

**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**

Master

الجمهورية الجزائرية الديمقراطية الشعبية

وزارة التعليم العالي والبحث العلمي

دفتـر الشـروط

لتجديد تكوين ذات تسجيل وطني

ماسـتر

## **Fiche d'organisation semestrielle des enseignements**

## Semestre 1:

| Unités<br>d'enseignement   | Matières                            | Crédits   | Coefficient | Volume horaire<br>hebdomadaire |            |          | VHS<br>(14-16<br>semaines) | Autre* | Mode d'évaluation   |        |
|--|-------------------------------------|-----------|-------------|--------------------------------|------------|----------|----------------------------|--------|---------------------|--------|
|  | Intitulé                            |           |             | Cours                          | TD         | TP       |                            |        | Contrôle<br>Continu | Examen |
| <b>UE Fondamentale</b><br><b>Code : UEF 1.1</b><br><b>Crédits :</b><br><b>Coefficients :</b>   | Probabilities and Statistics        | 6         | 4           | 3.0                            | 1.5        | 0.0      | 67.5                       |        | 40%                 | 60%    |
|  | Advanced Mathematics                | 6         | 4           | 3.0                            | 1.5        | 0.0      | 67.5                       |        | 40%                 | 60%    |
|  | Advanced Programming                | 6         | 4           | 3.0                            | 1.5        | 0.0      | 67.5                       |        | 40%                 | 60%    |
| <b>UE Fondamentale</b><br><b>Code : UEF 2.1</b><br><b>Crédits :</b><br><b>Coefficients :</b>   | Advanced Digital Systems            | 6         | 4           | 3.0                            | 0.0        | 0.0      | 45                         |        | 40%                 | 60%    |
| <b>UE Méthodologique</b><br><b>Code : UEM 1.1</b><br><b>Crédits :</b><br><b>Coefficients :</b> | Advanced Programming Laboratory     | 3         | 2           | 0.0                            | 0.0        | 3.0      | 45                         |        | 100%                |        |
|  | Advanced Digital Systems Laboratory | 3         | 2           | 0.0                            | 0.0        | 3.0      | 45                         |        | 100%                |        |
| <b>Total semestre 1</b>  |                                     | <b>30</b> | <b>20</b>   | <b>12</b>                      | <b>4.5</b> | <b>6</b> | <b>337.5</b>               |        |                     |        |

\*Autres travaux supplémentaires

## Semestre 2:

| Unités<br>d'enseignement   | Matières                                  | Crédits   | Coefficient | Volume horaire<br>hebdomadaire |            |            | VHS<br>(14-16<br>semaines) | Autre* | Mode d'évaluation   |        |
|--|---|-----------|-------------|--------------------------------|------------|------------|----------------------------|--------|---------------------|--------|
|  | Intitulé                                  |           |             | Cours                          | TD         | TP         |                            |        | Contrôle<br>Continu | Examen |
| <b>UE Fondamentale</b><br><b>Code : UEF 2.1</b><br><b>Crédits :</b><br><b>Coefficients :</b>   | Advanced IC's                             | 6         | 4           | 3.0                            | 0.0        | 0.0        | 45                         |        | 40%                 | 60%    |
|  | Numerical Methods                         | 4         | 3           | 3.0                            | 0.0        | 0.0        | 45                         |        | 40%                 | 60%    |
| <b>UE Fondamentale</b><br><b>Code : UEF 2.2</b><br><b>Crédits :</b><br><b>Coefficients :</b>   | Data Structures and Algorithms            | 6         | 4           | 3.0                            | 1.5        | 0.0        | 67.5                       |        | 40%                 | 60%    |
|  | Operating Systems                         | 6         | 4           | 3.0                            | 0.0        | 0.0        | 45                         |        | 40%                 | 60%    |
| <b>UE Méthodologique</b><br><b>Code : UEM 2.1</b><br><b>Crédits :</b><br><b>Coefficients :</b> | Numerical Methods Laboratory              | 2         | 1           | 0.0                            | 0.0        | 1.5        | 22.5                       |        | 100%                |        |
|  | Advanced IC's Laboratory                  | 2         | 1           | 0.0                            | 0.0        | 1.5        | 22.5                       |        | 100%                |        |
|  | Data Structures and Algorithms Laboratory | 2         | 1.5         | 0.0                            | 0.0        | 3.0        | 45                         |        | 100%                |        |
|  | Operating Systems Laboratory              | 2         | 1.5         | 0.0                            | 0.0        | 1.5        | 22.5                       |        | 100%                |        |
| <b>Total semestre 2</b>  |   | <b>20</b> | <b>20</b>   | <b>12</b>                      | <b>1.5</b> | <b>7.5</b> | <b>315</b>                 |        |                     |        |

\*Autres travaux supplémentaires

### Semestre 3:

| Unités d'enseignement   | Matières                                    | Crédits   | Coefficient | Volume horaire hebdomadaire |            |            | VHS<br>(14-16 semaines) | Autre* | Mode d'évaluation |        |
|---|---|-----------|-------------|-----------------------------|------------|------------|-------------------------|--------|-------------------|--------|
|   | Intitulé                                    |           |             | Cours                       | TD         | TP         |                         |        | Contrôle Continu  | Examen |
| <b>UE Fondamentale</b><br>Code : UEF 3.1<br>Crédits :<br>Coefficients :   | Embedded Systems                            | 6         | 4           | 3.0                         | 0.0        | 0.0        | 45                      |        |                   |        |
|   | Digital Signal Processing with Applications | 6         | 4           | 3.0                         | 0.0        | 0.0        | 45                      |        |                   |        |
| <b>UE Fondamentale</b><br>Code : UEF 3.2<br>Crédits :<br>Coefficients :   | Computer Networks                           | 6         | 4           | 3.0                         | 0.0        | 0.0        | 45                      |        |                   |        |
|   | Programming Languages                       | 6         | 4           | 3.0                         | 1.5        | 0.0        | 67.5                    |        |                   |        |
| <b>UE Méthodologique</b><br>Code : UEM 3.1<br>Crédits :<br>Coefficients : | Embedded Systems Laboratory                 | 1.5       | 1           | 0.0                         | 0.0        | 1.5        | 22.5                    |        |                   |        |
|   | Digital Signal Processing Laboratory        | 1.5       | 1           | 0.0                         | 0.0        | 1.5        | 22.5                    |        |                   |        |
|   | Computer Networks Laboratory                | 1.5       | 1           | 0.0                         | 0.0        | 1.5        | 22.5                    |        |                   |        |
| <b>UE Transversale</b><br>Code : UET 3.1<br>Crédits :<br>Coefficients :   | Introduction to UML                         | 1.5       | 1.5         | 1.5                         | 0.0        | 0.0        | 22.5                    |        |                   |        |
| <b>Total semestre 2</b>   |   | <b>30</b> | <b>20.5</b> | <b>13.5</b>                 | <b>1.5</b> | <b>4.5</b> | <b>292.5</b>            |        |                   |        |

\*Autres travaux supplémentaires

#### Semestre 4 :

Stage en entreprise sanctionné par un mémoire et une soutenance.

|                               | <b>VHS</b> | <b>Coeff</b> | <b>Crédits</b> |
|-------------------------------|------------|--------------|----------------|
| <b>Projet de fin d'Etudes</b> | 560        | 16           | 24             |
| <b>Communication skills</b>   | 40         | 2            | 3              |
| <b>Project management</b>     | 40         | 2            | 3              |
| <b>Total Semestre 4</b>       | 640        | 20           | 30             |

En plus du travail personnel, la matière intitulée *Projet de Fin d'Etudes* peut renfermer un stage en entreprise et/ou la participation à des séminaires. Elle est sanctionnée par un mémoire et une soutenance.

**Programme détaillé par matière**  
(1 fiche détaillée par matière)



**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Probability and Statistics**

**Semestre : 1**

**Enseignant responsable de l'UE : Mohamed KHALIFA**

**Enseignant responsable de la matière: KHELIFATTI Sadek, HAMOUDI Imane**

**Objectifs de l'enseignement**

Knowledge of basic notions of probabilities, how to deal with the random variables, different types of distributions and solving probability problems by choosing the right corresponding distribution.

**Connaissances préalables recommandées :**

- Basic notions of mathematics, computing single and double integrals.

**Contenu de la matière :**

- I. Review of Set Theory
- II. Combinatorial Analysis
- III. Probability Definitions
- IV. Random Variables, Random Vectors
- V. Some Probability Models
- VI. Limit laws: The Central Limit Theorem
- VII. Introduction to Statistics
  - Estimation of Means, Variance, Proportion, Confidence Intervals
  - Introduction to Hypothesis Testing
  - Linear Regression.

**Mode d'évaluation :** control continu+ travail personnel

**Références :**

1. Probability and Statistics, A. Papouts, R. GauHill, 1990.
2. The Art of Probability for Scientists and Engineers. Richard W. Hamming. Addison-Wesley, 1991.
3. Probability, Random Variables and Stochastic Processes, A. Papoulis, 3rd Edition, McGraw-Hill, 1991.

**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Advanced Mathematics.**

**Semestre : 1**

**Objectifs de l'enseignement :**

Développer les concepts de base acquis en algèbre linéaire. Acquérir des concepts avancés utiles dans l'analyse et la conception.

**Connaissances préalables recommandées :**

Un cours de base en analyse  
Un cours de base en algèbre linéaire.

**Contenu de la matière :**

Review of vector spaces and linear mappings

- 1- Review of vector spaces and linear mappings
- 2- Orthogonality.
- 3- Positive definiteness
- 4- Computations with matrices (norm, condition number, eigenpairs, linear equations, least squares problem, etc.)
- 5- Matrix decompositions.
- 6- Singular Value decomposition and the Moore-Penrose inverse.
- 7- Systems of linear differential equations.

**Mode d'évaluation :** control continu+ travail personnel.

**Références**

- 1- Gilbert Strang, *Linear Algebra and its Applications.*
- 2- Steven Roman, *Advanced Linear Algebra*
- 3- R.L. Finney, D.R. Ostberg, R.G. Kuller, *Elementary Differential Equations with Linear Algebra.*

**Intitulé du Master :** Ingénierie Informatique  
**Intitulé de la Matière :** Advanced Programming.

**Semestre :** 1

### **Objectifs de l'enseignement.**

This course will focus on the study in some depth of the programming language Java. At the of the semester the student will grasp the powerful features of Java, such as encapsulation, inheritance, interface, polymorphism, generics, collections etc.

### **Connaissances préalables recommandées.**

Programming I

### **Contenu de la matière :**

1. Main Features of Object Oriented Programming Languages.
2. An Overview of Java.
3. Introduction to Classes.
4. In-depth Study of Classes. Inheritance.
5. Packages and Interfaces.
6. Exceptions and Multi-Threadings.
7. I/O and Applet Interfaces.
8. Generics.
9. The API Library.

**Mode d'évaluation :** Contrôle continu +Examen final

### **Références**

1. H. Schildt. *Java, a beginner's guide*. Mc Graw Hill, 2005
2. H. Schildt. *Java cookbook*. Mc Graw Hill 2008
3. H. Deitel. *Java for programmers*. Pearson Education 2012

## **Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière :** Advanced Digital systems

**Semestre : 1**

### **Objectifs de l'enseignement :**

*To be competent in designing complex digital systems using VHDL and their Implementation in FPGAs.*

### **Connaissances préalables recommandées :**

Digital Systems Design with VHDL I and II (EE221 & EE222)  
Computer Architecture.

### **Contenu de la matière :**

1. Review of logic design fundamentals.
2. Structural design modeling.
3. Design, optimization and synthesis of FSM using VHDL.
4. Advanced topics in VHDL.
5. Advanced LPMs.
6. Register files in VHDL.
7. Design & synthesis of datapath controllers with VHDL .
8. Programmable logic devices.
9. FPGA Architecture and technologies.

**Mode d'évaluation :** control continu+ examen final

### **Références :**

1. Digital Systems Design Using VHDL by Charles Roth, 1998 (ISBN 0-534-95099)
2. Digital Systems Design with FPGAs by Ion Grout, 2008 (ISBN 978-0-7506-8397-5)

## **Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière :** Advanced Programming Laboratory

**Semestre : 1**

### **Objectifs de l'enseignement :**

Implementation of the different features (encapsulation, inheritance, polymorphism, multi-threading etc.) of the java programming language.

### **Connaissances préalables recommandées :**

A first course in a programming language like C.

### **Contenu de la matière :**

1. Writing, Compiling and executing a Java Program.
2. Working with Classes, Objects and Methods.
3. More on Classes, Objects and Methods.
4. Working with Inheritance, Interfaces and Packages.
5. Working with the Class String.
6. Working with Threads.
7. Working with the Interface Collection.

**Mode d'évaluation :** control continu

### **Références :**

1. H. Schildt. *Java, a beginner's guide*. Mc Graw Hill, 2005
2. H. Schildt. *Java cookbook*. Mc Graw Hill 2008
3. H. Deitel. *Java for programmers*. Pearson Education 2012

## **Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière :** Advanced Digital Systems Laboratory

**Semestre : 1**

### **Objectifs de l'enseignement :**

Get hands on experiments on advanced topics in digital systems using VHDL and the DE2 board.

### **Connaissances préalables recommandées :**

Digital Systems Design using VHDL I and II (EE221 & EE222)  
Computer Architecture.

### **Contenu de la matière :**

- 1- Design and implementation of Structural model application
- 2- Implementation of FSMs
- 3- Implementation of Datapath controllers
- 4- Implementation of an LSI controller (such as UART, PIO, PPI, ...)
- 5- Implementation of a digital systems using Megafunctions

**Mode d'évaluation :** contrôle continu

### **Références**

The Altera DE2 Development Board.

## **Intitulé du Master : Ingénierie Informatique**

### **Intitulé de la Matière : Advanced IC's**

**Semestre : 2**

#### **Objectifs de l'enseignement :**

Present state-of-the-art digital integrated circuits and their applications.

#### **Connaissances préalables recommandées :**

Digital Systems Design with VHDL I and II (EE221 & EE222)

Computer Architecture

Microprocessor Systems design

#### **Contenu de la matière :**

- Interfacing the  $\mu$ P to the outside world.
- Different Address decoding techniques
- Intel (Motorola, Zilog) LSI I/O Controllers
- The Programmable Peripheral Interface (PPI) 8522
- The programmable Interval Time/Counter (PIT) 8254.
- The Keyboard/Display Controller 8279
- The UART 8251
- Designing  $\mu$ P based systems
- SoPC Based design approach

**Mode d'évaluation :** Control continu+ examen final .

**Références** (*Livres et photocopiés, sites internet, etc*).

- 1- The Z80 microprocessor GAONKAR, 2001

## **Intitulé du Master : Ingénierie Informatique**

### **Intitulé de la Matière : Numerical Methods**

### **Semestre : 2**

#### **Objectifs de l'enseignement :**

The goal of this course is to implement by using a programming language like C, the different numerical methods, such as solving the equation  $f(x) = 0$ , solving a system of linear and non linear equations, computing numerically the integral of functions, approximating a function by a polynomial etc.

#### **Connaissances préalables recommandées :**

Linear Algebra

Calculus.

#### **Contenu de la matière :**

1. Introduction: Mathematical Preliminaries and Errors Analysis.
2. Solutions of Equations of one and a system of non linear equations.
3. Linear Algebraic Methods..
4. Numerical Methods.
5. Interpolation and Polynomial Approximation.
6. Numerical Solution of Initial-Value Problems.
7. Approximating Eigen Values.

**Mode d'évaluation :** control continu+ examen final

#### **References :**

1. H.M. Antia. *Numerical Method for Scientists and Engineers*. Mc Graw Hill, 1995.
2. W. Dos Passos. *Numerical Methods, Algorithms and Tools*. Taylor and Francis Group, 2010
3. Numerical Methods. *Faires & Burns*. 2002.



**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Data Structures and Algorithms.**

**Semestre : 2**

**Objectifs de l'enseignement :**

The aim of this course is make the student understand how to organize computer data in such a way that it can be accessed and processed efficiently.

**Connaissances préalables recommandées :**

A first course in a programming Language like C.

A first course on calculus

Familiarity with some counting techniques

**Contenu de la matière :**

1. Design and Analysis of Algorithms.
2. The Abstract Data Type List.
3. The Abstract Data Type Tree
4. Directed Graphs
5. Undirected Graphs.
6. Sorting (simple sorting algorithms, merge sort, heap sort, bin sort).

**Mode d'évaluation :** control continu+ examen final

**References:**

1. Aho, Hopcroft, Ullman. *Data Structures and Algorithms*. Addison-Wesley, 1983.
2. Brassard, Bratley. *Fundamentals of Algorithmics*. Prentice Hall, 1993.
3. Cormen, Leiserson, Rivest, Stein. *Introduction to Algorithms*. MIT Press, 2001
4. Horowitz, Sahni, Rajasekaran. *Computer Algorithms*. Computer Science Press, 1998

**Intitulé du Master :** Ingénierie Informatique.

**Intitulé de la Matière :** Operating Systems.

**Semestre :** 2

**Objectifs de l'enseignement :** The aim of this course is to show how a Software Package called an Operating System manages the many different resources of a Computer System ( Processors, Memory, I/O, Secondary Storage etc.).

**Connaissances préalables recommandées :**

Programming 1 course, Computer Architecture course and Data structures and Algorithm Course are all pre-requisite.

**Contenu de la matière :**

- 1- Introduction: Definition of an OS, Types of OS, Fundamental Concepts of an OS.
- 2- Processes and Threads: Process and Thread Implementations, Inter Process Communications, Mutual Exclusion Problem Solutions (Busy Waiting, semaphores etc.), Process and Thread Implementations
- 3- Memory Management: Memory Abstractions, Virtual Memory, Segmentation, Segmentation with Paging.
- 4- File Systems: Files, Directories, File System Implementation, Examples of File Systems.
- 5- Input/Output Management: I/O HW, I/O SW, Clocks, User Interfaces (Keyboard, Mouse, Monitor).
- 6- .DeadLocks: Resources, Deadlock Conditions, Deadlock Detection and Recovery , Deadlock Avoidance, Deadlock Prevention.

**Mode d'évaluation :** control continu +examen final

**Références**

1. A. Shilberschatz, P. Galvin, G. Gagne, *Operating Systems Concepts*. Prentice Hall  
2008.
2. W. Stallings, *Operating Systems Concepts. Internals and Design Principles*. John Wiley  
& Sons, 2005
3. A. Tanenbaum, *Modern Operating Systems*. Pearson 2009

**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Numerical Methods Laboratory.**

**Semestre : 2**

**Objectifs de l'enseignement :**

Using C or Java as the programming language of choice, the student will learn how to implement the different numerical methods covered in the lectures.

**Connaissances préalables recommandées :**

Elementary Calculus  
Elementary Linear Algebra

**Contenu de la matière**

1. Implementation of the Bisection method, the Incremental method and Newton's method to solve the non linear equation  $f(x) = 0$ .
2. Implementation of Gauss elimination algorithm to solve a system of linear equations
3. Implementation of Jacobi's Gauss Siedel's algorithm to solve a system of linear equations.
4. Implementation of Lagrange polynomial for function interpolation
5. Implementation of Simpson's formula and Romberg's formula to numerically compute the integral of a function.
5. Implementation of Taylor's and Runge Kutta's algorithm to solve

**Mode d'évaluation : controle continu**

**Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière : Advanced IC's Laboratory**

**Semestre : 2**

**Objectifs de l'enseignement :**

Get hands on experiment using state-of-the-art digital integrated circuits

**Connaissances préalables recommandées :**

1. Digital Systems Design with VHDL I and II (EE221 & EE222)
2. Computer Architecture
3. Microprocessor Systems design

**Contenu de la matière :**

1. Implementation of the Z80 interrupt modes 0, 1 and 2
2. The PPI 8255 and applications
3. The 8254 and applications
4. The 8279 and applications ( keyboard and 7-seg display control)
5. The 8251 UART
6. Introduction to the SoPC based design using the DE2 board and Quartus II

**Mode d'évaluation : contrôle continu**

**Références**

1. The Z80 microprocessor GAONKAR, 2001
2. The Altera DE2 Board

## **Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière :** Data Structures and Algorithms Laboratory

**Semestre : 2**

### **Objectifs de l'enseignement :**

This is a companion course to the Data Structures and Algorithms course. Using a Programming Language such as C++ or Java, the student will learn how to implement the variety of different Data Structures and the Operations on these Data both elegantly and efficiently.

### **Connaissances préalables recommandées :**

A first course in a programming Language like C.

A first course on calculus

Familiarity with some counting techniques

### **Contenu de la matière :**

1. Comparing the running times of Algorithms.
2. Array and Pointer Implementation of General Lists.
3. Array and Pointer Implementation of Binary Trees.
4. Implementation of Depth First Search for Digraphs.
5. Implementation of Depth First Search for graphs.
6. Implementation of Dijkstra's Algorithm.
7. Implementation of Floyd Warshall's Algorithm.
8. Implementation of Merge Sort, Heap Sort and Bin Sort Algorithm.

**Mode d'évaluation :** control continu+ examen final

### **Références**

1. Aho, Hopcroft and Ullman. *Data Structures and Algorithms*. Addison-Wesley, 1983
2. Brassard, Bratley. *Fundamentals of Algorithms*. Prentice Hall, 1993
3. Cormen, Liserson, Rivest, Stein. *Introduction to Algorithms*. MIT Press, 2001
4. Horowitz, Sahni, Rajasekaran. *Computer Algorithms*. Computer Science Press, 1998

**Intitulé du Master : Ingénierie Informatique**  
**Intitulé du la Matière : Operating Systems Laboratory.**

**Semestre : 2**

**Objectifs de l'enseignement :** This is a companion course to the Operating Systems Course offered in the same semester. The main objective is to show to the students how System Calls are implemented By the Unix OS.

**Connaissances préalables recommandées :**

Programming 1, Computer Architecture and Data structures and Algorithm Courses are all pre-requisite.

**Contenu de la matière**

1. Working with Processes.
2. Working with Pipes.
3. Working with Files.
4. Working with Memory.
5. Working with I/O.

**Mode d'évaluation :** controle continu

**Références**

1. R. Card, E. D Dumas, F. Mével. *The Linux Kerne Book*. Wiley and Sons 2000
2. M. Dlvy. *Unix et les systèmes d'exploitation*. Dunod 2002

## **Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière : Embedded Systems.**

**Semestre : 3**

### **Objectifs de l'enseignement :**

Ce cours est axé principalement sur l'aspect logiciel/matériel des systèmes embarqués afin de s'appuyer sur les connaissances informatiques (à la fois logicielles et architecturales) de l'élève. Du point de vue électronique, l'accent est mis sur l'aspect système et plus particulièrement sur les systèmes programmables tel que les microcontrôleurs sur puces programmables tel que les FPGAs(System-On-Chip : SoPC).

### **Connaissances préalables recommandées :**

Advanced Digital Systems.

### **Contenu de la matière**

Introduction aux systèmes embarqués et aux SoC.

- Généralités
  - o Les systèmes considérés
  - o Le développement de tels systèmes
- Systèmes d'exploitation et contraintes temps réel.
- Réseau de capteur sans fil.

✓ Part 1 : Architecture microcontrôleurs et leur programmation ( $\mu$ contrôleur 68HC12 et PIC serie 18F258 pour les TPs).

- Processeur
- Mémoire
- Périphériques
- Bus de communication
- Entrées / Sorties

✓ Part 2: FPGA based SoPC using Altera's DE2 Kits.

- The Altera's SOPC Builder software.
- The Nios II processor on an Altera FPGA device.
- Blocs IP (Intellectual Properties) et notion de réutilisabilité.

**Mode d'évaluation :** controle continu +examen final

### **Références**

(1) Patrick Kadionik, <http://kadionik.developpez.com/>, Systèmes embarqués (ENSEIRB)

(2) Andreas Savvide, Yale, EE460A, Networked Embedded Systems and Sensor Networks.

## **Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière :** Digital Signal Processing with Applications.

**Semestre : 3**

### **Objectifs de l'enseignement**

Provide the know-how for the implementation and optimization of computationally intensive signal processing algorithms in the TMS320C6416 DSP Processor.

### **Connaissances préalables recommandées :**

**Computer Architecture**

**Linear Systems II**

**Microprocessor Systems design**

**Advanced Integrated Circuits**

### **Contenu de la matière :**

- Introduction to DSP
- Architecture addressing modes, and instruction set of the TMS320C6416 processor
- FIR Filters
- IIR Filters
- FFT
- Adaptive Filters
- DSP Applications

**Mode d'évaluation :** Control continu+ examen final

### **Références**

Rulph. Chassaing. Digital Signal Processing and Applications with the C6713 and C6416 DSK, 2005, (ISBN 0-471-69007-4).



## **Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière** : Programming Languages Paradigms.

**Semestre** : 3

**Objectifs de l'enseignement** : The aim of this course is to help the student to understand Programming Languages by analyzing and contrasting Language Constructs. The goal is to learn how to analyze Languages rather than the peculiarities of any particular Language in depth.

**Connaissances préalables recommandées** :

Programming 1, Computer Architecture course and Data structures and Algorithm Courses are all pre-requisite.

### **Contenu de la matière**

1. Introduction: Different Types of Programming Languages and their Foundations (Imperative PL's, Object Oriented PL's, Functional PL's and Logic PL's).
2. Specifying Syntax: Backus Naur Form, Context Free Grammars, Parsing (Top-Down Parsing, Dealing with ambiguities).
3. Imperative Paradigm.
4. Object Oriented Paradigm: Objects and Classes, Encapsulation and Polymorphism and Single and Multiple Inheritance.
5. Logic Programming Paradigm: Syntax, first Order Logic, the Herbrand Universe, Unification, Resolution. Example of Prolog.
6. Functional Programming Languages: Computation Model, Evaluation. The  $\lambda$ -Calculus.

**Mode d'évaluation** : controle continu +examen final

### **Références**

1. M. Ben-Ari. *Understanding Programming Languages*, Wiley & Sons 2006.
2. M. Gabrielli S. Martini. *Programming Languages : Principles and Paradigms*. Springer 2006.
3. M. Lee. *Programming Languages : An Active Approach*. Pearson 2008.
4. R. Sebesta. *Concepts of Programming Languages*. Pearson 2005

**Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière : Computer Networks.**

**Semestre : 3**

### **Objectifs de l'enseignement :**

The goal of this course is to bring the student to understand thoroughly the Network Protocol mechanisms, the roles and functions of the Intermediate Equipments, such as routers and switches.

### **Connaissances préalables recommandées :**

The student should have an insight about numbering systems, basic numbering systems, basic boolean algebra and computer architecture.

### **Contenu de la matière**

1. Network basic introduction.
2. OSI and TCP/IP protocols models,
3. Routing techniques.
4. Switching techniques.
5. Wan overview.

**Mode d'évaluation :** controle continu +examen final

### **Références**

1. Cisco CCNA V4.1, *Official Exploration Course*. 2011-2012
2. A. Tanenbaum & al, *Computer Networks, 5<sup>th</sup> Edition*. Prentice Hall 2010

**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Embedded System Laboratory.**  
**Semestre : 3**

**Objectifs de l'enseignement :**

Get hands on experiment using a reconfigurable complex digital circuits

**Connaissances préalables recommandées :**

Advanced Digital Systems

**Contenu de la matière :**

TP1: Introduction to Altera's SoPC Builder software.  
TP2: A Simple Computer System  
TP3: Program-Controlled Input/Output  
TP4: Subroutines and Stacks  
TP5: Polling and Interrupts  
TP6: Bus Communication

**Références**

- (1) Patrick Kadionik, <http://kadionik.developpez.com/>, Systèmes embarqués (ENSEIRB)
- (2) Andreas Savvide, Yale, EE460A, Networked Embedded Systems and Sensor Networks.

**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Digital Signal Processing Laboratory.**  
**Semestre : 3**

**Objectifs de l'enseignement :**

Provide hands-on experiment of computationally intensive signal processing algorithms on the TMS320C6416 DSP processor.

**Connaissances préalables recommandées :**

Microprocessor Systems design  
Advanced Integrated Circuits

**Contenu de la matière :**

Familiarity with the CCS  
Audio signal sampling  
Design and implementation of FIR Filters  
Design and implementation of IIR Filters  
FFT implementation  
DSP Applications  
    Sinewave generation  
    PAM, etc

**Références**

TMS320C6416 DSK

**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Network Protocols Laboratory.**  
**Semestre : 3**

**Objectifs de l'enseignement :**

The Goal of this series of labs is to make sure the student will grasp the concepts of LANs, sub-networking and VLANs

**Connaissances préalables recommandées :**

None or course pre-requisites.

**Contenu de la matière :**

The labs will be implemented using one the two simulators : Packet Tracer V3.3.3 of Cisco Academy or GNS 3.x

1. Introduction to Packet Tracer and GNS3.
2. Router Configurations used in LANs.
3. Switch configuration used in LANs (VLAN configuration).
4. LANs interconnections (MANs or/and WANs).
5. Lab exam.

**Mode d'évaluation :** controle continu +examen final

**Références**

1. Cisco CCNA V4.1, *Official Exploration Course*. 2011-2012
2. A. Tanenbaum & al, *Computer Networks, 5<sup>th</sup> Edition*. Prentice Hall 2010

**Intitulé du Master : Ingénierie Informatique**

**Intitulé de la Matière : Introduction to UML**

**Semestre : 3**

**Enseignant responsable de la matière: KHALIFA Mohamed**

**Objectifs de l'enseignement :**

At the end of the course, the student using the UML formalism will be able to analyze and model simple as well as complex oriented object applications.

**Connaissances préalables recommandées :**

A good understanding of an object oriented programming (Java for example)

**Contenu de la matière :**

1. Diagram Overview.
2. Structure Diagram.
  - Class Diagram.
  - Component Diagram.
  - Object Diagram.
3. Behavior Diagram.
  - Use Case Diagram.
  - Interaction Diagram.
  - Activity Diagram.
  - State Machine Diagram.

**Mode d'évaluation :** contrôle continu +examen final

**Références**

1. S.W. Ambler. *Agile Model Development with UM*, Cambridge University 2004.
2. R.C. Martin . *UML for Java Programmers*, Prentice Hall 2003

**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Communications Skills**  
**Semestre : 4**

**Objectifs de l'enseignement :** This is a 'service English' communication course intended to prepare the students to communicate and function in English (Lab reports, Industrial experience reports and end of study cycle project reports). The course outline presented in this document is divided into two parts: a first part (first five units) which is considered as a link between the students' previous work in the previous semesters; and a second part consisting of eleven units which will present the students with discourse behaviours and discourse means to communicate and function in English. Other items are treated throughout the programme: mechanics of writing ( punctuation, numbering of chapters and sub-chapters, labelling of visuals, quotations...)

**Connaissances préalables recommandées :** None

**Contenu de la matière :**

a) Part Two

1. Transition from sentence production to the development of continuous prose
2. Devices for linking ideas and sentences: logical, grammatical and lexical connectors
3. Concepts of reference
4. Paragraph Development: Producing pieces of coherent discourse
5. Different types of paragraphs (analysis, description, comparison/contrast, analogy, definition ...)

b) Part Two

1. Definition: Explaining what something is
2. Instructions and Process: Explaining how to do something
3. Description of a Mechanism: Explaining how something works
4. Analysis through Classification and Partition: Putting things in order
5. Analysis through Effect and Cause: Answering Why
6. The Summary: Abstracting and Getting to the heart of the matter
7. Using the Library: Getting acquainted with resource materials
8. Visuals: Seeing is convincing
9. Report Writing: Telling it like it is
10. Oral Communication: Saying it clearly
11. Business Letters: Sending a Message through the mail

**Intitulé du Master : Ingénierie Informatique**  
**Intitulé de la Matière : Project Management**  
**Semestre : 4**

**Objectifs de l'enseignement :**

The objectives of this course are to provide a basic acquaintance with elementary concepts of production planning and organization in order to make sound production and management decisions.

**Connaissances préalables recommandées :**

*Introduction to Economics.*

**Contenu de la matière :**

- Background of production management
- Basic economic concepts
- Equipment and storage
- Procurement and storage
- Production planning and control
- Product design

**Mode d'évaluation :** controle continu +examen final

**Références**

1. *Harold Koontz and Cyril O'donnel, "Management, " 5<sup>th</sup> ed, Mc Graw Hill.*
2. *F. G. Moore and T. E. Henkel, , "Production/Operations Management, " 8<sup>th</sup> ed, Mc Graw Hill.*