Integrated Preparatory Cycle (CPI) Programs

(September 2019)

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Distribution of lessons – 1 time year

1 era CPI Year - SEMESTER 1 (15 Weeks)										
Teaching unit		Matter	Coded Matter	Lessons (hours)	TD (hours)	Tutorial/ TP (hours)	Volume Week (hours)	Coef. Volume Semester (hours)	credits	
Unit Fundamental **UEF1**	UEF1.1	Algorithms and data structures static	ALSDS 2			4	6	90	5	6
	UEF1.2	Computer Architecture1	ARCH1 3			2	5	75	4	5
	UEF1.3	Introduction to Operating system1	SYST1			2	2	30	3	3
Unit Fundamental **UEF2**	UEF2.1	Mathematical analysis1	ANA1	3	3		6	90	5	6
	UEF2.2	Algebra 1	ALG1	1	2		3	45	3	3
	UEF2.3	electricity	ELECT 2		2		4	60	3	4
Unit transverse LANGUAGES **UET1**	UET1.1	English 1	ENG1		2		2	30	2	2
Unit of Discovery **DSU1**	UED1.1	Office automation and website	BW			2	2	30	1	1
TOTALS				**11**	**9**	**10**	**30**	**450**	**26**	**30**

1 time CPI Year - SEMESTER 2 (15 Weeks)										
Unit of Teaching		Matter	Coded Matter	Lessons (hours)	TD (hours)	TD/TP (hours)	Volume Week (hours)	Volume Semester (hours)	Coef.	Credits
Unit Fundamental **UEF3**	UEF3.1	Algorithms and dynamic data structures	ALSDD 2			4	6	90	5	6
	UEF3.2	Introduction to Operating system2	SYST2	1		2	3	45	3	3
Unit Fundamental **UEF4**	UEF4.1	Mathematical analysis2	ANA2	3	3		6	90	5	6
	UEF4.2	Algebra 2	ALG2	2	2		4	60	3	4
Unit Methodological **EMU1**	EMU1.1	Mechanics of Point	MECA 1		2		3	45	3	3
	EMU1.2	Electronic Fundamental1	ELECF1	2	2		4	60	4	4
Unit transverse LANGUAGES **UET2**	UET2.1	TE expression techniques				2	2	30	2	2
	UET2.2	English 2	ENG2		2		2	30	2	2
TOTALS				**11**	**11**	**8**	**30**	**450**	**27**	**30**

Distribution of lessons – 2nd year

2th CPI Year - SEMESTER 3 (15 Weeks)										
Teaching unit		**Matter**	**Coded Matter**	**Lessons (hours)**	**TD (hours)**	**Tutorial/ TP (hours)**	**Volume Week (hours)**	**Volume Semester (hours)**	**Coef.**	**Credits**
Unit Fundamental **UEF5**	UEF5.1	Structure Files and Structures of Data	SFSD	2		2	4	60	4	4
	UEF5.2	Architecture of Computers2	ARCH2	2		2	4	60	4	4
Unit Fundamental **UEF6**	UEF6.1	Analysis Mathematics3	ANA3	3	3		6	90	5	6
	UEF6.2	Algebra3	ALG3	1	2		3	45	3	3
Unit Methodological **EMU2**	EMU2.1	Electronic Fundamental2	ELECF2	2		2	4	60	4	4
	EMU2.2	Probabilities and Statistics1	PRST1	2	2		4	60	4	4
Unit of Discovery **UED2**	UED2.1	Business Economics	ECON	3			3	45	2	3
Unit transverse LANGUAGES **UET3**	UET3.1	English 2	ENG2		2		2	30	2	2
TOTALS				**15**	**9**	**6**	**30**	**450**	**28**	**30**

2th CPI Year - SEMESTER 4 (15 Weeks)										
Teaching unit		**Matter**	**Coded Matter**	**Lessons (hours)**	**TD (hours)**	**Tutorial/ TP (hours)**	**Volume Week (hours)**	**Volume Annual (hours)**	**Coef.**	**Credits**
Unit Fundamental **UEF7**	UEF7.1	Programming Object Oriented	OOP	2		2	4	60	4	4
	UEF7.2	Introduction to Information system	SINF	1		2	3	45	3	3
Unit Fundamental **UEF8**	UEF8.1	Analysis Mathematics4	ANA4	3	3		6	90	5	6
	UEF8.2	Logic Mathematical	LOGM	2	2		4	60	4	4
	UEF8.3	Optics and electromagnetic waves	OOE	1	2		3	45	3	3
Unit Methodological **EMU3**	EMU3.1	Project Multidisciplinary	PRJP			4	4	60	4	4
Unit Methodological **EMU4**	EMU4.1	Probabilities and Statistics2	PRST2	2	2		4	60	4	4
Unit transverse LANGUAGES **UET4**	UET4.1	English 3	ANG3		2		2	30	2	2
TOTALS				**11**	**11**	**8**	**30**	**450**	**29**	**30**

Detailed programs
UEF 1.1 - ALGORITHMICS AND STATIC DATA STRUCTURES

EU code	Module title	Credits
UEF 1.1	ALGORITHMIC and STATIC DATA STRUCTURES	6

Hourly volumes				
Course	TD / TP	TP	Other (specify) TOTAL	90 h.
30 hrs.	60 hrs.			

Semester :	1

Prerequisites: None	

GOALS :

Acquisition of a methodological approach based on modularity allowing the design and production of small software using elementary objects and static structured data (one- and two-dimensional arrays, character strings, sets, records)

be able, starting from the statement of a problem, to:

- **proceed to its modular division •**
- **analyze and build separately the different modules (main and secondary). • validate each module • separately**
- **program the various algorithms corresponding to the modules (main and secondary)**
- **Prepare a technical programming file**

MODULE CONTENT:

I. BASIC ELEMENTS (~3 hours) • Algorithm, processor, action • Programs and programming languages • from problem to result • Analysis of a problem

II. PRESENTATION OF THE ALGORITHMIC FORMALISM (~7 hours) • Requires an algorithmic formalism • Presentation of the adopted algorithmic formalism

- o Structure of an algorithm
- o the environment – elementary objects
  - ÿ Objects in an environment ÿ Declarations ÿ
  - Declaration of constants ÿ
  - Declaration of simple types (standards - non-standards) ÿ Declarations of variables
- o The body of the algorithm:
  - ÿ The control structures: ÿ
  - other basic actions (Assignment - Arithmetic, logical, relational and mixed expressions - Reading - Writing)

III. BASIC ELEMENTS OF PASCAL LANGUAGE

Very important note: The programming language will not be taught at the course level but through documentation that will be given to the student. Its implementation will be done at the level of TD/TP sessions. At this level of the course, only the fundamental elements of the language will be given in order to apply the knowledge acquired in chapters I and II. Additional language will be provided as the course progresses and according to the various concepts discussed.

- STRUCTURE OF A PROGRAM
- THE BODY OF THE PROGRAM
  - o Assignment o
  - Expressions o
  - Block o IF
  - statement (if) o CASE
  - OF statement (case among) o FOR
  - statement (for) o WHILE
  - statement (while) o REPEAT
  - statement (repeat o Input procedures:
  - READ and READLN o Output procedures:
  - WRITE and WRITELN o Program documentation •
  - PROGRAM ENVIRONMENT
  - o Definition of an identifier o
  - Declaration of constants o
  - Declaration of types o
  - Declaration of variables •
- LIST OF RESERVED WORDS
- SAMPLE PROGRAM IN PASCAL

IV. MODULARITY (~15 hours) •

- fundamental concepts and advantages of modularity •
- Types of modules o
  - Examples o
  - Communication mechanism o
  - Parameter passing •
- Functions. o User
  - functions ÿ Structure of a
    - function ÿ Call of a function.
    - ÿ Declaration of a function
  - o standard functions o
  - functions in the Pascal language o how
  - to catalog a module in Pascal • Procedures
- o User procedures
  - ÿ Structure of a procedure ÿ
    - Calling a procedure o
    - Standard procedures o
  - Procedures in the Pascal
  - language
- internal modules and external modules
- local objects and global objects

- side effects
- Modular approach and formalism
- the concept of library (application to the Pascal language)

V STATIC DATA STRUCTURES (~5 hours) • One-dimensional arrays • Sorts (selection, transposition, bubbles, counting, Shell) • Two-dimensional arrays • Strings • Sets • Records

PERSONAL WORKS:

- Three (3) practical exercises must be carried out, including two (2) on modularity. The TPs consist of the implementation of the approach studied and the preparation of TPs files including: the statement, the possible modular breakdown, the analyzes and algorithms of the different modules, the test game, the listings of the programs and the results.

KNOWLEDGE CONTROL PROCEDURES

2 intermediate controls + 3 TPs + 1 rapid test score + 1 participation bonus

RECOMMENDATIONS:

- It is recommended to use the video projector for the course and to distribute booklets on the important parts of the course and the programming language the directed
- and practical work must be done in classrooms equipped with computer equipment
- Emphasis must absolutely be placed on the methodological aspect and respect for the formalism adopted
- The programming language used is the Pascal language. It is introduced as the algorithmic course progresses and its learning will be done by self-training through brochures.

BIBLIOGRAPHY

- N. WIRTH, Introduction to systematic programming • N. WIRTH, Algorithms and data structures • B. MEYER & C. BAUDOUIN, Programming methods
- L. GOLDSHLAGER & A. LISTER, Computer Science and Algorithms

We do not give references concerning the Pascal language given the wealth of these.

UEF 1.2 - COMPUTER ARCHITECTURE 1

EU code	Module title	Credits
UEF 1.2	COMPUTER ARCHITECTURE 1	5

Hourly volumes				
45 hour course.	TD / TP 30 hrs.	TP	Other (specify)	TOTAL 75 h.

Semester :	1

Prerequisites:	None

GOALS :

• Popularize all the basic concepts of a computer; • Know the representation of numbers; • Know the main components of a computer; • Know the methods of synthesis of combinatorial and sequential logical systems; • Acquire a low-level knowledge of programming.

MODULE CONTENT:

I BASIC ELEMENTS (~ 3 hours) •
Numeration and coding, conversion, representation of numbers •
Boolean algebra
II COMBINATORY AND SEQUENTIAL LOGIC (~ 15 hours)
• Basic functions •
Synthesis of combinatorial functions •
Memorization elements •
Synthesis of sequential circuits •
Programmable logic networks
III COMPUTER OVERVIEW (~6 hours) • Memory function •
Communication function

• Execution function
IV STUDY OF A PEDAGOGICAL MACHINE (~ 6 hours)

PERSONAL WORKS:

• Personal work (presentations, practical work, case studies, simulations) must be carried out.

KNOWLEDGE CONTROL PROCEDURES

• 2 Intermediate controls + 2 Labs/Presentations + 1 participation note

RECOMMENDATIONS :

• It is recommended to use the video projector for the course and to distribute course material or mimeographed.

• Directed and practical work must be done in classrooms equipped with materials computers.

BIBLIOGRAPHY

- P. Zanella, Y. Ligier: “Computer architecture and technology”, Dunod, 2005 • A. Tanenbaum: “Computer architecture”, Dunod, 2001 • W. Stallings: “Computer organization and architecture”, Pearson Education • A. Cases, J. Delacroix: “Architecture of machines and computer systems”, Dunod, 2003
- Donald D.Givone: “Digital Principles and Design”, Mc GrawHill, 2003 • D. Roux, M.Gindre: “Digital electronics”, T1, T2, T3, Mc GrawHill, 1987 • JM Bernard, J. Hugon: “ Practice of logic circuits”, Eyrolles, 1990

UEF 1.3 - INTRODUCTION TO THE OS 1

EU code	Module title	Credits
UEF 1. 3	INTRODUCTION TO OPERATING SYSTEM 1	3

Hourly volumes				
Course	TD/TP	TP	other (explain, list,)	TOTAL
	30			30h.

Semester :	1

Prerequisites: None

GOALS :

- Introduce students to the practice of the Unix system. • At the end of the course the student must be able to work in a Unix environment (at least user level) and install a Unix (Linux) system

MODULE CONTENT:

I - INTRODUCTION

- DEFINITION AND FUNCTIONS OF AN OPERATING SYSTEM • HISTORY OF UNIX OPERATING SYSTEM

II- PRESENTATION OF THE UNIX SYSTEM

- UNIX USERS
- THE MAIN FUNCTIONS • STRUCTURE OF THE UNIX SYSTEM • THE SHELL

III- OPENING AND CLOSING OF SESSION

- LOGIN • CREATE/CHANGE PASSWORD
- LOGOUT

IV- UNIX COMMANDS

- COMMAND SYNTAX • BASIC COMMANDS

V- REDIRECTION AND PIPE

- INPUTS OUTPUTS • REDIRECTION OF INPUTS OUTPUTS
- REDIRECTION OF ERRORS
- PIPE

VI- UNIX DIRECTORIES AND FILES

- FILE TYPES
- GO TO A FILE o Name a file o The path

- VIEW FILES
- DIRECTORY MANAGEMENT COMMANDS
- FILE MANAGEMENT COMMANDS •

LINKS (PHYSICAL AND SYMBOLIC) • INODES •

METACHARACTERS •

ACCESS RIGHTS o

User identification o Definition of user rights a classic file 2. Case of a directory • ASSOCIATED COMMANDS

o Change rights: chmod o Change default rights: umask o Change owner and group

VII- UNIX FILTERS

- MODIFY FILE DATA
  - o Cut a file into pieces: split o Sort files: sort o Character string conversion: tr
- EDIT FILES WITH CRITERIA
  - o Edit a file from the end: tail o Edit a file from the beginning: head o Count the lines of a file: wc o Edit a field of a file: cut o Merge a file: paste o Extract common lines from two files: comm
- FILE COMPARISON
  - o Compare two files: cmp o Edit the differences between two files: diff

VIII- GREP AND FIND COMMANDS

- REGULAR EXPRESSIONS
- THE GREP COMMAND
- THE FIND COMMAND

IX- PROCESS MANAGEMENT

- CHARACTERISTICS OF A PROCESS • VISUALIZING PROCESSES
- PROCESS MANAGEMENT COMMANDS o
  - Start a background process o Stop a process

X- INTRODUCTION TO ADMINISTRATION

- INSTALLATION OF A UNIX SYSTEM (LINUX)
- MANAGEMENT OF USER ACCOUNTS

KNOWLEDGE CONTROL PROCEDURES

- At least 1 continuous assessment mark • At least 1 lab mark
- a final assessment mark at the end of the module

RECOMMENDATIONS :

- Classes, TD and TP are done in the TP room.
- For the administration chapter, it is desirable to have individual machines to be able to learn how to install a LINUX system

BIBLIOGRAPHY

- JM Rifflet, Programming under Unix 3rd edition - McGraw-Hil 1993
- JP Armspach, P. Colin, F. Ostré-Waerzeggers, "Linux initiation and use", Dunod 2000.

UEF 2.1 – MATHEMATICAL ANALYSIS1

EU code	Module title	Credits
UEF 2.1	MATHEMATICAL ANALYSIS 1	6

Hourly volumes				
45 hour	TD	TP	other (explain, list,)	TOTAL
lesson	45h			90h

Semester :	1

Prerequisites:	Analysis and Algebra of Secondary Education.

OBJECTIVES:

the central theme is the concept of a real function with one real variable. The program is organized around three objectives: •

Consolidation of differential and integral calculus acquired in secondary school. • Study of the asymptotic behavior. • Introduction of new integration techniques.

MODULE CONTENT:

I- Some properties of IR (~ 9 h) •

Algebraic structure of R. • Order in IR, upper bound, lower bound, upper bound, lower bound. • Interval, neighborhood, accumulation point, adherent point.

II- Limit and Continuity of Real Functions of a Real Variable (~ 1:30 p.m.) • Limit:

definition, operations on limits, indeterminate forms. • Continuity: definition and fundamental theorems. • Uniform continuity, Lipchitzian functions.

III- Differentiable Functions and Usual Functions (~ 1:30 p.m.) •

Differentiability and its geometric interpretation. o Operations on differentiable functions, extrema, Rolle's theorem, mean value theorem, Hospital's rule and Taylor's formula.

• Reciprocal trigonometric functions, hyperbolic and hyperbolic functions reciprocal.

IV- Asymptotic comparison (~ 27 h) • Landau

symbols and notion of equivalent functions. • Polynomial limited expansions (DL), and operations on DL • Generalization of limited expansions. • Application to the calculation of limits and the study of infinite branches.

V- Integration in dimension (~ 27 h) •

Riemann integral. • Properties of the Riemann integral. • Indefinite integral.

• Mean theorems.

• Integration techniques. •
Calculation of Primitives.

PERSONAL WORK :

Regular homework, to be done at home, is planned to work on the assimilation of lessons and the deepening of notions

KNOWLEDGE CONTROL PROCEDURES

written questions + homework note + a final exam

BIBLIOGRAPHY

• E. Azoulay, J. Avignant, G. Auliac, "Mathematics in license", Volumes 1 to 4, Edi Science. • J. Dixmier, “Mathematics course”, Preparatory cycle, 2 volumes, Dunod. • J. Monier, “Mathematics course”, Analysis 1, 2, 3 and 4, Dunod. • J. Lelong-ferand, JM Arnaudies, “Mathematics course”, Preparatory cycle, Analysis, volume 3, Geometry and kinematics, volume 4 multiple differential and integral equations, Dunod. • B. Calvo, A. Calvo, J. Doyen, F. Boschet, “Analysis course from I to Cycle and preparatory classes for the Grandes Ecoles. Armand Colin, Collection U.
• R. Couty, J. Ezra, “Analysis”, Armand Colin, Collection U.

UEF 2.2 - ALGEBRA 1

EU Code	Module title	Credits 3
UEF 2.2	ALGEBRA 1	

Hourly volumes				
Course	TD	TP	other (explain, list,)	TOTAL
3 p.m.	30			45h

Semester :	1

Prerequisites: Analysis and algebra of secondary education

OBJECTIVES: •

Consolidate secondary school knowledge concerning general algebra. • Acquire the techniques of decomposing rational fractions. • Exploit the results obtained for the study of linear structures in the units algebra2 and analysis2.

MODULE CONTENT:

I- Reminders and complements (~ 11 h) •
Logic and Sets • Relations and Applications

II- Algebraic Structures (~ 11 h)
• Groups and morphism of groups. •
Rings and morphism of rings. •
Bodies. •
Linear structures.

III- Polynomials and Rational Fractions (~ 22 h 30)
• Notion of polynomial in one indeterminate with coefficients in a ring.
• Algebraic operations on polynomials. •
Arithmetic in the ring of polynomials. •
Derivative polynomial and Taylor formula. • Notion of root of a polynomial and order of multiplicity of a root. • 6-Notion of rational fraction with an indeterminate. • 7-Decomposition of rational fractions into simple elements.

PERSONAL WORKS:

Regular homework, to be done at home, is planned to work on the assimilation of lessons and the deepening of notions

KNOWLEDGE ASSESSMENT PROCEDURES 2 written questions + homework mark + final exam

BIBLIOGRAPHY

- E. Azoulay, J. Avignant, G. Auliac, "Mathematics in license", Volumes 1 to 4, Edi Science.
- J. Dixmier, “Mathematics course”, Preparatory cycle, 2 volumes, Dunod.
- J. Monier, “Mathematics course”, Algebra 1 and 2, Dunod. • J. Lelong-ferand, JM Arnaudies, "Mathematics course", Preparatory cycle, Volume 1 Algebra, Dunod.
- M. Queysanne, “Algebra”, 1st Cycle and Preparatory Classes, Armand Colin, Collection U.

UEF 2.3 - ELECTRICITY

EU code	Module title	Credits
UEF 2.3	ELECTRICITY	4

Hourly volumes				
Course	TD	TP	other (explain, list,)	TOTAL
30 hrs.	26 hrs.	4 a.m.		60 hrs.

Semester :	1

Prerequisites:	none

OBJECTIVES:

The objective of this teaching is the introduction of the basic concepts related to electricity allowing to approach the courses of electronics.

At the end of this course, the student will be able to:

- understand and use the notions of electric forces, electric field, potential electrical and potential energy to electrical charges at rest,
- determine the current and the voltage in an electric circuit including sources of DC voltage, capacitors and resistors,
- understand the principles of electromagnetism and apply it to solve problems applying to electricity in the presence of alternating current, know how to apply the laws and
- fundamental theorems of electricity, • master the matrices associated with the different quadripoles as well as their associations, make the asymptotic Bode plot,
- know how to apply the Laplace transform for the resolution of a differential equation in order to study a linear circuit, • represent the amplitude and phase spectrum of a periodic signal by the method of Fourier.

MODULE CONTENT:

I ELECTROKINETICS (~ 7 hours)

Reminder on electrostatics
Definition of a conductor in electrostatic equilibrium (definition, capacitance of a conductor, stored energy), temporary current, direct current, capacitors, association of capacitors, Ohm's law, Joule's law, resistances, association resistors, Kirchhoff's law, charging and discharging of a capacitor.

II- ALTERNATING CURRENT (~ 5 hours)

Reminders (complex numbers, magnetism, magnetic induction, magnetic flux, self inductance, Faraday's law), alternating current, definition, period of a signal, pulsation, average value, rms value, complex notation, phase and phase shift, notion of impedance, combination of impedances, series and parallel resonance.

III- ELECTRICAL NETWORKS (~ 5 hours)

Definition, voltage divider and current divider laws, concept of sources (linked and independent), superposition theorem, Thevenin's theorem, Norton's theorem, Millman's theorem, Kennely's theorem.

IV- QUADRIPOLES (~ 6 hours)

Definition, convention of currents and voltages, impedance matrix admittance matrix, hybrid matrix, chain or transfer matrix, input impedance, output impedance, current transfer and voltage transfer, association of quadripoles (series, parallel, series input -parallel output).

V- BODE DIAGRAM (~ 2 hours)

Transfer function, cutoff frequency, decibel, Bode form of a linear du1 system er order, elbow frequency, asymptotic Bode plot.

VI- ELEMENTS OF SIGNAL THEORY (~ 5 hours)

Laplace transform (TL), definition, properties (linearity, differentiation, integration, delay theorem, final value theorem and initial value), TL of some usual functions (Dirac, unit step, e-at, periodic function), Inverse TL (decomposition into simple elements, residue method), study of some linear circuits and application of TL for solving a linear differential equation with constant coefficients of order n.

Fourier series, spectral analysis of a periodic signal by the Fourier method.

PERSONAL WORKS:

- Reports of practical work (TPs): o TP n°1: RC circuits in direct current. o Practical work n°2: RL-RC circuits in alternating current (Trace of Bode)
- Familiarize yourself with the elements appearing in the courses and prepare the exercises.

KNOWLEDGE ASSESSMENT PROCEDURES 1

intermediate assessment + 1 participation mark (average of 6 questions) + 1 final exam

RECOMMENDATIONS :

- It is recommended to use for lessons.
- Practical work must be done in rooms equipped with computer equipment. The objective of the practical work is to illustrate the theoretical electronics courses by studying analog circuits in simulation. •

Use of electronic simulation software (Workbench) (initiation to the software, application on Bode in S1)

BIBLIOGRAPHY

• ALONSO and FINN, "General Physics 2, fields and waves", Inter Editions, 1986.
• ALVIN HALPEN, "Physics 2, problems solved", Mc Graw-Hill, 1989. •
BEAUVILLAIN, "Electricity 1", Hachette library, 1979. •
BOUDOUANE, GRIB and SMARA, “Problems of electricity”, OPU, 1999. •
KHENE S., “Electricity, course reminders and corrected exercises”, OPU,
2003. • LADJOUZE, CAUBARERE and FOURNY, “Electricity and waves",
OPU, 2006. • MAALEM MS, "Electricity, corrected exercises with course reminders",
Hiwarcom, 1994. • MILSANT, "Electronics course",
Volume 1, Chihab • EDWIN, "Electronic circuits, courses and problems », Schaum Series

UET 1.1 - WRITTEN EXPRESSION TECHNIQUE

EU code	Module title	Credits
UET 1.1	WRITTEN EXPRESSION TECHNIQUE	2

Hourly volumes				
Class	TD / TP	TP	Other (specify)	TOTAL 30 h.
3 p.m.	3 p.m.			

Semester :	1

Prerequisites:	None

OBJECTIVES:

The desired objectives: •
a mastery of the fundamentals of written communication • the
acquisition of methods and tools facilitating the production of one's writings.
• Improving the editorial quality of various types of documents

MODULE CONTENT:

I - INTRODUCTION TO WRITTEN COMMUNICATION (9 hours)
• Definitions
• Mastery of grammar and spelling rules • How to
write an introduction? • How to write
a conclusion? • How to write an
abstract?

II – EFFECTIVE NOTE TAKING (3 hours)
• Master note-taking techniques • Identify
and retain essential information.
• Transcribe by an objective, concise and communicative reformulation.

III – BEING SYNTHETIC (3 hours) •
Being synthetic while preserving the essential. •
Prioritize information with relevance. • Communicate
information effectively in writing

PERSONAL WORKS:

• Synthesize a report •
Establish a CV
• Writing a cover letter

KNOWLEDGE CHECK PROCEDURES 2 intermediate checks

RECOMMENDATIONS :

• It is recommended to use texts relating to corporate culture and culture
IT for better profitability.

• The choice of texts could be made in consultation with the teachers of the EU relating to business economics.

BIBLIOGRAPHY

• Camus B. "Reports of internships and dissertations", Chihab Editions, Editions d'Organisation, Student Collection,
Algiers 1995 • Eckenschwiller M. "University writing", Editions d'organisations,
1994 • Gingras, F “How to cite Internet sources in scientific work”, available at http://aix1.uottawa.ca/~fgingras/metho/citation.html, page updated on 03/21/2005 • R.
Simonet, "Techniques of expression and communication - Evolution, foundations, practices", Harmattan, 1994 •
R. Simonet, J. Simonet, "Knowing how to argue", Editions d'organisation, 2004.

UED 1.1 - OFFICE AND WEB

EU code	Module title	Credits
UED 1.1	OFFICE AND WEB	1

Lessons / TD / TP	Personal work	TOTAL
30 h.		30 hrs.

Semester :	1

Prerequisites:	None

OBJECTIVES:

The student must be able to: •
effectively use office automation tools (Word, Powerpoint, Excel,..) • master the specificities of communication by e-mail, manage their messaging system effectively. • effectively use relevant information search tools (collection, sorting) in front of the heterogeneity of sources on documentaries (books, magazines, internet, etc.)?,

MODULE CONTENT:

I- BASIC OFFICE TOOLS (~9 hours)

- Word
- PowerPoint •
  Excel
- Gateways between tools

II- INTERNET, THE DIFFERENT SERVICES (~ 3 hours) •

General information on the
Internet o A bit of history o
Authorities o Typology of Internet service providers

- Internet services, general principles of operation: o Mail, HTTP, FTP, News o Search engines (and referencing process) o Java technology, assets, PHP, Flash o browsers •
  Effectively use the

Email

IV – Information search on the Internet (~3 hours) •

Problem • The
Web (visible and invisible) •
Information search strategy • Web tools

- Evaluate the reliability and validity of resources on the Net

PERSONAL WORKS:

- They must make it possible to check the degree of personal efficiency or degree of appropriation of the basic tools. Either then; o Texts to be written o Design of an animated presentation o Search on Google in relation to a specific theme

oh ...

KNOWLEDGE CONTROL PROCEDURES
Continuous checks + final exam

RECOMMENDATIONS :

- The planned loads will be done in the practical work room. It should be verified that students improve their personal efficiency in using office automation tools on selected examples.

UEF 3.1 – ALGORITHMICS AND DYNAMIC DATA STRUCTURES

EU code	Module title	Credits 6
UEF 3.1	ALGORITHMIC and DYNAMIC DATA STRUCTURES	

Hourly volumes				
30 hour	Tutorial/	TP	other (explain, list,)	TOTAL
lesson.	TP 60 hrs.			90 hrs.

Semester :	2

Prerequisites:	UEF1.1: algorithms and static data structures

OBJECTIVES: •

Overall they remain the same as those of the algorithmic course (UEF1.2), namely: the acquisition of a methodological approach, the validation of solutions, the programming of solutions and the preparation of technical programming files • Mastery of dynamic data structures • Use of recursion

MODULE CONTENT:

INTRODUCTION TO POINTERS (5 h.) •
Introduction to the Pascal language
• Static and dynamic allocations •
Relationship between arrays and pointers

II LINKED LINEAR LISTS (6 h.) • definitions, basic
functions and manipulations (length, access, deletion,
insertion,), sorting of lists, implementation of lists with contiguous representation

III BATTERIES AND QUEUES (3 h.) •
Definitions, basic functions, uses,

IV RECURSIVITY (6 h.) • Principle
• Designs of
recursive algorithms • Semantics of
recursion • Transition from
recursive algorithms to iterative algorithms • Recursion in the
c language

V TREES (9 h.) • Definition,
basic functions • Binary trees ÿ
Definition, basic
functions, traversal of trees ÿ Binary search trees
(manipulation) • M-ary trees ÿ Definition, basic
functions, traversal
of trees ÿ Binary tree transformation

VI COMPLEXITY (6 h.) • Efficiency in time and space • Landau notation (O-notation) • Rules for calculating the complexity of an iterative algorithm • Calculating the complexity of recursive algorithms

PERSONAL WORKS:

- Two (2) TPs will have to be carried out plus one (1) project which will be spread over the last three (3) semester month.
- The TPs as well as the project must be the subject of programming files. • The project score will be based on the written report and a demonstration of the work performed.

KNOWLEDGE CONTROL PROCEDURES

RECOMMENDATIONS :

- It is recommended to use the video projector for the course and to distribute course material or handouts. TDs/TPs
- must be done in classrooms equipped with computer equipment • The emphasis must absolutely be placed on the methodological approach aspect and respect for the formalism adopted • The programming language used is the C language. as the course progresses. Its learning will be done by self-training through brochures.

BIBLIOGRAPHY

- The art of computer programming (DE KNUTH – Addison Weslay – Vol3: searching and sorting)
- Data structures and algorithms (A. & JD ULLMAN, AV AHO, JE HOPKROFT-Addison Westley)
- Data and file structures (DE ZEGGOUR ÿ Chihab) • www-ipst.u-strasbg.fr/pat/program/algo.htm - • ftp://ftp-developpez.com/rmdiscala/livres/basesinfo4.pdf • introduction to recursion and trees – course material – P CL. SCOLL- institute of programming-GRENOBLE • C language (T. ZHANG S &SM) • Introduction to C language (B. CASSAGNE IMAG Grenoble) • C language course (P. JACOBINI) • Programming in C (A. ESNARD ENSERB Informatique) • TH Cormen , CE Leiserson, RL Rivest, Introduction to Algorithms, MIT Press, McGraw Hill, 1990.
- File structures (MJ Folk, B. Zoellick & G. Riccardi, Addison-wesley, 1998)

UEF 3.2 – OS 2

EU Code	Module title	Credits
UEF 3.2	OPERATING SYSTEM 2	3

Hourly volumes				
Course	TD/TP	TP	other (explain, list,)	TOTAL
3 p.m.	30h.			45h.

Semester :	2

Prerequisites: UEF1.1, UEF1.2 (algorithms and computer architecture)

GOALS :

Allow understanding: • of the operation of the machine; • the execution of programs in machine language; At the end of this module, the student is able to write programs in machine language.

MODULE CONTENT:

I- MACHINE OVERVIEW

• Functional description of the machine • Internal code and internal format of an instruction
- Internal structure of a program
• Description of the symbolic language (general syntax of the language)

II- PRESENTATION OF THE ASSEMBLER LANGUAGE
- General structure of a source program (symbolic) • Directives
- Transfer Instructions
- Arithmetic instructions
- Comparison, loop (repeat) and branch instructions
- Bit manipulation instructions (logics and shifts)
- Stack instructions
- Procedure instructions and interruptions
- String and prefix processing instructions

III- MACROS INSTRUCTIONS

IV- EXTENDED INSTRUCTIONS (multi media instructions, …)

PERSONAL WORK: In addition to the tps in the room, at least one personal work (TP with detailed report).

KNOWLEDGE CONTROL PROCEDURES

2 intermediate controls + TPs + 1 participation mark (TD/TP)

RECOMMENDATIONS :

- Directed and practical work must be done in classrooms equipped with computer equipment with the Assembly language. •

Introduction to program development (Debug, etc.); •

Programming of some tutorial exercises.

BIBLIOGRAPHY

- Books and brochures of the assembly language of the target machine. • The IA-32 Intel Architecture Software Developer's Manual (3 volumes) • H. LILEN, 80286 Assembler, Radio Edition • H. LILEN, 80386 Operating Modes Architecture - Program - Characteristic: Radio edition
- D. J- BRADLEY, “Assembleur sur IBM PC”, Edition Masson “The HYDE, • http:// Art Of Assembly Language Programming”, 2003 • R. webster.cs.ucr.edu/Page_asm/ArtOfAsm. html

UEF 4.1 – MATHEMATICAL ANALYSIS2

EU Code	Module title	Credits
UEF 4.1	MATHEMATICAL ANALYSIS 2	6

Hourly volumes				
45 hour	TD	TP	other (explain, list,)	TOTAL
lesson	45h			90h

Semester :	2

Prerequisites: UEF2.1

GOALS :

- Study the elementary concepts relating to numerical sequences and sequences of functions, with a view to to provide a coherent framework for the study of numerical series.
- To establish the convergence criteria of the series and to define the usual modes of convergence of the series of functions and to exploit them in order to study the conservation of the continuity and the differentiability and the integration by passing to the limit.
- Determine the expansions in whole series of the usual functions of analysis in order to implement number approximation algorithms. • -Give ODE resolution methods in order to use them in other disciplines.

MODULE CONTENT:

I- NUMERICAL SEQUENCES AND SEQUENCES OF FUNCTIONS (~18 H)

- Numerical Sequences
  - o Definition, convergence, operations on convergent sequences. o Convergence theorems, theorem of the three sequences, sub-sequence. Extension to infinite limits.
  - o Cauchy sequence, adjacent sequences and recurrent sequences.
- Sequences of Functions
  - o 1-Definition, simple convergence and uniform convergence practical rules of convergence.
  - o 3-Preservation of continuity, integrability and differentiability.

II- NUMERICAL SERIES AND SERIES OF FUNCTIONS (~45 H) •

Numerical series: o

- Definition and elementary properties. o Series with positive terms and convergence criteria, o Series with any terms and convergence criteria.

- Sets of Functions:
  - o Definition, simple convergence, uniform convergence and normal convergence. o Uniform and normal convergence criteria.
- Whole series:
  - o Definitions and properties. o Convergence radius, properties of integer series. o Taylor series and usual expansions.

III- ORDINARY DIFFERENTIAL EQUATIONS OF 1st and 2nd ORDER (~27 H)

- First order differential equations. Equations with separable variables, techniques of resolution of certain types of first-order equations, linear differential equations of the

first order. •
Second order linear differential equations with constant coefficients. • Second order differential equations with arbitrary coefficients.

PERSONAL WORK: Regular homework, to be done at home, is planned to work on the assimilation of lessons and the deepening of notions.

KNOWLEDGE ASSESSMENT PROCEDURES 4 written questions + homework note + final exam.

BIBLIOGRAPHY

• E. Azoulay, J. Avignant, G. Auliac, “Mathematics in license (Volumes 1 to 4)”, Science.
• J.Dixmier, “Mathematics course. Preparatory cycle (in two volumes)”, Dunod. • J.Monier, “Mathematics course (Analysis 1, 2,3 and 4)”, Dunod. • J.lelong-ferand, JMArnaudies, “Mathematics course. Preparatory cycle”, (volume 2 Analysis, volume 3 Geometry and kinematics, volume 4 differential equations and multiple integrals) Dunod.
• B. Calvo, A. Calvo, J. Doyen, F. Boschet, “Analysis course from I to V”, 1st Cycle and Classes preparatory to the Grandes Ecoles, Armand Colin, Collection U.
• R.Couty, J.Ezra, “Analysis”, Armand Colin, Collection U.

UEF 4.2 – ALGEBRA 2

EU Code	Module title	Credits
UEF 4.2	ALGEBRA 2	4

Hourly volumes				
30 hour	TD	TP	other (explain, list,)	TOTAL
lesson.	30 hrs.			60 hrs.

Semester :	2

Prerequisites: UEF2.2	

OBJECTIVES:

The program is organized around two objectives: • Study of

the fundamental concepts relating to finite dimensional vector spaces such as base, dimension, rank, and teach the student the method of scaling which will be very useful to him by following.

• Learn linear algebra and assimilate the basics of matrix calculation in order to acquire sufficient knowledge to approach the UEF12.

MODULE CONTENT:

I- VECTOR SPACE (~18 H)

• Definition of a vector space and a vector subspace, direct sum. • Generating family, under generated space. • Linear independence, basis and dimension. • Rank and scaling.

II- LINEAR APPLICATION (~9H)

• Definition and properties of linear maps in finite dimension.

III- MATRIX (~18H)

• Notion of matrix. • Matrices associated with a linear application and properties.

• The ring of square matrices and properties.

• Rank of a matrix, regular matrices and some inversion methods. • Similar matrices and equivalent matrices.

PERSONAL WORKS:

Regular homework, to be done at home, is planned to work on the assimilation of lessons and the deepening of notions.

KNOWLEDGE ASSESSMENT PROCEDURES written questions +

homework mark + final exam.

BIBLIOGRAPHY

• E.Azoulay, G.Auliac: Mathematics in license (Volumes 1 to 4) Edi Science. • J.Dixmier: Mathematics course. Preparatory cycle (in two volumes) Dunod. • J.Monier: Mathematics course (Algebra 1 and 2) Dunod. • J.lelong-ferand, JMArnaudies: Mathematics course. Preparatory cycle (Tome1 Algebra). Dunod

• M. Queysanne: Algebra. 1er Cycle and preparatory classes. Armand Colin, Collection U.

UEM 1.1 - POINT MECHANICS

EU Code	Module title	Credits
EMU 1.1	STITCH MECHANICS	3

Hourly volumes				
Course	TD	TP	other (explain, list,)	TOTAL
15	30	-	-	45 hrs.

Semester :	2

Prerequisites:	None

OBJECTIVES:

The main objective of this course is to introduce methods for studying and modeling physical phenomena with a view to analyzes and designs based in particular on computer simulation.

At the end of this course, the student will have acquired scientific skills relating to:

- knowledge of the hypotheses of classical mechanics,
- the isolation of an object comparable to a material point,
- the description and writing of the movement of a material point in different systems of contact details,
- understanding and ability to calculate the velocities and accelerations of a mobile for a any trajectory,
- the description, writing and analysis of external actions exerted on a material point,
- the understanding, writing and resolution of the equations of the dynamics governing the movement of a material point.

MODULE CONTENT:

I. KINEMATICS: (15 h)
- Elements of vector analysis
- Study of rectilinear movements in the plane and in space.
- Movement in Cartesian, polar coordinates.
- Circular, cylindrical, elliptical movements.
- Any movements.
- Relative movements.
- Motion recording.

II. DYNAMICS: (12h)
- Notions of Galilean frames of reference.
- Principle of inertia and quantity of movements.
- Newton's laws and their applications: gravitation, force of contact and strongly, forces elastics.
- Kinetic moment.
- Fundamental principle of dynamics in a non-Galilean frame of reference.

III. WORK AND ENERGY: (12 h)
- Power, Work, Energy (kinetic, potential, etc.).
- Conservation laws.
- Particle in a gravitational field.
- Particle in an elastic force field, Conservative and non-conservative forces.
- Collisions between particles.

IV.OSCILLATORS: (6 hrs)

- Harmonic oscillators. Damped oscillators.
- Forced oscillations. Resonance. Impedance.

KNOWLEDGE CONTROL PROCEDURES

- Continuous knowledge check
- Terminal control.

BIBLIOGRAPHY

- A. Gibaud, M. Henry, “Mechanics of the Point: Course and Corrected Exercises”, Dunod, 2007.
- RA Carregal, I. Junier, “Mechanics of the Point and of the Solid”, Ed. Bréal, 1999.
- F. Viot, "Mechanics of the Point: Courses and Problems solved", Dunod, 2005.
- S. Devillard, "Mechanics of the Point: Sheets, Methods and Corrected Exercises", Ed. Ellipses, 2005.
- H. Lumbroso, “Physics Problems: Point Mechanics - 114 Solved Problems”, Dunod, 2002.
- D. Teyssier, "Mechanics of the Point: Corrected Exercises", Ellipses, 2005.

UEM 1.2 – FUNDAMENTAL ELECTRONICS1

EU Code	Module title	Credits
EMU 1.2	FUNDAMENTAL ELECTRONICS 1	4

Hourly volumes TP 6				
30 hour	TD	h.	Other (specify) TOTAL 60 h.	
lesson.	24 hours.			

Semester :	2

Prerequisites: UEF2.3

GOALS :

The main objective of this course is the study of the operation of electronic components such as diodes, bipolar transistors and field effect transistors as well as their applications.

At the end of this course the student will be able to:

• Understand the principle of conduction in semiconductors and in PN junctions. • Know the operating characteristics of electronic components (diodes, bipolar and field effect transistors). • Use electronic components in concrete applications (rectifiers, clipping, stabilization, transistor amplification, switching, logic gates, etc.).

• Understand and compare the different families of logic circuits.

MODULE CONTENT:

I SEMICONDUCTOR DIODES (~5 hours)

- Semiconductor (SC): general, SC intrinsic, SC extrinsic type P and type N, unbiased PN junction, biased PN junction.
- The junction diode: polarization and characteristic of the diode, continuous diode, load line and operating point, alternating current diode (single and full wave rectification, clipping, peak detector). • The Zener diode: definition, polarization and current-voltage characteristic, the Zener diode in DC (voltage stabilization) and AC.

II THE BIPOLAR TRANSISTOR (~ 12 hours)

- Presentation, convention of currents (PNP and NPN), the transistor effect, transistor currents, the different mountings of a transistor (EC, CC, BC), operating characteristics, polarization of the transistor (purpose and need to polarize a transistor), attack line, load line and operating point, bias circuits, effect of temperature and thermal stability. The transistor in dynamic regime at low frequencies, dynamic load line, power efficiency and classes of amplifiers, study of a common-emitter amplifier, characteristics of EC, BC and CC amplifiers, associations of amplifier stages, the switching transistor.

III FIELD EFFECT TRANSISTORS (~8 hours)

- Introduction, the junction field effect transistor (FET) (JFET): principle of a transistor JFET, operation, characteristics, electrical models in amplification, assemblies

amplifiers (SC, DC, GC). Insulated Gate Field Effect Transistor (MOSFET), Depletion MOSFET, Enhancement MOSFET, Switching MOSFET, MOSFET applications.

IV LOGIC GATE TECHNOLOGIES (~5 hours)

• Classification of integrated circuits, characteristics of logic gates, DL logic gates, DTL, TTL and ECL, NMOS and CMOS logic gates, BiCMOS logic, comparison between bipolar and CMOS technology, logic gate interfacing

PERSONAL WORK: •

Practical work reports (TPs): o TP n°1: diodes.

- Normal diode: plot of the characteristic, operating point, • recovery.
- Zener diode: trace of the characteristic, operating point, • voltage stabilization.

o Practical work n°2: Bipolar transistors and TEC in static.

- Plot of feature networks - Operating point

• Become acquainted with the elements appearing in the courses and prepare the exercises.

KNOWLEDGE CONTROL PROCEDURES

1 intermediate control + 2 TPs + 1 participation note + 1 final exam

RECOMMENDATIONS :

- It is recommended to use the video projector for the course and to distribute course material or handouts.
- practical work must be done in rooms equipped with computer equipment. The objective of the practical work is to illustrate the theoretical electronics courses by studying analog circuits in simulation.
- Use of electronic simulation software (Workbench)

BIBLIOGRAPHY

• COEURDACIER S, “Low frequency amplification – switching”, Dunod, 1990. •
LADJOUZE H, “Electronics course”, OPU, 2005. •
TAYEB CHERIF R. “Basic electronics”, Berti editions, 1990. •
HARAOUBIA B ., “General electronics”, OPU, 2006. •
BORNAND M., “Exercises and problems with solutions”, ELECTRONICS Volume 1, Vuibert, 1990.
• COEURDACIER S, “Linear discrete components”, ELECTRONICS 1, Dunod, 1990 •
MALVINO, “Principles of electronics”, Mc Graw-Hill, 2004. •
BORNAND M., “Problems of electronics”, ELECTRONICS Volume 2, Vuibert, 1990.

UET 2.1 - ORAL EXPRESSION TECHNIQUE

EU code	Module title	Credits 2
UET 2.1	ORAL EXPRESSION TECHNIQUE	

Hourly volumes				
Class	TD / TP	TP	Other (specify) TOTAL	30 h.
3 p.m.	3 p.m.			

Semester :	2

Prerequisites: None	

GOALS :

• Develop interpersonal skills in all circumstances. • Gain efficiency in its function through better communication. • Putting communication at the service of its action.

MODULE CONTENT:

II - INTRODUCTION TO THE THEORY OF COMMUNICATION (3 hours) • Definitions • Need for communication •

Analysis of brakes and obstacles to communication • Fundamentals of oral communication

II – USE OF SIMPLE TECHNIQUES (6 hours) • importance of listening, •

Challenge of questioning and reformulation • necessary coherence between verbal and non-verbal

• Use skills: concentration, classification, imagination, • strength of voice, gaze, posture • Value ideas

III- COMMUNICATING IN DIFFICULT SITUATIONS (6 hours)

• How to prepare before the presentation?
• Structure your messages
• Adapt the communication to the audience
• Choose the appropriate words • Overcome your stress? • Dare to say “no”

PERSONAL WORK: • Bring students to discover the issues of communication; allow them to experiment and enrich their own modes of expression by putting them in situation (collective and public presentation), and from there develop their relational skills.

• Role-playing: active training in inter-individual communication

KNOWLEDGE CONTROL PROCEDURES

2 intermediate controls

RECOMMENDATIONS :

Make sure to make a personalized assessment of each student's strengths and areas for improvement

BIBLIOGRAPHY

• "ABC of the success of a presentation", Chair of Pedagogy and Didactics, EPA, Lausanne • "30 exercises to acquire good reflexes ", Edition of organization, 2008 • **"** Practical guide to behavioral change", Edition of organization, 2000

UET 2.2 – ENGLISH 1

EU code	Module title	Credits
UET 2.2	**ENGLISH** 1	**2**

Hourly volumes				
Course	**TD**	**TP**	**Other (specify) TOTAL**	
	30 h.			**30h.**

Semester :	**2**

Prerequisites:	

GOALS :

This English as a foreign language course focuses on the assimilation of the elements of speech. These elements are the essential components of sentence formation. Their knowledge will allow the learner to be able to use these components to communicate - both in writing and orally - his ideas.

MODULE CONTENT:

- Study of compound nouns (Compound Nouns);
- Contextual Reference (Pronouns);
- Sequence of Adjectives (Adjectives);
- Exceptions with Adverbs (Confusion: adverbs/adjectives with “ly” endings).
- Study of texts for the appropriation of vocabulary specific to the field of computing.

PERSONAL WORKS:

KNOWLEDGE ASSESSMENT PROCEDURES 02

assessments relating to the contents of the unit

1. mid-semester evaluation (+/- after 3 p.m.) **2.** at the end of the semester

RECOMMENDATIONS : •

The four semesters (UET1.1 ÿUET4.1) represent the upgrading of learners because coming from different institutions and with different levels of knowledge.

• Use of the Data Show • The courses will be carried out in the form of TDs

BIBLIOGRAPHY

• Mohammed BELLAL, “The Parts of Speech: A Workbook”, OPU, 2000.

UEF 5.1 – FILE AND DATA STRUCTURES

EU code	Module title	Credits 4
UEF 5.1	FILE AND DATA STRUCTURES	

Hourly volumes				
Course	TD / TP	TP	Other (specify) TOTAL	60 h.
30 hrs.	30 hrs.			

Semester :	3

Prerequisites: UEF3.1: Dynamic Data Structures

OBJECTIVES:

Very often the essential knowledge of files is diluted in different courses (structure of machines, algorithms, information systems, analysis, databases, operating systems, etc.) with different approaches that make synthesis, essential, between these various knowledge is not always made. This is why we have brought them together in a single course, so that the student can:

- Design file structures that are efficient and meet the needs of any type of applications.
- Master all the terminology and fundamental concepts of files • Have sufficient knowledge of magnetic media technology so that they are not seen as simple black boxes
- Know the different types of file organization, their representation, their operation and how to make the choices
- Perceive all of these elements as a coherent and complete whole, which will be a necessary prerequisite for other courses and for professional life.

MODULE CONTENT:

I- GENERAL INFORMATION ON FILES (6 h.) • basic concepts • file, record, zone, character • activity of a file, consultation rate, renewal rate, stability • typology of files (permanent or basic, movement, maneuver , intermediate, archive, history, single-volume file, multi-volume, multi-file volume, table, • basic operations on files (creation, update, union, splitting, sorting, merging, extracting, copying)

• difference between Ram and Secondary memory • physical files and logical file • logical record and physical record • types of records (fixed length, variable, indefinite) • blocking factor, its interest • static and dynamic files

II- SUPPORT TECHNOLOGY (4 hrs.)

• Magnetic tape •
Magnetic disk • Optical
disk (description,
physical recording, recording density, recording mode, theoretical and practical storage capacity, read/write time)
• evolution of magnetic media

III- FILES ORGANIZATION (17 h.) • SIMPLE
STRUCTURES (3 h.) o Contiguous
organization o Chained
organization o
Classification of simple structures

• INDEX METHODS (3 h.) o
Primary index o
Secondary index o
Multilevel index

• TREE STRUCTURES (5 h.) o Tree
file o Tree index o B-
Trees

• HASHING (4 h.) o
Hash function o
Collision resolution methods o Static
hashing o Dynamic
hashing

• CHOICE OF AN ORGANIZATION (2 h.)
o choice parameters o
example of application

IV- INTRODUCTION TO DATABASES (3 h.) • Why a
database? • Definition

• Fundamental concepts common to all databases • Main
functions of a DBMS

PERSONAL WORKS:

• Two to three practical exercises to be carried out in C language and a case study

KNOWLEDGE CONTROL PROCEDURES

Written exam + Practical work + Case study

RECOMMENDATION :

• Some TD sessions must take place in machine rooms.

BIBLIOGRAPHY

• Jouffroy ÿ Létang, “Files – data organization”, Bordas. • MJ Folk, B. Zoellick & G. Riccardi, “File structures”, Addison-wesley, 1998 • DE Zegour, “Data and file structures”, Ed. Chihab, 1996. • D. Knuth, “The art of computer programming”, 3rd Ed. Vol. 3, Addison-wesley, 1978 • A. Aho, J. Hopcroft & J Ullman, “Data structures and algorithms”, Addison-wesley, 1987 • J. AKOKA , Ed. Eyrolles, “database management systems” • S. MIRANDA & JM. BUSTA, Ed. Eyrolles, “introduction to databases”

UEF 5.2 - COMPUTER ARCHITECTURE 2

EU Code	Module title	Credits
UEF 5.2	COMPUTER ARCHITECTURE 2	4

Hourly volumes				
30h	TD / TP	TP	Other (specify)	TOTAL 60 h
lesson	30h			

Semester :	3

Prerequisites:	UEF1.2: COMPUTER ARCHITECTURE 1

GOALS :

At the end of this course, the student should be able to design an elementary calculator.
He must in particular:

- know the role of each component in the data path of a computer. • control the flow of information in the basic circuits and know the operation of the control unit (sequencer).
- understand the basic mechanisms allowing a computer to communicate (inputs/outputs and interrupt systems).

MODULE CONTENT :

I- MEMORIES (15 hours) •
Introduction

- Semiconductor memory technology
  - ÿ ROMs ÿ ROMs (Read Only Memory) ÿ PROMs (Programmable ROMs) ÿ EPROMs (Erasable PROMs) and EEPROMs (Electrically Erasable PROMs) ÿ Applications of ROMs
  - o Random access random access memories ÿ *Static RAMs* ÿ *Dynamic RAMs*
- Sequential access memories o
  - FIFO (First In First Out) memories o
  - LIFO (Last In First Out) memories •

Associative memories o

- Description of a associative memory o
- Operations on an associative memory o
- Applications of associative memories o
- Examples of use of an associative memory •

Cache memories or buffer memories o

- Principle of cache memories o
- Principle of calculation of physical addresses o Replacement of information o Writing cached
- o Cache size

II- BODIES LINKED TO AN ENTRY/EXIT OPERATION (3 hours) • Introduction

• The device
o Main types of peripherals o Some examples of peripherals • The peripheral controller o
Architecture of a controller o
Dialog interface with the central unit o
Dialog interface with the peripheral o Orders executed by a controller

III- ENTRY / EXIT MODES (3 hours)
• Introduction •
Input/output modes o
Programmed mode ÿ
State test mode ÿ
Interrupt mode o Direct memory access (DMA) ÿ Input/ Output channel ÿ Channel program ÿ Channel architecture ÿ Selector channel and multiplexer channel

IV- INTERRUPTION SYSTEMS (3 hours)
• Introduction •
Different causes of interruption o
Internal interruptions or traps o Input/output interruptions o Hardware interruptions • Detection and handling of an interruption in a simple system
o Detection of an interruption
o Saving of the context o
Search for the cause of the interruption
o Acknowledgment of the interruption o Processing of the interruption o Restoration of the context of the interrupted program • Hierarchical interrupt systems o Inhibition, masking and validation o Detection and consideration of an interruption in a hierarchical system o Coding of levels o Vectorized interruptions

V- THE SEQUENCER (3 hours)
• Introduction •
The wired sequencer •
The micro-programmed sequencer

PERSONAL WORKS: • Practical work on ROM chapter. •
Practical work on Associative Memoirs chapter.
• Presentation on I/O Organs chapter. •
Practical work on Interruption chapter.
It would also be interesting to disassemble computers and show the different components to students by helping them to disassemble and then reassemble

a disk, a memory stick, a power supply, a motherboard...

KNOWLEDGE ASSESSMENT PROCEDURES 2 assessments

+ 3 practicals + 2 participation notes + presentation + unscheduled questions.

RECOMMENDATIONS :

• In the absence of real development systems and cards, it is essential to have simulation software to carry out the proposed practical work. • Ongoing monitoring should be done in tutorial sessions. Take uncorrected exercises and ask students to solve them in a limited time. It will thus be possible to encourage students to better prepare their series of exercises and to review their lessons before the TD session. The final mark would be an average of the written tests, practical work, and tutorial notes.

BIBLIOGRAPHY

• M. De Blasi, "Computer architecture", Addison Wesley 1991. •

M. Burrell, "Fundamentals of Computer Architecture", Editor: Palgrave Macmillan, 2003. • BS

Chalk, Robert Hind and Antony Carter, "Computer Organization and Architecture" , edition, 2003. • Editor: Palgrave Macmillan, 2 n/a I. Englander,

"The Architecture of Computer Hardware and System Software: An Information Technology Approach", Third edition, Bentley College, Wiley Publishers, 2003. • M. Ercegovac,

T. Lang and J. Moreno, "Introduction to Digital Systems", Wiley Publishers, 1999.

• JL Henessy and DA Patterson, "Computer Architecture", International Thompson Publishing, 2006.

• Vincent P. Heuring and Harry F. Jordan, "Computer Systems Design and Architecture", International Edition, Editor: Prentice-Hall, 2nd edition, 2003.

• M. Koudil and SL Khelifati, "Structure of computers, around the processor", OPU, 3th edition, 2004.

• M. Morris Mano and Charles Kime, "Logic and Computer Design Fundamentals", Editor: edition, Prentice Hall, 3rd 2003.

• JF Maquiné, "Understanding cache memory", 2000. http://www.hardware.fr • S.

Martel, "Computer architecture", École Polytechnique de Montréal, 2002 • M. Morris

Mano and Cs Kime, "Logic and Computer Design Fundamentals", Editor: Prentice Hall, 3rd edition, 2003.

• E. Sanchez, "Types and performance of processors", Ecole Polytechnique de Lausanne, 2003.

• W. Stallings, "Computer organization and Architecture, Designing for performance", Sixth edition, Prentice Hall, 2003. • A.

Tanenbaum, "Computer architecture", InterEditions 1991 • S. Tisserant,

"Computer architecture", 2003.http://marpix1.in2p3.fr/calo/my web/archi/archi.html

UEF 6.1 – MATHEMATICAL ANALYSIS3

EU code	Module title	Credits
UEF 6.1	MATHEMATICAL ANALYSIS 3	6

Hourly volumes				
45 hour	TD	TP	other (explain, list,)	TOTAL
lesson	45h			90h

Semester :	3

Prerequisites:	UEF2.1, UEF4.1

GOALS :

The objective of this teaching unit is threefold: • -Discover some topological concepts of IR^2 and IR^3 -Extend the notions of limit IR continuity and differentiability of IR functions IR^{not} in IR and generalize them to functions of IR^{not} to IR^m.

• -Exploit the above results to deal with some optimization problems with or without constraints.

MODULE CONTENT:

I- Elements of topology (18 h). • _
Metric distances and spaces. • n
vector spaces • Ball,
neighborhood, open and iron •
Notion of topology. •
Interior, adhesion, boundary of a set. • Case of IRm
spaces .

II- The notions of limit and continuity of functions of IR^m to IR^{not}, for m=2.3 and n=1, 2.3 (22:30)

• Limit and continuity of functions from IRm to R.
• Limit and continuity of functions from IRm to IRN.
• Properties.

III- Differentiability of functions with several real variables (40 h) •
Partial derivatives and Schwarz's theorem
• Differentiability and properties, implicit functions. •
Taylor formula. •
Differential forms and notion of exterior differential.

IV-Optimization with or without constraints (9 h)

PERSONAL WORK: Regular homework, to be done at home, is planned to work on the assimilation of lessons and the deepening of notions.

KNOWLEDGE ASSESSMENT PROCEDURES 4 written questions + homework mark + final exam.

BIBLIOGRAPHY

• E. Azoulay, J.Avignant, G.Auliac: Mathematics in license (Volumes 1 to 4) Edi Science. •
J.Dixmier: Mathematics course. Preparatory cycle (in two volumes) Dunod. • J.Monier:
Mathematics course (Analysis 1, 2,3 and 4) Dunod. • J.lelong-ferand,
JMArnaudies: Mathematics course. Preparatory cycle (volume 2 Analysis,
tome3 Geometry and kinematics, tome 4 differential equations and multiple integrals) Dunod.
• B.Calvo, A.Calvo, J.Doyen, F.Boschet: Analysis courses from I to V. 1 er Cycle and Classes
preparatory to the Grandes Ecoles. Armand Colin, Collection U.
• R.Couty, J.Ezra: Analysis. Armand Colin, Collection U.

UEF 6.2 - ALGEBRA 3

EU code	Module title	Credits
UEF 6.2	ALGEBRA 3	3

Hourly volumes				
Course	TD	TP	other (explain, list,)	TOTAL
15	30			45h

Semester :	3

Prerequisites: UEF2.2, UEF4.2

GOALS :

- The main objective is to introduce the concept of determinant in its natural framework which is multilinear algebra. This tool solves some problems such as the reduction of endomorphisms and the resolution of linear systems.

MODULE CONTENT:

I- Determinants

- Definitions and properties.
- Determinant of a square matrix and properties.
- Methods for calculating the determinant.
- Some applications: inversion of a matrix and resolution of the Cramer system.

II- Resolution of linear systems •

Definitions and properties. • System of n equations with m unknowns • Study using column vectors • Study using row vectors. • Study using determinants.

III- Reduction of endomorphisms •

Definition of an eigenvalue and an eigenvector. • Characteristic polynomial and properties • Reduction of an endomorphism. • Application to the resolution of differential systems.

PERSONAL WORK: Regular homework, to be done at home, is planned to work on the assimilation of lessons and the deepening of notions.

KNOWLEDGE ASSESSMENT PROCEDURES written
questions + homework mark + final exam.

BIBLIOGRAPHY

- E. Azoulay, J.Avignant, G. Auliac, “Mathematics in license” (Volumes 1 to 4) Science.
- J. Dixmier, “Mathematics course. Preparatory cycle”, Two volumes, Dunod. • J.

Monier, “Mathematics course (Algebra 1 and 2)”, Dunod. • J.

Lelong-ferand, JMArnaudies, “Mathematics course. Preparatory cycle (Tome1 Algèbre)”, Dunod • M.

Queysanne, “Algèbre”, 1st Cycle and Preparatory classes. Armand Colin, Collection U.

UEM 2.1 – FUNDAMENTAL ELECTRONICS2

EU Code	Module title	Credits
EMU 2.1	FUNDAMENTAL ELECTRONICS 2	4

Hourly volumes				
30 hour	TD / TP	TP	Other (specify) TOTAL 60 h.	
lesson.	30 hrs.			

Semester :	3

Prerequisites: UEF2.3 and UEM1.2

OBJECTIVES:

The aim of this course is to familiarize students with electronic functions based on integrated circuits. It deals with analog and digital functions for communications as well as for continuous and discrete signal processing. It revolves around the following concepts: amplification, analog and digital signal generation, A/D and DA conversion and modulation.

At the end of this course the student will be able to:

• design and analyze circuits centered on the operational amplifier, • produce analog and digital signals, • know the different operating principles of A/D and D/A converters, • choose a converter according to the constraints in resolution, in speed and cost, • understand the operation of the basic assemblies of a data acquisition chain (samplers/blockers, converters, amplifier, clock),

• master an analog modulation technique

MODULE CONTENT:

I OPERATIONAL AMPLIFIER (~ 8 hours) • Introduction and presentation • The ideal operational amplifier (AO) • Fundamental assemblies to ideal AO • The real operational amplifier • Applications of the operational amplifier: Schmitt Trigger, Oscillators and filters assets

II DIGITAL CIRCUITS (~ 9 hours) • Introduction •

General notions on electronic flip-flops (multivibrators) • RC switching circuit • Bistable assemblies with transistors and logic gates • Monostable assemblies with AO and CMOS logic gates • Astable assemblies with AO and gates CMOS logic • Applications of multivibrators • The NE555 in bistable, monostable and astable flip-flops

III ANALOG – DIGITAL (CAN) AND DIGITAL – CONVERSION ANALOG (DAC) (~6 hours) • Introduction

• Analog-to-digital conversion • Analog-
to-digital converters • Digital-to-analog
converters • Example of an integrated ADC/
DAC

IV INTRODUCTION TO ANALOG AMPLITUDE MODULATION (~7 hours)

• General information on the transmission of information

• Principle of amplitude modulation •
Temporal representation of an amplitude modulated signal •
Power carried by an amplitude modulated signal •
Suppressed carrier modulation •
Single sideband modulation • Methods
of amplitude modulation • Demodulation
of amplitude

PERSONAL WORKS:

• Reports of practical work (TPs): o TP n°1: The
operational amplifier in linear mode o TP n°2: The
operational amplifier in saturated mode o TP n°3: A/D
and D conversion /AT

• Become acquainted with the elements appearing in the courses and prepare the exercises.

KNOWLEDGE ASSESSMENT PROCEDURES 2 intermediate assessments + 3 practical exercises + 1 participation note

RECOMMENDATIONS :

• It is recommended to use the video projector for the course and to distribute course material or handouts.

• practical work must be done in rooms equipped with computer equipment.
The objective of the practical work is to illustrate the theoretical electronics courses by studying analog and digital circuits in simulation.

• The simulation software used is the Workbench (Electronics Workbench).

BIBLIOGRAPHY

• COEURDACIER S., Low frequency amplification - switching, Dunod, 1990. •
MULLER C, Operational amplifiers and active filters, Mentor, 1984. • J.
MILLMAN and A. GRABEL, Digital circuits and systems, Volume 2 and Volume 3, Mc Graw-Hill, 1983.
• D. BELL, Electronic devices and circuits, Prentice-Hall, 1986. •
HARAOUBIA B., General electronics, OPU, 2006. •
HARAOUBIA B., The main functions of electronics, OPU, 1995 • MALVINO,
Principles of electronics, Mc Graw-Hill, 2004. • DORVAL,
Impulse techniques, impulse and switching circuits, Mc Graw-Hill, 1983 .

UEM 2.2 - PROBABILITY AND STATISTICS 1

EU Code	Module title	Credits
EMU 2.2	PROBABILITY AND STATISTICS 1	4

Hourly volumes				
30 hour	TD / TP	TP	Other (specify) TOT	AL 60 h.
lesson.	30 hrs.			

Semester :	3

Prerequisites:	S1 and S2 (analysis and algebra)

GOALS :

- In part (1) of this Module, we will present the data in a raw form, reducing them to a few graphical summaries and characteristic parameters. • In part
(2), and after the reminders of combinatorial analysis, we introduce the principles principles of the calculus of probabilities, by showing the possibilities of using the algebra of sets, the different usual probability laws are then studied and their conditions of application examined.

MODULE CONTENT: (1) :

Descriptive statistics (06h class and 04h30 tutorial)

1. Introduction
2. Tables and graphs 3.

Analysis of a frequency distribution **(2) :**

Calculation of probabilities

1: Combinatorial analysis (01h30 Tutorial)

2: Space of probabilities (03h course and 03hTD)

- random experience,
- random events,
- Probabilities (intuitive approach, definition, properties and uniform probability)

3: Conditional probability and independence (03h lecture and 03hTD)

Introduction, definition, compound probability formula, probability formula to bayes formula, independence. 4: discrete random variables (VAD) (06h lecture and 06hTD) a) Vad b) Probability laws c) Distribution function d) Mode, moments, expectation and variance e) Discrete random couple - Couple law - Marginal laws - Independence - Conditional laws - Laws of sum

5: Discrete probabilistic models (03h lecture and 03hTD)

Uniform law, Bernoulli's law, binomial law, Poisson's law, hypergeometric law, Pascal's law, approximations

6: Continuous Random Variables (VAC)

(06h lessons and 06hTD)

1. VAC 2.

Couple of continuous random variables 3.
Generalization to the continuous random vector

7: Continuous probabilistic models (03h lecture and 03hTutorial)

1. Normal distribution
2. Other common continuous distributions

Uniform law, exponential law, chi-square law, Student's law, Fisher's law.

PERSONAL WORKS:

Personal work will be scheduled in the second semester.

METHODS OF KNOWLEDGE ASSESSMENT 1 assessment + 1

Average mark (participation, written questions in tutorials)

RECOMMENDATIONS :

• It is recommended to use the video projector for the course and to distribute course material or handout.

BIBLIOGRAPHY

- Descriptive statistics, Bernard PY, Economica 1991

- Probability and statistics, Jacqueline FOURASTIE and Benjamin SAHLER,

J Quinet series, DUNOD 1981 edition

- Probability and statistics course, Christian LEBOEUF, Jean-louis ROQUE and Jean GUEGAND

Ellipses-Marketing 1983

- Probabilities, statistics and surveys, J.GENET, G.PUPION and M.REPUSSARD

Vuibert 1974

UED 2.1 - BUSINESS ECONOMY

EU Code	Module title	Credits
UED 2.1	BUSINESS ECONOMICS	3

Hourly volumes				
Lectures/TD/TP	TD / TP	TP	Other (specify)	TOTAL 45 h.
45				

Semester :	3

Prerequisites:	None

GOALS :

- The student must be able to understand the role of business in the economic activity of a nation and approach it as an open system. • The student must also be able to analyze the missions and responsibilities of each of the major functions (operational and support) of the company.

MODULE CONTENT:

I - INTRODUCTION TO ECONOMY (3 hours) •
Definition •
Economic activity and its objectives

II – INTRODUCTION TO THE COMPANY (3 hours)
- Definitions
- Basic missions
- Classification of companies (legal, sectoral, ..) • The company as a system (flow)

III – THE COMPANY AND ITS ENVIRONMENT (6 hours) • The company and its direct environment: A basic unit of economic activity
  - o Circuit with two agents: Supply and Demand o Circuit with three agents: Savings – Investment
- The company and its (broad) indirect environment
- Role of administration •
Role of culture •
Synthesis

III – THE MAJOR FUNCTIONS OF THE COMPANY (9 hours)
- Operational functions o
  - Commercial function o
  - Production function o
  - Purchasing and supply function • Support functions (Administration, HR, Finance, Communication, ..)

IV – COMPANY FACING THE INFORMATION SOCIETY (3 hours)
- Information society •
Challenges of the Net-Economy
- New forms of companies.

PERSONAL WORKS:

- Group case study related to business functions

KNOWLEDGE ASSESSMENT PROCEDURES 1

intermediate assessment + 1 personal and/or group work note

RECOMMENDATIONS :

- It is recommended to use the video projector for the course and to distribute course material or handouts.
- Emphasis must absolutely be placed on the general culture aspect

BIBLIOGRAPHY

- BIOLLEY G., "Change in management", Les Editions d'Organisation, 1986. • ROUX D. "Economic analysis and business management: Theories, methods and practices", Dunod, 1989
- LYVIAN YF "Introduction to the analysis of organizations", Economica, 2000

UET 3.1 – ENGLISH 2

EU code	Module title	Credits
UET 3.1	ENGLISH2	2

Hourly volumes				
Course	TD	TP	Other (specify)	TOTAL 30 h.
	30h			

Semester :	3

Prerequisites:	Computer vocabulary/particular point of grammar.

OBJECTIVES: In the chapter1 the student will learn how to: • talk and write about computer applications in everyday life. • recognize the basic components of a computer system and understand their functions.

• use synonyms, acronyms and abbreviations when talking about computers.

In the chapter2 the learner will understand the basic features of databases and acquire specific vocabulary related to internet utilities.

In the chapter3 concerns languages work.

MODULE CONTENT:

- The study of clauses
  - Noun clauses
  - Adjective clauses
  - adverb clauses
- The study of sentences (participials) •
  The presentparticiple
  - The pastparticipant
- Study of texts for the appropriation of vocabulary specific to the field of computing

PERSONAL WORKS: 6 hours for preparing personal works.

KNOWLEDGE CONTROL MODALITIES : 1mark for control+1mark for personal work

RECOMMENDATIONS :

- Tasks in laboratory
- The courses will be carried out in the form of TDs

BIBLIOGRAPHY

- “Natural English, upper intermediate student book”, Oxford university press, 2003
- “Oxford advanced learner's dictionary, Oxford university press, 2000

UEF7.1 – OBJECT ORIENTED PROGRAMMING

EU code	Module title	Credits
UEF7.1	O B J E T ORIENTED P RO GRAMMING	4

Hourly volumes TD /				
TP lessons 30 h. 30 hrs.		TP	Other (specify) TOTAL 60	
				h.

Semester: 4	

Prerequisites :	UEF1.1

OBJECTIVES:

- To introduce the basic concepts of object-oriented programming. The notions of classes, objects/instances, sending messages must be assimilated, as well as the breakdown of a problem in these terms. At the end of this module the student must be aware of the importance and the application of the notions of polymorphism, inheritance and abstraction of the representation of the problem. • Learn to program in Java.

MODULE CONTENT:

I Introduction to Object Oriented Programming (~2 hours)
II Classes and objects (~4 hours)
III Primitive types, arrays and strings (in Java) (~3 hours)
IV Inheritance and polymorphism (~4hours)
V Inner classes and anonymous classes (~2 hours)
VI Collections (~3hours)
VII Graphic programming (~4 hours)
VIII Applets (~2 hours)
IX Exception handling (~2 hours)
X Streams and Files (~4 hours)

PERSONAL WORK: • Periodic activities • A practical work to be submitted at the end of the semester

PROCEDURES FOR KNOWLEDGE ASSESSMENT

intermediate examinations, TPs and note of participation and attendance

RECOMMENDATION :

- Putting OOP concepts into practice is essential for the proper understanding of the course. It is therefore suggested that all tutorial sessions take place in machine rooms.
- The use of the BlueJ environment during the first practical sessions to a better assimilation of the notions of the Object Oriented approach before moving to the Eclipse IDE.

BIBLIOGRAPHY

(title, author(s), publisher)

1. Head First Java, Second Edition, By Kathy Sierra, Bert Bates, O'Reilly Media.
2. Programming in JAVA4th edition, Deitel and Deitel, Les éditions reynald Goulet 3.
Http://java.sun.com 4.
The JAVA 2 Programmer, Lemay L, Campus Press.
5. Inside Java 2 Volume I - Fundamentals, Horstmann and Cornell, The Sun Microsystems Press Java Series
6. Programming in Java, Claude Delannoy, Eyrolles

UEF 7.2 - INTRODUCTION TO INFORMATION SYSTEMS

EU code	Module title	Credits 3
UEF 7.2	INTRODUCTION TO INFORMATION SYSTEMS	

Hourly volumes				
Class	TD / TP	TP	Other (specify) TOTAL	45 h.
3 p.m.	30 hrs.			

Semester :	4

Prerequisites: UEF5.1	

GOALS :

- The student must be able to understand the concept of system in order to better use it in modeling of complex situations
- The student must be able to perceive the fundamental role of information as well as the main analysis tools for a better quality of information.
- He must perceive the importance of the company's information systems? A saving of service, an information economy or even the creation of value.

MODULE CONTENT:

I – NOTION OF SYSTEM (6 hours) • System definitions • Composition of a system • Objectives of a system • Function of a system • A classification of systems • Natural systems and technical systems • Physical systems and conceptual systems • Systems static and dynamic • Open systems and closed systems • Life cycle of a system • Systems and subsystems • Control of a system

II- CONCEPT OF INFORMATION (3 hours)

- Definitions: • What is data, information, knowledge?
- Information theory • Measurement of the quantity of information • Analysis of the chain of communication • Quality of information

III- INFORMATION ANALYSIS TOOLS (12 hours) • Codification of information

- Definitions
- Lexicographic power • Purpose of codification • Types of codification

- Characteristics of a code • Coding systems • How to choose a coding?
- Information control
  - Need for controls
  - Different types of control • Order of execution of controls
  - Manual controls and automatic controls • Protection of information

IV- CONCEPT OF INFORMATION SYSTEM (9 hours) • Definitions

- What is an information system? • What are the different subsystems? (strategic, tactical, operational) • What is information technology?
- Objectives
- Role of the IS in the organization
  - OID model (Lemoigne)
- Classification of IS • Operational IS • Decision support IS • Communication IS
- IS development lifecycles

PERSONAL WORKS:

- Case studies on the system • Case studies on: codification, controls

KNOWLEDGE ASSESSMENT PROCEDURES 2 intermediate assessments + 1 practical work

RECOMMENDATIONS :

- It is recommended to use the video projector for the course and to distribute course material or handouts.
- It is necessary to insist on the fact that the IS is the language of the company, a language articulated to its action. It is organic, linked to its positioning, to its priorities; it expresses its personality.

BIBLIOGRAPHY

- Blanchard, BS., Fabrycky, WJ., “Systems engineering and analysis”, Prentice Hall Upper Saddle River, New Jersey 07458,

1998 • Davis GB, Olson MH , Ajensat J., Peaucelle JL, "Information systems for the management", Edition G. Vermette Inc,

1986 • KC Laudon, JP Laudon, "Management Information Systems: Managing The Digital Firm", 9th Edition, Prentice Hall, 2005.

- Lemoigne JL, "The theory of the general system", Presses Universitaires Françaises,

19?? • Lemoigne JL, "Information Systems", Editions d'organisations, 1971 •

Meinadier JP, "The profession of system integration", Hermès 2002 Reix R., "Dictionary of information systems", 1999, •

Senn JA, "IS Analysis and Design", Mc Graw Hill, 1989. • Akoka

J. & al, "Encyclopedia of Computing and Information Systems", Vuibert, 2006

• Von Bertalanffy L. “General Systems Theory”, Dunod, 1993.

UEF 8.1 - MATHEMATICAL ANALYSIS4

EU Code	Module title	Credits
UEF 8.1	MATHEMATICAL ANALYSIS 4	6

Hourly volumes				
45 hour	TD	TP	other (explain, list,)	TOTAL
lesson	45h			90h

Semester :	4

Prerequisites: UEF6.1

GOALS :

The objective of this EU is threefold:

- Extend the notion of Riemann integral to the cases of an unbounded interval or a function unbounded.
- Define the Riemann integral in dimensions 2 and 3.
- Introduce some notions on PDEs.

MODULE CONTENT:

I- Geometry of curves and surfaces (27 h)

- Curves and surfaces in Euclidean space I • Parametrization of curves and surfaces.
- Regularity of curves and surfaces. • Line tangent to a curve, and plane tangent to a surface. • Notion of vector field normal to a curve, or to a surface. • Orientable curves and surfaces, and orientation. • Notion of edge, and oriented edge. • Notion of sub-manifold of IR3 .

II- Improper integrals (18 h) •

Definition and elementary properties. • Convergence of integrals of positive functions. • Convergence of integrals of functions of arbitrary sign. • Integration techniques. • Parametric integrals.

III- Integration of differential forms on submanifolds of IR • Curvilinear ^{3} (27 hrs)

integrals • Surface integrals. • Volume integrals. • Stocks formula in dimensions 2 and **3.**

IV- Notion of partial differential equations (18 h) • General definitions and resolution of some PDEs of order 1. • Examples of PDEs of order 2 (Poisson, heat and wave equations.)

PERSONAL WORK: Regular homework, to be done at home, is planned to work on the assimilation of lessons and the deepening of notions.

KNOWLEDGE ASSESSMENT PROCEDURES 4 written questions + homework mark + final exam.

RECOMMENDATIONS :

BIBLIOGRAPHY

• E. Azoulay, J.Avignant, G.Auliac, “Mathematics in license (Volumes 1 to 4)”, Edi Science. • J.Dixmier, “Mathematics course. Preparatory cycle”, Two volumes, Dunod. • J.Monier, “Mathematics course”, (Analysis 1, 2,3 and 4), Dunod. • J.lelong-ferand, JMArnaudies, “Mathematics course. Preparatory cycle (volume 2 Analysis, volume 3 Geometry and kinematics)”, Dunod. • B.Calvo, A.Calvo, J.Doyen,F. Boschet, “Analysis courses from I to V. 1er Cycle and Classes preparatory to the Grandes Ecoles. Armand Colin”, Collection U. • R.Couty, J.Ezra, “Analyse”, Armand.

UEF 8.2 – MATHEMATICAL LOGIC

EU Code	Module title	Credits
UEF 8.2	LOGICMATHEMA TIC	4

Hourly volumes				
Course	TD	TP	other (explain, list,)	TOTAL
30h	30h			60h

Semester :	4

Prerequisites:	

OBJECTIVES:

At the end of the course, the student must be able to make the difference between syntax and semantics, know how to formalize the statement of a problem and know how to use model theory or proof theory to show satisfiability (not satisfiability) of this statement. The student must also master the consistency and completeness properties of a logical system.

MODULE CONTENT :

I. Set theory (reminders) (4h30h) • Functions
• Relations

• Set and parts of a set, • Countable sets II. Propositional calculus
(3:30 p.m.) • Introduction • Proposition and
paradox • Syntax of
propositional language • The alphabet
• Writing rules •
Semantic study of
propositional language • Truth table of a formula
• Satisfiability • Logical consequence •
Complete system
of connectives, Sheffer
connectives • Properties of logical connectives • Normal forms •
Semantic tree

• Proof theory in propositional calculus o Introduction o
Resolution in
propositional calculus o Consistency and
completeness of the resolution o Resolution
strategies
•

• III. Calculus of first-order predicates (40h)
o Introduction to first-order languages o The alphabet

o Language expressions (terms and formulas) o Complete system of connectives o Field of a quantifier o Free variables, bound variables, free terms for a variable

• Semantic study of the language of first-order predicates o Interpretation of a term o Interpretation of a formula o Satisfiability of a formula o Model of a formula o Valid formula o Satisfiability of a set of formulas o Model of a set of formulas o Logical consequence o Conjunctive normal form and disjunctive normal form o Prenex normal form o Skolem form o Clausal form

ÿ Herbrand's universe

ÿ Herbrand interpretation (H-interpretation) ÿ Semantic tree

• Proof theory o Introduction to proof theory in predicate calculus o Resolution in predicate calculus o Substitution o Composition of substitutions o Unification o Principle of resolution o Consistency and completeness of resolution in predicate calculus o The resolution strategies

PERSONAL WORKS:

KNOWLEDGE CONTROL PROCEDURES

• Three short checks (30 minutes) • A final check of medium duration: 2 hours • A participation note

BIBLIOGRAPHY

• Chang, Char-Tung Lee., “Symbolic Logic and Mechanical Theorem Proving”, Academic Press, Inc. 1973.

• Kleene, “Mathematical Logic”, Collection U, 1973. • Mendelson. D., “Introduction to Mathematical Logic”, Van Nostrand Company. 1979.

UEF 8.3 – OPTICS AND ELECTROMAGNETIC WAVES

EU code	Module title	Credits
UEF 8.3	OPTICS AND ELECTROMAGNETIC WAVES	3

Hourly volumes				
Course	TD	TP	other (explain, list,)	TOTAL
15	30			45h

Semester :	4

Prerequisites:	

GOALS :

MODULE CONTENT:

I. GEOMETRIC OPTICS (20h) • General

• Light beam and ray • Objects, real and virtual images • Principle of rectilinear propagation of light • Principle of inverse return of light • Snell-Descartes laws • Fermat's principle • Plane mirrors • Dioptres: planes, spherical, blades with parallel faces, prisms • Thin lenses: converging and diverging • Eye

II. ELECTROMAGNETIC WAVES (25h) •

Mathematical reminders: grad, div, rot, Laplacian, … • Maxwell's equations • Static electromagnetic field ÿ Electric field ÿ Gauss's theorem: differential and integral form ÿ Magnetic field ÿ Ampère's theorem • Variable electromagnetic field

ÿ Faraday's law: integral and differential forms - Lenz's law

ÿ Generalized Ampère's law • Maxwell's equations in vacuum • Electromagnetic waves ÿ Plane waves, sinusoidal plane waves ÿ Propagation of energy: Pointig vector • Reflection and refraction of electromagnetic waves

ÿ Dielectric-dielectric, dielectric-conductor interface • Interference and diffraction

PERSONAL WORKS:

KNOWLEDGE CONTROL PROCEDURES

• Two short-term checks (30 mins) • A final check of medium duration: 2 hours • A participation note • A practical work

UEM 3.1 – MULTIDISCIPLINARY PROJECT

EU Code	Module title	Credits 4
EMU 3.1	MULTIDISCIPLINARY PROJECT (PRJP)	

Hourly volumes				
Course	TD / TP	TP	Other (specify) TOTAL	60 h.
	60 hrs.			

Semester :	2 (The duration of the project is three (3) months and it runs from mid-February to mid-May)

Prerequisites: ALDS, ALDD, SYST1, SYST2, SFSD,

GOALS :

The project takes place during the second semester of the second year. It consists of the design and implementation of a computer project that takes place under the same conditions as those of a company. It is described through precise specifications and can relate to a wide variety of themes. It is offered by one or more teachers who play the role of “client” and it must cover at least two disciplines. He is supervised by a teacher who can be the “client” at the same time.

The project group, made up of a minimum of 4 students and a maximum of 6, depending on the size of the project and under the responsibility of a project manager appointed from among the members of the group, must behave like a real team. In addition to the technical content, which will consist of the application of the knowledge acquired for the implementation of the development cycle of a small piece of software, the emphasis will be placed on the acquisition and application of the organizational and relational aspects between the members. of the group, the supervisor and the "client": • analysis and breakdown of the work, • distribution of the workload between the members of the group by the project manager, • circulation of information between the members of the group, • implementation of a work schedule, • weekly presentation of the progress of the project, • delivery of the deliverables fixed in the project file, • drafting of a final report • and presentation of the work carried out.

MODULE CONTENT:

The project must comply with the standard outline of specifications for CPI projects.

PROJECT EVALUATION PROCEDURES

The evaluation of the project will be in the form of a score out of twenty and based on the following criteria:

- A continuous working note which will be given by the supervisor at each session. It can be an overall mark attributed to the team or individually in case the supervisor finds that the volume of work provided by the members is uneven. This note will, in a way, validate the objectives set for each week,
- A note of the final product: software and manual(s) for maintenance and use given by the "customer" and the supervisor
- A note from the project report given by the supervisor • A note from the presentation given by a jury composed of at least the “client” and the supervisor

Project score calculation formula	
Evaluation element	**Coefficient.**
continuous work	4
final product: software and source code	4
Installation instructions	1
Instructions for use	1
defense	3
report	2
Average = (ÿ (assessment element * coeff) / ÿ coeff) rounded up to the upper half point	

RECOMMENDATIONS: The project must be seen differently from a practical work, both by the students and by the supervisor and the “client”. It is not only used to implement the theoretical and practical knowledge acquired but also to create the conditions for a real project in a professional environment which will highlight and/or develop the qualities necessary for any engineer:

- Responsibility. Each member must feel responsible for the work he must accomplish and realize that any breach, negligence or failure will have repercussions on himself and on the whole group,
- Compliance with work schedules. Once the work schedule has been decided, compliance with it becomes a requirement, because any delay has a financial cost but also undermines the credibility and seriousness of the entity in charge of the project. In a fiercely competitive world, the market will always be entrusted to the competitor, who is cheaper and more credible. Of course, the schedule will often be readjusted, but you have to keep an eye on the critical path. If it is affected, it is necessary to measure its impact and immediately take the necessary corrective measures,
- Versatility. We must avoid specialization, participate in the tasks of analysis and design, production, writing, planning, preparation of the presentation, of the presentation itself... if a task seems difficult or uninteresting, on the contrary, take advantage of this opportunity and confront it! engineers who have this ability to adapt are the most sought after in the world of work,
- Collaborative work. Group members should change their ideas, knowledge, know-how, documentation, tools between them. We must not confine ourselves only to the tasks that have been assigned. The success of the project must be a collective objective. It is necessary to use collaborative work tools whenever possible,
- Communication. The relationships between the members of the group, with the supervisor and the "client" are essential. They must be cordial whatever the situation.

  Conflicts must be dealt with very quickly. Apart from the scheduled weekly sessions, very short work sessions must be organized to exchange ideas, identify any problems, find solutions to them and make personal and global verbal assessments concerning the project. Give constructive criticism, practice self-criticism and tolerance, the fundamental basis of human relations.

It is strongly recommended that the defenses take place during the second half of May and before the end of year exams.

Special attention should be devoted to plagiarism!!
Any plagiarism, which consists of the appropriation of the work of others (idea, text, drawing, data, images, etc.) will be penalized by a zero score for the project.

To avoid plagiarism, the following simple rules are recommended: 1. if you copy a text entirely, do not forget to put the text between quotation marks and add a bibliographic reference at the end of this text,

2. if you carry out a reformulation of the initial text, add only a bibliographical reference at the end of your text, 3. integrate at the end of your document a page in which you will note all your bibliographical references by completing them (nature of the source, author, title, page, publisher, year of publication)

4. Sometimes copying is prohibited, but all you have to do is request authorization from an author, a company or any organization. Do it and in case of refusal, respect this decision.

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BIBLIOGRAPHY

UEM 4.1 - PROBABILITY AND STATISTICS 2

EU Code	Module title	Credits
EMU 4.1	PROBABILITIES AND STATISTICS 2	4

Hourly volumes				
30h	TD	TD/ TP	other (explain, list,)	TOTAL
lesson	30 hrs.			60 hrs.

Semester :	4

Prerequisites: S1, S2 and S3 (analysis, algebra and UEM2.2)

GOALS :

- Part A will allow the student to be well equipped to approach other notions and themes of probabilities and more in-depth statistics.
- Part (B) introduces inductive statistics which, thanks to the assimilation of observations experimental to the theoretical laws and the application of the tests, provides elements of decision.

MODULE CONTENT:

Part (A): •

1: Properties of expectation (07h30 lesson and 06h tutorial)

• Introduction

• Expectation of a sum of random variables • Covariance, sum variance, correlation • Conditional expectation • Conditional expectation and prediction

• Moment generating functions • Other properties of normal random variables • 2: Convergence (0430h lecture and 06h TD) •

Inequalities , convergence in probability, weak law of large numbers, convergence in law, central limit theorem, approximations

Part (B): Inferential Statistics

1: Sampling theory (04h30 lesson and 04h30 tutorial)

2: Estimate (4:30 a.m. lesson and 4:30 a.m. tutorial)

3: Tests (04:30 lessons and 04:30 tutorials)

Selected Probability Topics (9h) • Statistical Survey • Survey Techniques

• Poisson Processes • Markov Chains

• Surprise, uncertainty, entropy

• Coding theory and entropy • Simulation……..

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PERSONAL WORK: The chosen themes of probabilities will be treated in the second semester in the form of practical work, presentations…

KNOWLEDGE CONTROL PROCEDURES

1 control + 1 note of participation or interrogation in TD + 1 note of personal work.

RECOMMENDATIONS : •

During the second semester, selected topics of probability will be offered to students in the form of personal work (TP, presentations, etc.)

• It is recommended to use the video projector for the course and to distribute course material or handouts.

BIBLIOGRAPHY

- Descriptive statistics, Bernard PY, Economica 1991

- Probability and statistics, Jacqueline FOURASTIE and Benjamin SAHLER,

J Quinet series, DUNOD 1981 edition

- Probability and statistics course, Christian LEBOEUF, Jean-louis ROQUE and Jean GUEGAND

Ellipses-Marketing 1983

- Probabilities, statistics and surveys, J.GENET, G.PUPION and M.REPUSSARD

Vuibert 1974

UET 4.1 – ENGLISH 3

EU Code	Module title	Credits
UET 4.1	ENGLISH 3	2

Hourly volumes				
30 hour	TD / TP	TP	other (explain, list,)	TOTAL
lesson .				

Semester :	4

Prerequisites:	English2

OBJECTIVES:

The chapter 1, 2 focus on structure of a sentence and extra practice in translating technical texts.

MODULE CONTENT:

- The study of tenses (Conjugation review)
  - Present simple, continuous, perfect;
  - Pastsimple, continuous, perfect;
  - Future simple, continuous, perfect;
  - The concept of Futurity.
- The Voice
  - Active Vs Passive Voice
- Study of texts for the appropriation of vocabulary specific to the field of computing.

PERSONAL WORKS:

KNOWLEDGE CONTROL PROCEDURES

Knowledge check: written test + oral test + quiz

RECOMMENDATIONS :

• If possible laboratory. •
The courses will be carried out in the form of TDs

BIBLIOGRAPHY

• “Natural English, upper intermediate student book”, Oxford university press, 2003 •
“Oxford advanced learner's dictionary, Oxford university press, 2000 •
Santiago esters, “English for computer uses”,

• Raymond-Murphy, “English grammar in use