	C	TD	TP	Autres			Continu	Examen
UEF61 Electronique V	**135**	**9**	**0**	**0**		**9**	**12**		
Communications Circuits	45	3	0	0		3	4	40%	60%
Energy Systems	45	3	0	0		3	4	40%	60%
Linear Control Systems	45	3	0	0		3	4	40%	60%
UEM61 Méthodologique	**54**	**0**	**0**	**4.5**		**2**	**3**		
Communications Circuits Lab	36	0	0	3		1	2	100%	0%
Linear Control Systems Lab	18	0	0	1.5		1	1	100%	0%
UEM62 Projet	**0**	**0**	**0**	**0**		**4**	**12**		
Project	0	0	0	0	**Travail Personnel**	4	12	100%	0%
UED61 Gestion	**45**	**3**	**0**	**0**		**2**	**3**		
Engineering Management	45	3	0	0		2	3	40%	60%
Total Semestre VI	**234**	**12**	**0**	**4.5**		**17**	**30**		

Programme détaillé par matière
(1 fiche détaillée par matière)

Semestre : I
UE : UEF11 Sciences Fondamentales I
Matière : Mathematics I

Objectifs de l'enseignement

This course is designed to provide a foundation whereby students develop a good understanding of differential and integral calculus, develop the ability to reason logically and rigorously and are prepared for higher level mathematical courses. At the end of the course, students are expected to gain conceptual and practical knowledge and understanding of differential calculus, integral calculus.

Connaissances préalables recommandées

High school mathematics program

Contenu de la matière :

- Review of basic notions (limits, continuity, derivatives, graphs)
- Integrals, Exponentials, Logarithms, Polar coordinates
- Circular and Hyperbolic trig functions, Inverses
- Techniques of integration and Improper Integrals
- Infinite series, Power series, Taylor's series

Mode d'évaluation :

Contrôle continu + Examen Final

Références:

1. Salas and Hill, Calculus, McGraw-Hill

Semestre : I
UE : UEF11 Sciences Fondamentales I
Matière : Chemistry I

Objectifs de l'enseignement
Students will acquire a fundamental background in electronic and nuclear reactions, interactions of chemical elements and related properties, electronic structures, wave nature and atomic spectra of matter related to electronic excitations states mostly used in electronics.

Connaissances préalables recommandées
Differential and integral calculus, dimensional analysis

Contenu de la matière :
- **Matter and atomic structure:** Kinds of substances, Microscopic and macroscopic nature of matter, Atomic theories, Atomic mass measurement, Isotopes
- **Radioactivity and nuclear reactions:** Radioactivity, Nuclear reactions, energy and Einstein equation, Nuclear stability and binding energy, Rate of radioactive decay
- **The electronic structure of the atom and atomic spectra:** Properties of electron in the atom and molecule, the BOHR theory- the hydrogen atom, Electron configuration and arrangement in the atom
- **Chemical reaction equations :** Le Chatelier principle, Chemical equation, Reaction kinetics, Acid- base reactions, oxydo-reduction reaction and electrochemistry
- **Chemical bonding:** Ionic bonding, Covalent bonding, Lewis structure, Molecular geometry

Mode d'évaluation :
Contrôle continu + Examen Final

Références:
1. Chemistry, J. A. Olmsted, G. M. Williams, 4th edition, J. Willey & sons Inc, 2006

Semestre : I
UE : UEF11 Sciences Fondamentales I
Matière : Physics I

Objectifs de l'enseignement
To give students an understanding of the physical concepts of translational and rotational kinematics, dynamics and heat and to help them develop an organized approach to solving problems

Connaissances préalables recommandées
High school physics and mathematics programs

Contenu de la matière :
- Dimensional Analysis, scalar and vector products
- Rectilinear Motion : Concepts of velocity and acceleration
- Planar motion and circular motion
- Force and Newton's laws
- Applications of Newton's laws
- work, potential energy and kinetic energy
- Conservative forces, conservation of total energy
- Linear momentum, conservation of linear momentum
- Center of mass, collisions
- Rotation of a solid body, Moment of inertia, Huygens' theorem
- Kinetic energy of rotation
- Angular momentum, conservation of the angular momentum

Mode d'évaluation :
Contrôle continu + Examen Final

Références:
1. Fundamentals of Physics, D. Halliday and R. Resnick, 6th Ed.
2. Physics for Scientists and Engineers, R. A. Serway, J. W. Jewett, 6th Ed.

Semestre : I
UE : UEM11 TP Sciences Fondamentales I
Matière : Physics I Lab

Objectifs de l'enseignement
These physics experiments are designed to help students verify physical laws and relationships by manipulating equipment, recording and organizing data, and drawing conclusions through data and error analysis.

Connaissances préalables recommandées
Calculus, Physics I

Contenu de la matière :
- Measurement and Error Analysis
- Free Fall or Projectile Motion
- Inertia Balance
- Applications of Newton's Laws
- Collisions in One Dimension
- Rotational Motion and Moment of Inertia

Mode d'évaluation :
Contrôle continu

Références:
1. Physics Lab Booklet

Semestre : I
UE : UET11 Anglais et Bureautique
Matière : English I

Objectifs de l'enseignement

- Learn the essentials of English grammar; particularly the rules used in the scientific and technical literature.
- Asking and understanding questions, understanding lectures, taking notes and making oral presentations.
- Comprehend general technical and scientific texts and be able to write coherent paragraphs.
- Learn scientific discourse and terminology specifically for electricity and electronics.

Connaissances préalables recommandées

High school English program + Placement test

Contenu de la matière :

- Statements: Affirmative , negative , interrogative statements
- Prepositions, Phrasal verbs, Comparisons, Tenses, Modals, Clauses, The sounds of English,
- Simple questions, Complex questions
- Listing for general comprehension, Listening for details, Listening to lectures
- Note-taking, Oral presentation, Learning dictionary skills
- Reading for general comprehension, Scanning , Skimming
- Writing simple sentences, Writing compound and complex sentences
- Learning dictionary skills
- Properties and shapes, Measurements
- Basic electricity concepts, Basic electricity terminology, Basic electronics concepts, Basic electronics terminology, Electricity and Electronics discourse.

Mode d'évaluation :

Contrôle continu + Examen Final

Références:

1. Rapid review of English Grammar ; Mastering American English
2. http://www.fortunecity.com/bally/durrus/153/gramtoc.html
3. http://www.englishmedialab.com/grammar.html
4. Active listening, listening comprehension and note-taking
5. http://www.real-english.com/ ;
6. http://www.breakingnewsenglish.com/
7. Basic English for science writing scientific English
8. http://iteslj.org/links/ESL/Reading
9. Basic English for science , Basic Electricity

Semestre : I
UE : UET11 Anglais et Bureautique
Matière : Office Suite

Objectifs de l'enseignement

A course designed to help students become computer literate. The course provides the knowledge and skills required to perform functions common to all Microsoft Windows applications with an emphasis on the common functionality between the three main Microsoft Office applications: Microsoft Word, Excel and PowerPoint.

Connaissances préalables recommandées
Basic use of Microsoft Windows

Contenu de la matière :
- Getting Started with Windows XP *Windows*
- Creating Documents with MS Word 2007 *Word*
- Creating Documents with MS Word 2007 *Word*
- Formatting and Organizing Text *Word*
- Using Graphics and Tables *Word*
- Creating a Worksheet and Analyzing Data *Excel*
- Creating a Worksheet and Analyzing Data *Excel*
- Getting Started with Microsoft Power Point 2007 *PPT*
- Designing a PowerPoint Presentation *PPT*
- Prepare presentation

Mode d'évaluation :
Contrôle continu + Examen Final

Références:
None

Semestre : II
UE : UEF21 Sciences Fondamentales II
Matière : Mathematics II

Objectifs de l'enseignement
To help students deepen conceptual understanding of calculus. The course is designed to develop the intuitive understanding, theory, and computational skills necessary for the concepts of calculus of scalar functions of several variables and the calculus of vector functions.

Connaissances préalables recommandées
Mathematics I

Contenu de la matière :
- Multivariable functions, Partial derivatives, Conic surfaces, Min and Max
- Double and Triple Integrals, Cylindrical and Spherical coordinates, Area of a surface
- Line Integrals, Vector Product, Divergence and Curl, Green's Theorem

Mode d'évaluation :
Contrôle continu + Examen Final

Références:
2. Salas and Hill, Calculus, McGraw-Hill

Semestre : II
UE : UEF21 Sciences Fondamentales II
Matière : Mathematics III (Linear Algebra)

Objectifs de l'enseignement
To help students understand the concepts and methods of linear algebra and develop abstract and critical reasoning by studying logical proofs and the axiomatic method as applied to linear algebra.

Connaissances préalables recommandées
Differential and Integral Calculus

Contenu de la matière :
- **Basic algebraic structures:** Sets, Groups, Rings, Fields, Polynomials
- **Vector spaces of finite dimension:** Vector spaces, subspaces, spanned subspaces, operations on subspaces
- **Basis/Dimension:** Linear independence, basis, dimension, extensions to a basis
- **Linear mappings:** Mappings, types, linear mappings, rank/nullity, Non singular mappings, matrix representation of linear mappings
- **Matrices:** Operations, rank/nullity, special matrices, echelon form, non-singular matrices
- **Determinants:** Explicit form, Laplace expansion , Adjoint matrices, Applications
- **Equivalence/similarity:** Change of basis, equivalence, similarity
- **Eigenvalues/Eigenvectors:** Eigenvalues, eigenvectors, diagonalization, Jordan canonical form, minimal polynomial

Mode d'évaluation :
Contrôle continu + Examen Final

Références:
1. Elementary Differential Equations with Linear Algebra, R.S. Finney, Addison-Wesley.
2. Introduction to matrices and linear transformations, D.T. Finkbeiner II, W. H. Freeman

Semestre : II
UE : UEF21 Sciences Fondamentales II
Matière : Chemistry II (Organic Chemistry)

Objectifs de l'enseignement
Acquire fundamentals in organic compounds and intermediates mostly used in electronic technologies, as solvents, etchings agents, dopants and many other chemicals.

Connaissances préalables recommandées
Chemistry I serves as an important support to understand organic structures.

Contenu de la matière :
- **Matter, molecular formula and identification of organic compounds**: Molecular formula of OC, Separation of matter, Identification of org. compounds
- **Molecular structure and stereochemistry of organic compounds**: Molecular Geometry, Conformation configuration of org. compounds, ,Isomers, optical activity, Enantiomers, Fischer projection and R, S configuration, (Cahn-Imgold) Nomenclature
- **Chemical reactions of organic compounds:** Type of reactions, reaction mechanism, reaction rates and kinetics, Catalysis of org. reactions
- **Hydrocarbons** : Classification of Hydrocarbons (HC), Nomenclature of organic compounds, Aliphatics: saturated and unsaturated, Aromatics
- **Oxygenated Hydrocarbons**: Single bonded oxygenated HC: Alcohols, phenols, Double bonded oxygenated HC: carboxylic acids, esters and carboxylic acids derivatives
- **Heterofunctionnal Hydrocarbons** : Amides, Amines, Halides and chlorinated

Mode d'évaluation :
Contrôle continu + Examen Final

Références:
1. Organic chemistry, Thomas N. Sorrell, 2nd edition, copyright 1999-2006.

Semestre : II
UE : UEF21 Sciences Fondamentales II
Matière : Physics II
Objectifs de l'enseignement
To acquire the principles of electrostatics, magnetostatics and geometrical optics

Connaissances préalables recommandées
Calcul différentiel et intégral, mécanique

Contenu de la matière :
- Charge, Coulomb's Law, Electric Field, Superposition Principle
- Flux and Gauss's Theorem
- Electric Potential energy and Electric potential
- Relationship between the Electric Field and the Electric Potential
- Electric Dipole
- Concepts of Capacitance and Dielectrics
- Current Density and Ohm's Law
- Magnetic field, Magnetic force and Torque
- Ampère' s Law and Biot-Savart' s Law
- Electromagnetic Induction, Faraday's Law and Lenz's Law
- Self inductance, Mutual Inductance
- Geometrical Optics, Reflection and Refraction
- Lenses' Law

Mode d'évaluation :
Contrôle continu + Examen Final

Références:
1. Fundamentals of Physics, D. Halliday and R. Resnick, 6th Ed.
2. Physics for Scientists and Engineers, R. A. Serway, J. W. Jewett, 6th Ed.

Semestre : II
UE: UEM21 Programmation et TP de Physique
Intitulé de la Matière : Introduction to C Programming

Objectifs de l'enseignement :

The aim of this course is to introduce the rudiments of programming to the students. Students will become familiar with problem solving techniques and algorithm development and implementation using computers.

Connaissances préalables recommandées :

None

Contenu de la matière :

- Introduction to Programming and Basics of C
- Control Statements
- Arrays
- Functions
- Pointers
- User Defined Data Types
- Files
- Linked Lists
- Other Features of C

Mode d'évaluation : Contrôle continu +Examen final

Références :

1. Programming in C, by Pradip Dey & Manas Ghosh
2. C for Dummies, by D. Gookin

Semestre : II
UE: UEM21 Programmation et TP de Physique
Intitulé de la Matière : Physics II Lab

Objectifs de l'enseignement :

These laboratory physics experiments are designed to enhance the students' skills in performing experiments (Verification of laws, data recording and data analyzing)

Connaissances préalables recommandées :

Calculus, Physics I, physics II

Contenu de la matière :

- Electric Field Mapping
- Measurement of the de la Permittivity of Air
- Magnetic Effects or Electromagnetic Induction
- Measurement of the Permeability of air or Measurement of the Permeability of Iron
- Reflection and Refraction
- Lenses

Mode d'évaluation : Contrôle continu

Références :
Physics Laboratory Booklet

Semestre : II
UE: UET21 Anglais Avancé
Intitulé de la Matière : English II

Objectifs de l'enseignement :

At the end of this unit, students should be able to:
- Understand technical lectures, to understand and interpret graphs and to give oral presentations.
- Comprehend general technical and scientific texts and be able to write coherent texts and lab reports.

Connaissances préalables recommandées :

To have completed successfully listening and speaking I

Contenu de la matière :

- Understanding oral discourse (lectures)
- Drawing conclusions
- Expressing opinions
- Interpreting data (graphs , figures , pie charts)
- Taking notes
- Giving oral presentations
- Types of sentences (review)
- Types of paragraphs
- Paragraph organization
- Connectors
- Academic essay
- Advanced reading skills

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Ielts preparation ; toefel preparation . listening comprehension, and note taking
2. http://www.learn4good.com/languages/spec_english_toefl.htm;
3. http://www.rong-chang.com/listen.htm;
4. http://www.testpreppractice.net/IELTS/Free-Online-IELTS-Practice-Tests.aspx

Semestre : II
UE: UED21 Electricité
Intitulé de la Matière : Electrical Engineering I

Objectifs de l'enseignement :

At the end of this course, the student is expected to be able to apply Ohm's law and Kirchhoff's voltage and current laws to analyze simple circuits, excited by dependent and independent direct current sources, using mesh and nodal analysis methods**.**

Connaissances préalables recommandées :

High school calculus

Contenu de la matière :

- Circuit Analysis and Electrical Engineering
- Basic Component and Electric Circuits
- Voltage and Current Laws.
- Basic Component and Electric Circuits
- Voltage and Current Laws
- Useful Circuit Analysis Technique

Mode d'évaluation : Contrôle continu +Examen Final

Références :
1. Engineering Circuit Analysis, .W. H. Hayt, J. E. Kemmerly, and S. T. Durbin, 6th edition
2. Introductory Circuit Analysis, R. L. Boylestad, 10th edition

Semestre : III
UE: UEF31 Sciences Fondamentales III
Intitulé de la Matière : Mathematics IV (Ordinary Differential Equations)

Objectifs de l'enseignement :

The goal of this course is to provide students with an understanding of the solutions and applications of ordinary differential equations. The course serves also as an introduction to nonlinear differential equations.

Connaissances préalables recommandées :

Students must have taken calculus and linear algebra courses

Contenu de la matière :

- **Introduction to differential equations:** Types, order
- **First order differential equations:** Separation of variables, Homogeneous coefficients, Exact equation, Integrating factor
- **Order reduction:** missing independent variable, missing dependent variable
- **Linear differential equations:** First order, Bernoulli's equation, dimension of solution space, Wronskian
- **Linear differential equations with constant coefficients:** Homogeneous solutions, particular solution, the method of variation of parameters, the method of undetermined coefficients
- **Laplace transform:** Properties, solution of initial value problems, convolution
- **Systems of first order linear differential equations:** matrix representation, solution, eigenvalues/eigenvectors, application to state space equations

Mode d'évaluation : Contrôle continu+Examen final

Références :
1. Elementary Differential Equations with Linear Algebra, R.S. Finney, Addison-Wesley

Semestre : III
UE: UEF31 Sciences Fondamentales III
Intitulé de la Matière : Physics III (Vibrations and waves)

Objectifs de l'enseignement :

The phenomena of vibration and waves provide a fundamental background necessary to approach a wide variety of applications in physics and engineering. The course will introduce students to the fundamentals of vibrations, including superposition driven oscillations and resonance, coupled oscillators and normal modes. The course will also focus on wave motion. Basic wave phenomena including diffraction and interference will be discussed.

Connaissances préalables recommandées :

Calculus and Physics I

Contenu de la matière :

- Harmonic Oscillations, Superposition of Harmonic Oscillations
- Damped Oscillations
- Forced Oscillations, Resonance
- Coupled Oscillations and modes of oscillations
- N coupled Oscillators , Continuous systems in one Dimension
- Wave Equation in one Dimension
- Waves, propagation, reflection and transmission
- Stationary Waves
- Physical Optics, Interference and Diffraction

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Vibrations and Waves, A.P. French, MIT introductory Physics Series
2. The Physics of Vibrations and Waves, H. Pain, 6ed., Wiley, 2005

Semestre : III
UE: UEF32 Electronique I
Intitulé de la Matière : Active Devices I

Objectifs de l'enseignement :

The main goal is to provide students with an understanding of the relation between physical structure and circuit behavior of semiconductor active devices. At the end of the course students will know the basic mechanism of rectification, amplification and switching and their implementation with various types of semiconductor devices.

Connaissances préalables recommandées :

The prerequisites for this course are the differential and integral calculus, the DC and AC circuits courses

Contenu de la matière :

- **Introduction to semiconductor materials:** Atomic structure, covalent bonds, Classes of materials (conductors, insulators, semiconductors), Intrinsic semiconductor materials, Extrinsic semiconductor materials (N-type and P-type)
- **Semiconductor diodes and theirs applications:** Diode description, operation and voltage-current characteristics (under no bias, forward bias and reverse bias), Diode models ,Diode circuits analysis end applications: Rectifiers (Half wave and full wave), Power supply filters and regulators, Diode limiting and clamping circuits, Voltage multipliers. Special-purpose diodes description, operation and applications (Schottky diode, Zener diode, Light Emitting Diode, photodiodes – Photovoltaic cells, Varactor)
- **Bipolar Junction Transistors (BJT's):** BJT description, operation, voltage-current characteristics and parameters, BJT amplification action, DC operating point, BJT biasing circuits, maximum and optimum swings, Q_{pt} stability analysis, coupling and bypass capacitors, load lines, BJT as a switch
- **BJT amplifiers small signal low frequency analysis and design:** Circuit parameters (voltage gain, current gain, input impedance, output impedance),BJT AC model, Common emitter BJT amplifier configuration, Common collector BJT amplifier configuration, Common base BJT amplifier configuration, Multi-stage amplifier
- **Power amplifiers:** Amplifier power efficiency, Classes of amplifiers, Power amplifiers maximum power efficiencies : - Common emitter class A power amplifier– Transformer coupled class A - Class B complementary symmetry – Class B push pull

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. R. BOYLESTAD and L. NASHELSKY, 'Electronic Principles and Circuit Theory', 9th ed.
2. T. FLOYD, 'Electronic Devices', 9th ed.

Semestre : III
UE: UEF32 Electronique I
Intitulé de la Matière : Digital Systems I with VHDL

Objectifs de l'enseignement :

Provide students with the basic foundations for the analysis and design of digital systems.
Digital design using HDL-based approach is emphasized.

Connaissances préalables recommandées :

Basic Programming

Contenu de la matière :

- Number Systems & Data Representation
- Boolean Algebra
- Minimization Techniques
- Introduction to CAD tools & VHDL
- NAND-NAND & NOR-NOR Networks
- Combinational Circuits : Arithmetic & Logic Circuits
- Combinational Circuits in VHDL
- Integrated Circuits Logic Families

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Fundamentals of Digital Logic with VHDL. By S. Brown & Z. Vranesic
2. Digital Design with CPLD Applications & VHDL By R. K. Dueck

Semestre : III
UE: UEF32 Electronique I
Intitulé de la Matière : Electrical Engineering II

Objectifs de l'enseignement :

This course will introduce fundamental concepts of AC electric circuits building on concepts developed in the DC circuits course and will provide students with electric circuits analysis techniques.

Connaissances préalables recommandées :

Electrical Engineering I, high school calculus

Contenu de la matière :

- AC Fundamentals and Sinusoidal Alternating Waveforms
- R, L and C elements and Impedance Concept
- Power in AC circuits
- Series and Parallel AC circuits- series/Parallel AC Networks
- Methods of AC Circuit Analysis
- AC Network theorems
- Resonance

Mode d'évaluation : Contrôle continu +Examen final

Références :

1. Engineering Circuit Analysis, .W. H. Hayt, J. E. Kemmerly, and S. T. Durbin, 6th edition
2. Introductory Circuit Analysis, R. L. Boylestad, 10th edition

Semestre : III
UE: UEM31 TP Electronique I
Intitulé de la Matière : Active Devices I Lab

Objectifs de l'enseignement :

Upon completion of this course, the students must be able to verify experimentally the characteristics of semiconductor devices, implement circuits and test their operation and evaluate their design.

Connaissances préalables recommandées :

Students must have been introduced to measuring instruments, power supplies and should have implemented and test circuits.

Contenu de la matière :

- Diode characteristics
- Diode applications
- Special-purpose diodes
- Bipolar Junction Transistors (BJT) Characteristics
- BJT biasing
- Class A amplifiers
- Class B power amplifiers

Mode d'évaluation : Contrôle continu

Références :
1. R. BOYLESTAD and L. NASHELSKY, *'Electronic Principles and Circuit Theory'*, 9th ed.
2. T. FLOYD, '*Electronic Devices'*, 9th ed.

Semestre : III
UE: UEM31 TP Electronique I
Intitulé de la Matière : Digital Systems I with VHDL Lab

Objectifs de l'enseignement :

Get hands on practice with discrete ICs and a modern CAD tool such as Quartus II and VHDL.

Connaissances préalables recommandées :

Basic Programming

Contenu de la matière :

- Basic combinational circuits using discrete ICs
- Introduction to the CAD tools & Development board
- Design and implementation of combinational circuit using schematic capture design entry
- Design and implementation of combinational circuit using VHDL design entry
- Implementation of an ALU using VHDL

Mode d'évaluation : Contrôle continu

Références :

1. Fundamentals of Digital Logic with VHDL. By S. Brown & Z. Vranesic
2. Digital Design with CPLD Applications & VHDL By R. K. Dueck

Semestre : III
UE: UEM31 TP Electronique I
Intitulé de la Matière : Electrical Engineering II Lab

Objectifs de l'enseignement :

To develop the practical skills required to build, test, troubleshoot and analyze AC sinusoidal networks involving resistors, capacitors, inductors.

Connaissances préalables recommandées :

High school calculus, Electrical Engineering I

Contenu de la matière :

- The Oscilloscope
- Transients
- RLC Transients
- Reactance
- Frequency Response
- Series and parallel Circuits
- Resonance
- Transformers
- Thevenin' s equivalent circuits

Mode d'évaluation : Contrôle continu

Références :
Laboratory Manual

Semestre : III
UE: UED31 Economie
Intitulé de la Matière : Introduction to Engineering Economics

Objectifs de l'enseignement :

This course gives students an overview of the economics concepts and methods employed in effective engineering decisions. It will help them
- Develop the required skills in economic analysis,
- Make sound economic and financial decisions,
- Improve the efficient use of available resources in engineering projects.

Connaissances préalables recommandées :

None

Contenu de la matière :

- General Introduction
- Fundamental Concepts of Engineering Economics
- Elementary Examples of Economy Studies
- Economic Analysis of Alternatives
- Evaluating Replacement Alternatives
- Break even and Minimum Cost Analysis
- Value Analysis – Value Engineering

Mode d'évaluation : Contrôle continu+Examen final

Références :
None

Semestre :IV
UE: UEF41 Sciences Appliquées
Intitulé de la Matière : Electromagnetic Field Theory

Objectifs de l'enseignement :

This course will provide students with the theoretical background of electromagnetic fields and wave phenomena. Upon completion of this course students should be able to solve Maxwell's equations for specific regular geometries, understand general electromagnetic wave propagation and analyze a given problem using the electromagnetic field theory.

Connaissances préalables recommandées :

Differential and Integral calculus and physics II

Contenu de la matière :

- Vector algebra, vector operators, coordinate systems and vector calculus
- Electrostatic field theory, Magnetostatic field theory
- Line and surface integral, Divergence and Stokes's theorem
- Establishment of the Maxwell's equations: Ampere circuital law, Faraday's law, Gauss law for the electric field, Gauss law for the magnetic field
- Maxwell's equation in integral form, Maxwell's equation in differential form, Maxwell's equation in a sinusoidal time varying field
- The wave equation in free space, conducting media, other media and their solutions
- Uniform plane wave concept, expressions of the field solution of the wave equations, Polarisation of the waves
- Energy flow and the Poynting vector
- Boundary conditions
- Reflections and refractions of electromagnetic waves, Total internal reflection, Brewster's angle
- Introduction to radiation theory

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Elements of Engineering Electromagnetic, Narayana Rao
2. Electromagnetic Waves and Radiating systems, Jordan

Semestre :IV
UE: UEF41 Sciences Appliquées
Intitulé de la Matière : Linear Systems I
Objectifs de l'enseignement :

This course is designed to have students develop abstract reasoning and acquire knowledge about the application of linear algebra to the analysis of linear systems.

Connaissances préalables recommandées :

Calculus and Linear Algebra courses

Contenu de la matière :

• **Continuous-time signals and systems:** Properties, basic signals, transformations, interconnections
• **Continuous-time linear time-invariant systems:** Impulse response, convolution integral, properties
• **Fourier Series:** Response to continuous-time complex exponentials, Fourier series expansion, properties
• **Fourier Transform:** Fourier Transform, Inverse, properties
• **Laplace Transform:** Region of convergence, Inverse, Properties, Unilateral Laplace Transform and initial-value problems
• **Transfer function description:** Poles , Zeros, Stability, Minimum phase
• **State space description:** States, state solution, canonical forms, stability, observability, controllability, minimal realization
• **Conversion between descriptions:** From state space to transfer function, from transfer function to state space

Mode d'évaluation : Contrôle continu+Examen final

Références :

1. Signals and Systems, A.V. Oppenheim and A. Willsky, Prentice-Hall
2. Linear System Theory and Design, C.T. Chen, HRW

Semestre :IV
UE: UEF42 Electronique II et Machines
Intitulé de la Matière : Active Devices II

Objectifs de l'enseignement :

Students will acquire a further knowledge about active devices and will be able to analyze circuits based on them. They will discover the importance and the diverse applications offered by the discrete and integrated semiconductor components.

Connaissances préalables recommandées :

DC / AC Circuits and Active Devices I

Contenu de la matière :

- **Field-Effect Transistors (FET's):** FET description (p and n-channel), operation, voltage-current characteristics and parameters, JFET circuits biasing, JFET small signal low frequency model, JFET amplifier small signal low frequency analysis (common drain, common source and common gate amplifiers), Metal-Oxide-Semiconductor FET's (MOSFET's), description (p and n-channels, depletion and enhancement modes), operation, voltage-current characteristics and parameters, MOSFET circuits analysis and design
- **Silicon Controlled Rectifiers (SCR) and other devices:** SCR description, operation, voltage-current characteristics and parameters, SCR applications, Other semiconductor devices
- **Multiple-transistor circuits:** Darlington amplifier, Common mode rejection ratio, Difference amplifier with constant current source, Difference amplifier with emitter resistor, Difference amplifier using FET
- **Operational amplifiers (Op-amps):** Op-amps description, input modes and parameters (gain, impedances), Offset voltage, Ideal op-amp – Op-amp with feedback (negative and positive feedbacks), **Op-amp applications**: Voltage comparator, followers, inverting and non inverting amplifiers, summer, difference amplifier, differentiator, integrator, analog computer, Schmidt trigger, voltage regulators
- **Active Filters:** Basic filter response characteristics, Bode plots, Active Low-Pass, High-Pass, Band-Pass and Band-Stop Filters

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. R. BOYLESTAD and L. NASHELSKY, *'Electronic Principles and Circuit Theory'*, 9th ed.
2. T. FLOYD, '*Electronic Devices'*, 9th ed.

Semestre :IV
UE: UEF42 Electronique II et Machines
Intitulé de la Matière : Digital Systems II with VHDL

Objectifs de l'enseignement :

The course is to provide students with an in depth knowledge of standard combinational and sequential systems. A modular approach to design larger systems will be emphasised and the HDL-based approach will be used.

Connaissances préalables recommandées :

Basic Programming and Digital systems I with VHDL

Contenu de la matière :

- Sequential Logic Circuits: Flip-Flops, Counters, Registers at SSI and MSI levels
- VHDL Description of Sequential Circuits
- Standard Combinational Modules
- VHDL Description of Standard Combinational Modules
- Finite State Machines (F.S.Ms)
- VHDL Description of F.S.Ms
- Semiconductor Memories
- Programmable Logic Devices (PAL to FPGA)
- Data Acquisition and Interfacing

Mode d'évaluation : Contrôle continu + Examen final

Références :
1. Fundamentals of Digital Logic with VHDL By S. Brown & Z. Vranesic
2. Digital Design with CPLD Applications & VHDL By R. K. Dueck

Semestre :IV
UE: UEF42 Electronique II et Machines
Intitulé de la Matière : Electrical Machines

Objectifs de l'enseignement :

Understand the principles and theory of the different types of electrical machines and be able to analyze and quantify their performance in the steady state regime.

Connaissances préalables recommandées :

Calculus, AC Circuits, Electro-magnetic field

Contenu de la matière :

- Magnetic circuits
- Transformers
- Synchronous machines
- Induction or (asynchronous) machines
- Direct current dc machines
- Single phase induction machines
- Stepping motors

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Introduction to Electrical Machines and Transformers, G. McPherson

Semestre :IV
UE: UEM41 TP Electronique II et Machines
Intitulé de la Matière : Active Devices II Lab

Objectifs de l'enseignement :

Upon completion of this unit, students must be able to verify experimentally the characteristics of semiconductor devices (discrete and integrated) and to implement microelectronic circuits. The lab emphasizes circuit design and testing skills.

Connaissances préalables recommandées :

Students must have used measuring equipment, implemented and tested DC/AC electrical circuits.

Contenu de la matière :

• Field Effect Transistors characteristics
• FET Amplifiers
• Silicon Controlled Rectifiers
• Difference amplifiers
• Basic operational amplifiers
• Operational amplifiers applications
• Active filters

Mode d'évaluation : Contrôle continu

Références :

1. R. BOYLESTAD and L. NASHELSKY, *'Electronic Principles and Circuit Theory'*, 9th ed.
2. T. FLOYD, '*Electronic Devices'*, 9th ed.

Semestre :IV
UE: UEM41 TP Electronique II et Machines
Intitulé de la Matière : Digital Systems II with VHDL Lab

Objectifs de l'enseignement :

To develop skills in designing and implementing large digital systems using a modern CAD tools & VHDL

Connaissances préalables recommandées :

Basic Programming and Digital systems I with VHDL

Contenu de la matière :

- Design and Implementation of Sequential Circuits using
- Discrete IC (74xxx) series
- Using VHDL
- Standard Combinational Modules: Applications
- Finite State Machines
- Semiconductor Memories
- Data Acquisition & Distribution Systems

Mode d'évaluation : Contrôle continu

Références :

1. Fundamentals of Digital Logic with VHDL By S. Brown & Z. Vranesic
2. Digital Design with CPLD Applications & VHDL By R. K. Dueck

Semestre :IV
UE: UEM41 TP Electronique II et Machines
Intitulé de la Matière : Electrical Machines Lab

Objectifs de l'enseignement :

The machines Lab experiments will provide students with a first hand chance to get familiar with basic machines. The course covers practical experiments on the real and apparent powers, the power factor, the transformers, the alternator and the DC machines. Besides, the lab will focus on the safety precautions and rules.

Connaissances préalables recommandées :

Electrical Engineering I and II, Calculus and Physics II

Contenu de la matière :

- The Wattmeter
- Phase Angle, Real and Apparent Power
- Capacitive Reactance
- Reactive Reactance
- Watt, Var, Volt-Ampere and Power Factor
- Vectors and Phasors
- The single Phase Transformer
- Three-Phase Transformer Connections
- The Three-Phase Alternator
- The asynchronous Motor
- The DC Motor

Mode d'évaluation : Contrôle continu

Références :

1. Introduction to Electrical Machines and Transformers» G. McPherson,
Lab-Volt laboratory manual.

Semestre :V
UE: UEF51 Electronique III
Intitulé de la Matière : Computer Architecture

Objectifs de l'enseignement :

This course provides the fundamentals of computer organization (physical design) and architecture (logical design). It will cover machine level representation of data, assembly level organization, memory system organization and architecture, memory, input/output, instruction sets, CPU structure and functions and the control unit operation.

Connaissances préalables recommandées :

Digital Systems I and II

Contenu de la matière :

- Digital Components
- Data Representation
- Register Transfer and Micro Operations
- Basic Computer Organization
- Central Processing Unit
- Computer Arithmetic
- Input-Output Organization
- Memory Organization
- Assembly Language Programming
- Microprocessors
- Large System Architecture

Mode d'évaluation : Contrôle continu + examen final

Références :

1. Computer Architecture, Carter Nicholas, Mc Graw Hill, 2008.
2. Computer System Architecture, M. Morris Mano, Mc Graw Hill, 2008.

Semestre :V
UE: UEF51 Electronique III
Intitulé de la Matière : Communication Principles

Objectifs de l'enseignement :

In this course, students must learn basic signal processing in order to understand modulation theory. This includes both CW and pulse modulation. At the end of the course, an introduction to noise calculation will be given.

Connaissances préalables recommandées :

The student must have taken a preliminary course on signals and systems

Contenu de la matière :

- **Introduction and Basic Terminology of Communication**
- **Review of Signals and Systems:** Classifications of signals, representation of signals using rotating phasors, Fourier series, Fourier transform, impulse function.
- **Linear Time Invariant Systems:** Basic definitions, impulse response, transfer function, Distortionless transmission, Bandpass signals and bandpass systems
- **Introduction to Modulation: Classification of modulations according to carrier type**
- **CW Modulation "Linear Modulation" (for both analog and digital messages):** DSB AM, mixing, superheterodyne concept, spectrum analyzer; DSB SC, Carrier recovery problem, SSB, VSB, QAM (for digital communication)
- **CW modulation Exponential Modulation:** Return to the definition of frequency and phase, FM and PM definitions, Relationships between the modulations, Narrowband PM and FM, Sinusoidal modulating waveform, Carson's rule, FM through LTI systems, FM through memoriless non linear systems, FM production, FM demodulation: Slope demodulator and PLL demodulation
- **Pulse Modulation:** The sampling theorem, PAM, PDM, PPM, PCM and quantization noise
- **Introduction to Noise Analysis in Electronic Systems:** Thermal noise, shot noise, signal to noise ratio, noise figure

Mode d'évaluation : Contrôle continu + examen final

Références :

1. Communication Systems: An Introduction Signal and Noise in Electrical Communication, A.B. Carlson, P.B. Crilly and J.C. Rutledge, Mc Graw Hill, 2002

Semestre :V
UE: UEF51 Electronique III
Intitulé de la Matière : Microprocessor System Design

Objectifs de l'enseignement :

Give students a comprehensive treatment, both hardware and software, of a commercially available 8-bit Microprocessor with an emphasis on practical applications.

Connaissances préalables recommandées :

Digital Systems I and II, Basic Programming and Computer Architecture

Contenu de la matière :

• Overview of Microprocessor-Based Systems
• The Programming Model
• Addressing Modes
• Instruction set and programming techniques
• Hardware Architecture and Interfacing
• Stacks and Subroutines
• Interrupts
• Programmable Interface Devices : The PPI and Applications
• Programmable Timers and Counters

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. The Z80 Microprocessor Architecture, Interfacing, Programming and Design By R. Gaonkar

Semestre :V
UE: UEF52 Electronique IV
Intitulé de la Matière : Power Electronics

Objectifs de l'enseignement :

The objective of this course is to provide fundamental understanding on modern power semiconductor devices and circuits. Students will acquire competencies in the design and analysis applications in power electronic systems and learn how to use the Pspice software.

Connaissances préalables recommandées :

Differential and Integral Calculus, Electrical Engineering I and II

Contenu de la matière :

- Introduction
- Power semiconductor diodes and circuits
- Rectification
- Controlled (SCR) rectification
- AC Voltage controllers
- DC to DC converters
- Inverters
- Protection of power devices and circuits
- Case study

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Power Electronics by Muhammad H. Rashid
2. Power Electronics by Mohan et al.
3. http://www.pspice.com

Semestre :V
UE: UEF52 Electronique IV
Intitulé de la Matière : Linear Systems II

Objectifs de l'enseignement :

The main objective of this course is to provide students with an understanding of the methods and techniques for the design and analysis of discrete linear systems.

Connaissances préalables recommandées :

Linear Algebra and Linear systems I courses

Contenu de la matière :

- **Signals and systems:** Discrete-time signals, properties, transformations, basic signals, systems; properties, interconnection
- **Discrete linear time-invariant systems:** Impulse response, convolution sum, properties, graphical convolution
- **Fourier analysis of discrete-time periodic signals:** Response to discrete-time complex exponentials, Fourier series expansion, properties
- **Fourier analysis of discrete-time aperiodic signals:** Discrete-time Fourier transform, properties, the DFT
- **The Z-Transformation:** The Z-transform, the inverse, properties, the unilateral z-transform
- **Sampling:** The sampling theorem, Aliasing and applications, signal reconstruction
- **Discrete-time models:** Zero Order Hold modelling, Transfer function model, State space model

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Signals and Systems, A.V. Oppenheim and A. Willsky, Prentice-Hall
2. Signals and Systems, MIT lecture notes, http://ocw.mit.edu

Semestre :V
UE: UEF52 Electronique IV
Intitulé de la Matière : Process Control and Instrumentation

Objectifs de l'enseignement :

This course is designed to provide students with the fundamentals of instrumentation and intelligent sensors used in process control.

Connaissances préalables recommandées :

Calculus, Physics and Electronics courses

Contenu de la matière :

- **Introduction:** Elements of process control, block diagrams, setpoint, errors,…
- **Signal Conditioning:** Principles, Bridge circuits, Op amps circuits in instrumentation: voltage follower, differential amplifier, integrator, summer,…
- **Transducers:** Thermal: thermistors, rtd's, thermocouples; Mechanical: displacement, position, motion, strain gages; Pressure and flow transducers; Optical transducers: photocells, photo-detectors
- **Controller Principles:** Process characteristics; Parameters, Controller modes: P, I and D actions; Composite control modes: PI, PD , PID; Process loop tuning: Ziegler-Nichols methods, Electronic controllers using op amps
- **Final Control Operation:** Actuators: pneumatic and hydraulic; Final control elements

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Process Control Instrumentation Technology, C.D. Johnson, Prentice-Hall

Semestre :V
UE: UEM51 TP Electronique III
Intitulé de la Matière : Communication Principles Lab

Objectifs de l'enseignement :

This is an accompanying set of laboratory experiments to the communication principles course. These laboratory experiments are used to demonstrate the different modulations and demodulations seen in the course.

Connaissances préalables recommandées :

The student must be familiar with the use of laboratory equipment

Contenu de la matière :

- Signals in time and frequency. Use of the spectrum analyser.
- AM modulation.
- AM and DSB modulator
- AM demodulator
- FM Spectra
- FM modulator
- FM demodulation (PLL)
- Pulse Modulation

Mode d'évaluation : Contrôle continu

Références :

1. Communications Lab. Manuel, Clay and Doumi

Semestre :V
UE: UEM51 TP Electronique III
Intitulé de la Matière : Power Electronics Lab

Objectifs de l'enseignement :

Design and analysis of power electronic circuits and circuit operation simulation with PSPICE

Connaissances préalables recommandées :

Electronic circuits and Power Electronics courses

Contenu de la matière :

- Half wave rectifier circuits R load and RL load and Free wheeling diode effect on circuit performance
- Full wave single phase rectifier circuits with R load and RL load
- Controlled rectification : R load and RL load Performance calculations
- Single Phase AC Voltage Control using 2 back to back SCRs or a TRIAC. R and RL loads and performance calculations
- Step down chopper with R and RL load, Performance characteristics
- Single phase Inverter: R load and RL load

NB: Concurrently, all circuits operation is to be simulated with PSPICE outside working time as homework

Mode d'évaluation : Contrôle continu

Références :

1. Power Electronics by Muhammad H Rashid
2. Power electronics by Mohan et al.
3. http://www.pspice.com

Semestre :V
UE: UEM51 TP Electronique III
Intitulé de la Matière : Microprocessor Design Lab

Objectifs de l'enseignement :

To develop the ability to use and design industrial and practical applications using an 8-bit microprocessor and peripherals.

Connaissances préalables recommandées :

Digital Systems I and II, Basic Programming and Computer Architecture

Contenu de la matière :

- Familiarity with the Development Board
- Programming Techniques and Addressing Modes
- I/O (Buffer / Register) Interfacing
- Subroutines and Delay Loops
- Stepper (or DC) Motor Speed / position Control
- Interfacing the ADC and DAC: Applications (T° and waveform generation)
- Interfacing a Matrix Keyboard and Displays

Mode d'évaluation : Contrôle continu

Références :

1. The Z80 Microprocessor Architecture, Interfacing, Programming and Design By R. Gaonkar

Semestre :VI
UE: UEF61 Electronique V
Intitulé de la Matière : Communication Circuits

Objectifs de l'enseignement :

At the end of the course, the student must master basic electronic circuits used in communication such as passive coupling networks, oscillators, mixers and modulators, small signal IF and RF amplifiers and power amplifiers.

Connaissances préalables recommandées :

Students must have a good knowledge of elementary electronic circuits and networks. They must also know the basic modulations.

Contenu de la matière :

- **Review of electronic devices and biasing**
- **Passive coupling networks, Q transformations, transformer like networks**
- **Non linear controlled sources:** Piecewise linear, square law, exponential, differential, effect of series resistance, resistively biased BJT
- **Sinusoidal oscillators**

Receiver circuits: Super heterodyne principle, mixers (passive and active), rf amplifier design (noise and interferences), if amplifier design (y parameter design procedures)

- **Transmitter circuits:** Power amplifiers (class A, B and C)

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Communication Circuits: Analysis and Design, K. K. Clarke and D. T. Hess, Addison-Wesley, Reading, Mass. 1971.

Semestre :VI
UE: UEF61 Electronique V
Intitulé de la Matière : Energy Systems

Objectifs de l'enseignement :

This course is designed to familiarize students with the generation, transmission and distribution of electric power over an electrical power system.

Connaissances préalables recommandées :

Electrical Engineering I and II, Calculus and Power Electronics

Contenu de la matière :

- Introduction to electric Energy System
- Steam Power Plant
- Hydroelectric Power Plant
- Gas-turbine Power Plant
- Renewable Energy Sources
- Transmission Line Parameters
- Circuit Models of Transmission Lines
- HVDC Transmission Lines and FACTS
- Distribution System
- Substations

Mode d'évaluation : Contrôle continu + examen final

Références :

1. Weedy, B. M. Electric Power Systems, Third edition, John Willy & Sons, Inc. New York
2. William D. Stevenson, Elements of Power System Analysis, Third edition, McGraw-Hill
3. Miller, Robert H., Power system operation, 2nd edition, McGraw-Hill Inc.

Semestre :VI
UE: UEM41 Electronique V
Intitulé de la Matière : Linear Control Systems

Objectifs de l'enseignement :

To acquire knowledge about the methods and techniques for the analysis and design of linear feedback systems

Connaissances préalables recommandées :

Students must have taken the Linear Systems I and Process Control courses

Contenu de la matière :

- **Mathematical Models of Systems:** System modeling, Laplace transform, differential equations of systems, transfer function, block diagram and state flow graph representations
- **State Space Representation** : state variables, state space from differential equations, transfer function from state space, time response and state transition matrix
- **Performance of Feedback Systems :** Performance of 2^{nd} order system, steady-state error of feedback system, performance indices, s-plane root location and transient response, simplification of linear system
- **Stability of Linear Feedback Systems:** Concept of stability, Routh-Hurwitz criterion, relative stability, stability of state space systems
- **The Root Locus Method:** Concept, procedure, sensitivity, PID controller
- **Frequency Response Method:** Frequency response plots, frequency domain performance indices)
- **Stability in Frequency Domain:** Mapping contours in s-plane, Nyquist criterion, system bandwidth, stability of control system with delays
- **Design of Feedback Control System:** Cascade compensation networks, phase-lead, phase-lag compensation using Bode plot, root locus, deadbeat response design

Mode d'évaluation : Contrôle continu + Examen final

Références :

1. Modern Control Systems, R,C. Dorf, R, H. Bishop, Prentice-Hall
2. Automatic Control systems, B,C Kuo, Golnaraghi

Semestre :VI
UE: UEM61 TP Electronique IV
Intitulé de la Matière : Communication Circuit Lab

Objectifs de l'enseignement :

This is an accompanying set of laboratory experiments to the communication circuit course. At the end of the course, the student should be able to design typical communication circuits such as oscillators, modulators, amplifiers.

Connaissances préalables recommandées :

The student must absolutely know basic lab procedures and should have a working knowledge of a SPICE based software

Contenu de la matière :

- Low frequency single BJT amplifier
- Wien bridge oscillator
- LC oscillators
- Crystal oscillators
- Mixer circuits
- Transmitter circuits

Mode d'évaluation : Contrôle continu

Références :

1. Communications Circuits lab. Manual, A. Dahimène

Semestre :VI
UE: UEM61 TP Electronique IV
Intitulé de la Matière : Linear Control Systems Lab

Objectifs de l'enseignement :

Practical implementation of the concepts acquired in the Linear Control Systems course.

Connaissances préalables recommandées :

Students must have taken the Active Devices, Linear Systems I and Process Control courses

Contenu de la matière :

- **Familiarization with Control System Lab. Equipment**
- **Systems Modeling:** Modeling characteristics of DC motors, tacho-generators, input/output potentiometers, op amps
- **Open Loop Control:** Simple feed-forward open loop motor speed control system
- **Closed Loop Control I:** Simple closed loop motor speed control system
- **Closed Loop Control II:** Simple closed loop motor position control system
- **Closed Loop Control III:** PID motor speed control system
- **Closed Loop Control IV:** Deadbeat control system

Mode d'évaluation : Contrôle continu

Références :
Laboratory hand-outs

Semestre :VI
UE: UEM62 Projet
Intitulé de la Matière : Project

Objectifs de l'enseignement :

The project provides an important opportunity for students to study, plan and implement a project from an initial idea. They must show their ability to:
- Analyse the proposed project and prepare a clear planning schedule,
- Implement and test the project,
- Write a clear and instructive academic report about the project,
- Give a convincing presentation about the project and defend their work.

Connaissances préalables recommandées :

Contenu de la matière :

Mode d'évaluation : Contrôle continu

Références :

Semestre :VI
UE: UED61 Gestion
Intitulé de la Matière : Engineering management

Objectifs de l'enseignement :

The objectives of this course are to introduce students to issues related to the management functions of planning, organizing, motivating, and controlling and to the concepts of operations and production management.

Connaissances préalables recommandées :

Introduction to Economics

Contenu de la matière :

- **Fundamental Aspects**
- Planning
- Organizing and Staffing
- Directing and Leading
- Controlling
- **Maintenance, Operations/ Production Management**
- Maintenance Management
- Scheduling and Control with PERT, CPM and GANT
- Scheduling and Capacity Planning with Linear Programming

Mode d'évaluation : Contrôle continu+ Examen final

Références :

1. Management, Harold Koontz and Cyril O'Donnel, 5th ed, Mc Graw Hill
2. Production/Operations Management, F.G. Moore and T.E. Henkel, 8th ed.