# Canvas of compliance

# TRAINING OFFER
# L.M.D.

# ACADEMIC LICENSE

# 2015 - 2016

| Establishment | Faculty / Institut | Department |
|---|---|---|
| **University of Mohamed Khider – Biskra** | **Faculty of Sciences Exact and Sciences of Nature and Life** | **Computer science** |

| Domain | Sector | Specialty |
|---|---|---|
| **Mathematics and Computer science** | **Computer science** | **Computer science Systems** |

# الجمهورية الجزائرية الديمقراطية الشعبية

## وزارة التعليم العالي و البحث العلمي

# نموذج مطابقة

# عرض تكوين
# ل. م . د
# ليسانس أكاديمية

# 2015- 2016

| القسم | الكلية/ المعهد | المؤسسة |
|---|---|---|
| الاعلام الالي | كلية العلوم الدقيقة و علوم الطبيعة و الحياة | جامعة محمد خيضر بسكرة |

| التخصص | الفرع | الميدان |
|---|---|---|
| نظم المعلوماتية | الإعلام الآلي | الرياضيات و الإعلام الآلي |

**I – License identity form**

# 1 - Location of the formation :

**Faculty (or Institute) :** **Faculty of Exact Sciences and Natural and Life Sciences**
**Department : Computer sciences**

**References to the license authorization order (attach copy of the order)**

# 2- External partners
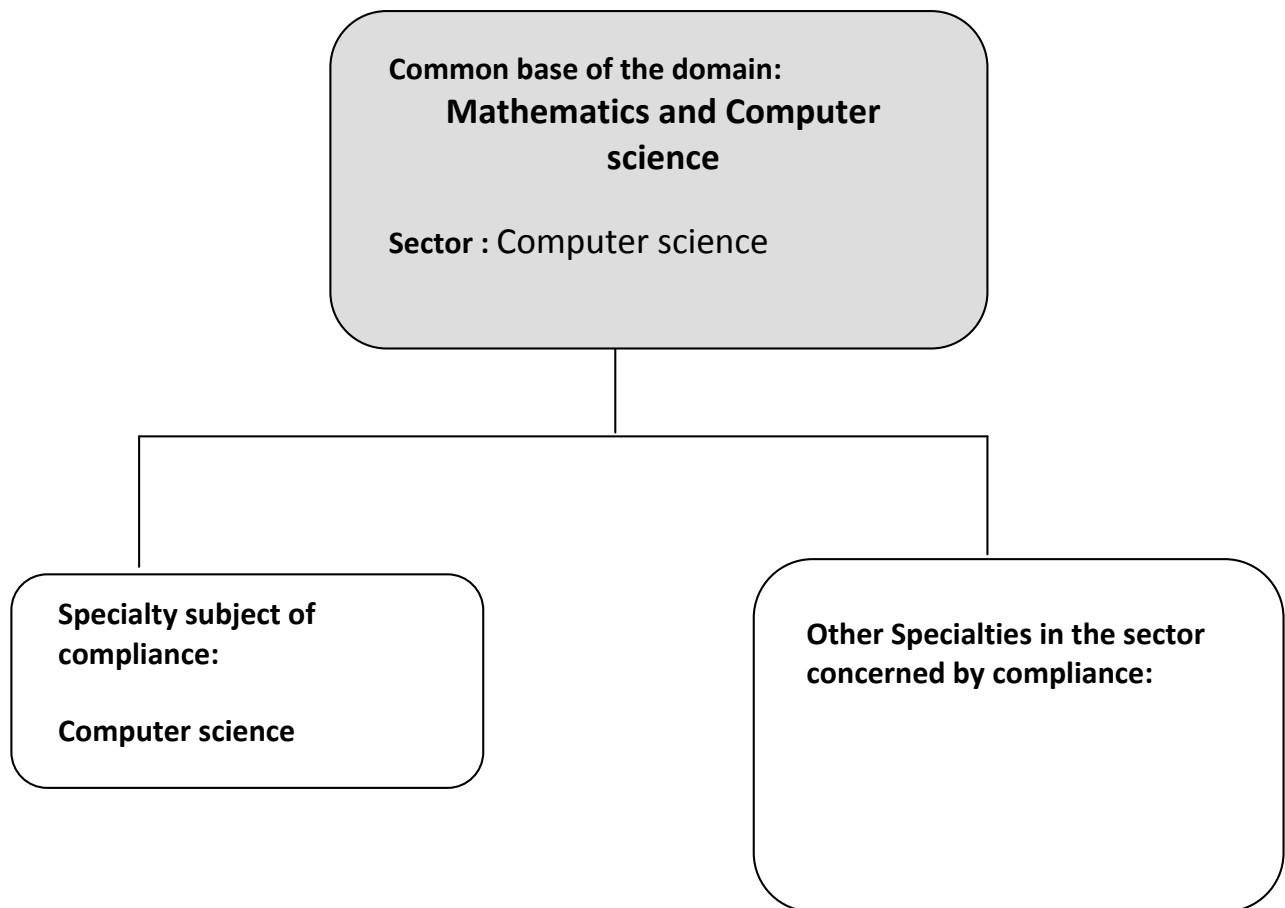
- other partner establishments:

- businesses and other socio-economic partners:

- International partners:

# 3 – Context and objectives of the formation

## A – General organization of the training: position of the project (obligatory field)

*If several licenses are offered or already supported at the establishment level (same formation team or other formation teams), indicate in the following diagram the position of this project in relation to other courses.*

**Common base of the domain:**
**Mathematics and Computer science**

**Sector :** Computer science

**Specialty subject of compliance:**

**Computer science**

**Other Specialties in the sector concerned by compliance:**

## B - Objectives of the formation (obligatory field)

*(Skills targeted, knowledge acquired at the end of the formation - maximum 20 lines)*

The academic degree in computer science (course: Computer Systems (IS)), has a general vocation, it allows the acquisition of solid basic formation in the main areas of computer science: algorithms, logic, languages, compilation, architecture ,....

It has a theoretical component and a practical component. These components are closely intertwined and refer to each other. Students will therefore be required to carry out significant work (programs, design of architectures and systems) and to pass theoretical exams.

The objective of the Academic Degree in Computer Science (course: Computer Systems (IS)) is to provide students with high-level instruction in computer science. For the computer scientist, familiarity with the abstract concepts underlying the technique has become essential: without it, his knowledge becomes obsolete after a few years. The sector is therefore intended to be generalist and fundamental to train students who will be able, throughout their professional lives, to adapt to the constant evolution of the discipline. Added to this aspect is the concern to meet the more immediate needs of the company. Thus, courses in operating systems and object programming and software engineering in the Bachelor's degree, and in networks, databases and information systems in the Master's degree, enable the acquisition of skills that are highly valued in the professional world.

## C – Profiles and targeted skills (obligatory field) *(maximum 20 lines)* :

The skills acquired at the end of the formation enable graduates:

1. access to Master's level IT formation .

2. the integration into the world of work of all fields of IT, the opportunities being numerous and interesting.

## D – Regional and national employability potential (obligatory field)

Employability at the regional or national level consists of the integration of graduates into the world of work in all areas of IT, where opportunities are numerous and interesting in all sectors: banks, administrations in various institutions, economic sector ,…

Business creation and IT stratup.

## E – Gateways to other specialties (obligatory field)

1. Bridges are possible between the Maths-Computer Science (MI) and possibly Sciences and Technologies (ST) majors.

2. Graduates can access the computer science master's degree.

## F – Performance indicators expected from the formation (obligatory field)
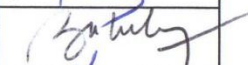(Viability criteria, success rate, employability, graduate monitoring, skills achieved …)
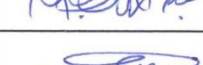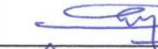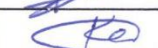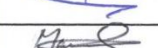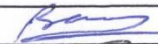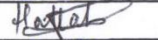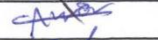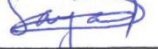
1. Monitoring of the sector and specialty manager

2. Educational Committee of department

3. Internships in companies.

# 4 – Moyens humains disponibles

## A : Capacité d'encadrement (exprimé en nombre d'étudiants qu'il est possible de prendre en charge) :
### 200 étudiants

## B : Equipe pédagogique interne mobilisée pour la spécialité : (a renseigner et faire viser par la faculté ou l'institut)

| Nom, prénom | Diplôme graduation | Diplôme de spécialité (Magister, doctorat) | Grade | Matière à enseigner | Emargement |
|---|---|---|---|---|---|
| DJEDI NourEddine | Ingénieur | Doctorat d'état | Prof | Rédaction scientifique | |
| KAZAR Okba | Ingénieur | Doctorat d'état | Prof | IA | |
| BABAHENINI Mohamed Chaouki | Ingénieur | Doctorat d'état | M.C.A | Systèmes d'exploitation 2 | |
| CHERIF Foudil | Ingénieur | Doctorat d'état | M.C.A | Infographie | |
| BENHARZALLAH Saber | Ingénieur | Habilitation | M.C.A | Programmation logique | |
| KAHLOUL Laid | Ingénieur | Habilitation | M.C.A | GL2 | |
| BACHIR Abdelmalik | Ingénieur | Habilitation | M.C.A | Applications mobiles | |
| BENNAOUI Hamadi | Ingénieur | Habilitation | M.C.A | Paradigmes des LP | |
| REZEG Khaled | Ingénieur | Doctorat | M.C.B | IHM | |
| GUEMEIDA Abdelbasset | Ingénieur | Doctorat | M.C.B | Administration des BD | |
| CHERIET Abdelhakim | Ingénieur | Magister | M.A.A | Sécurité des systèmes | |
| MEADI Med Nadjib | Ingénieur | Magister | M.A.A | Compilation | |
| KACI Fatma | DES | Magister | M.A.A | Programmation linéaire | |
| MANSOURI Badreddine | DES | Doctorat | M.C.B | Proba/stat | |
| BOUKHLOUF Djemaa | Ingénieur | Magister | M.A.A | Cryptographie | |

| | | | | | |
|---|---|---|---|---|---|
| BENAMEUR Sabrina | Ingénieur | Magister | M.A.A | Cryptographie | |
| HATTAB Dalila | Ingénieur | Magister | M.A.A | Infographie | |
| HAMIDA Ammar | Ingénieur | Magister | M.A.A | IHM | |
| BAHI Naima | Ingénieur | Magister | M.A.A | Systèmes d'exploitation 2 | |
| OUANNES Nesrine | Ingénieur | Magister | M.A.A | Compilation | |
| ABDELLI Belkacem | Ingénieur | Magister | M.A.A | Paradigmes des LP | |
| AYAD Sohyeib | Ingénieur | Magister | M.A.A | Applications mobiles | |
| MOUAKI Bennani Nawal | Ingénieur | Magister | M.A.A | GL2 | |

**Visa du département**

**Visa de la faculté ou de l'institut**

رئيس قسم الإعلام الآلي
باباحنيني محمد شوقي

نائب العميد المكلف بالدراسات
والمسائل المرتبطة بالطلبة
عبد اللــــه عطــاف

**C : Equipe pédagogique externe mobilisée pour la spécialité :** (a renseigner et faire viser par la faculté ou l'institut)

| Nom, prénom | Etablissement de rattachement | Diplôme graduation | Diplôme de spécialité (Magister, doctorat) | Grade | Matière à enseigner | Emargement |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Visa du département

Visa de la faculté ou de l'institut

رئيس قسم الإعلام الآلي
باباحنيني محمد شوقي

نائب العميد المكلف بالدراسات
والمسائل المرتبطة بالطلبة
عبد الله عطاف

## D : Overall summary of human resources mobilized for the specialty (L3) :

| Grade | Internal Workforce | External Workforce | Total |
|---|---|---|---|
| Professors | 2 | 0 | 2 |
| Lecturers (A) | 6 | 0 | 6 |
| Lecturers (B) | 3 | 0 | 3 |
| Assistant Master (A) | 12 | 0 | 12 |
| Assistant Master (B) | 0 | 0 | 0 |
| other (*) | 0 | 0 | 0 |
| **Total** | **23** | **0** | **23** |

(* )Technical and support staff

## 5 – Material resources specific to the specialty

**A- Educational Laboratories and Equipment:** Sheet of existing educational equipment for the practical work of the planned formation  (1 sheet per laboratory)

**Laboratory title:** Computing center

**Student Capacity: 100**

| N° | Equipment title | Nomber | observations |
|---|---|---|---|
| 01 | SERVOR  HP ProLiant ML370G5<br>* 2 processors Intel Xeon Quadricoeur :.33 GHZ<br>* RAM :6 Go<br>* DD : 6x 140 Go<br>* Lecteur DAT : Hp Dat 72 USB.<br>* Ecran TFT + Clavier | 06 | Local networks + permanent internet access Operating systems. Windows/Linux |
| 02 | Poste clients légers HP :<br>Ecran 19 +Unité Léger +clavier +Souris | 25 | |
| 03 | PC HP Compaq dx 2300 dual core 1.8 ghz ,<br>Ram :1 Go ,D D :160 Go +Souris +clavier + Ecran 19`` | 25 | |
| 04 | Dell proc dual core 1.80 Ghz<br>Ram : 512 Mo D.D: 80 Go | 25 | |
| 05 | PC : HP Compaq dx 2400 dual core<br>RAM: 1 Go  DD: 160 Go écran 17`` | 10 | |
| 06 | Network cabinet<br>Onduleur 3000 VA<br>Modem ADSL  2 Mo<br>Switch catalyst 2960   24  ports | 01<br>01<br>01<br>05 | Local network |

**Laboratory title:** Machine room (02 rooms)
**Student Capacity: 25**

| N° | Equipment title | Nomber | Observations |
|---|---|---|---|
| 01 | PC + internet connection | 25 | |

**Laboratory title:** Network laboratory
**Student Capacity : 25**

| N° | Equipment title | Nomber | Observations |
|---|---|---|---|
| 01 | PC Dell P4 3.06 Ghz<br>Ram: 512Mo D.D: 80Go | 20 | |
| 02 | Laboratory CISCO (switch, materiel de formation) | | |

## B- Internship sites and in-company formation (see agreements/conventions section):

| Lieu du stage | Nombre d'étudiants | Durée du stage |
|---|---|---|
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

## C- Documentation available at the establishment level specific to the proposed formation (obligatory field):

- A. Silberschatz, P. Galvin Principes des Systèmes d'Exploitation, Addison-Wesly, 1994

- A. Tanenbaum Systèmes d'Exploitation : Systèmes Centralisés, Systèmes Distribués Prentice-Hall 1994

- Andrew Tanenbaum, Jean-Alain Hernandez, René Joly. Corrigés de systèmes d'exploitation. Pearson Education. septembre 2008

- BouzefraneSystèmes d'exploitation - Cours et exercices corrigés. Editions Dunod. 2003

- Aho, Sethi, Ullman : Compilers (Addison-Wesley) Trad. française chez InterÉditions

- Christopher Fraser and David Hanson. A Retargetable C Compiler : Design and Implementation. Benjamin/Cumming, 1995

- Web sémantique et modélisation ontologique (avec G-OWL) : Guide du développeur Java sous Eclipse, de Michel HÉON

- Semantic Web for the Working Ontologist, Effective Modeling in Rdfs and Owl, de Dean Allemang, James A. Hendler

- The OpenGL Programming Guide 3rd Edition ("The Red Book") Addison-Wesley.

- The OpenGL Reference Manual 3rd Edition ("The Blue Book") Addison-Wesley & Benjamin Cummings.

- Advanced Animation and Rendering Techniques: Theory and Practice, by Alan Watt and Mark Watt, Addison-Wesley

- Chazarain, Programmer avec SCHEME . De la pratique à la théorie. Thomson International, 1996.

- Hoogger. Programmer en logique. Masson, 1987

- Weis& Leroy. Le langage CAML. Interéditions, 1993.

- Bertrand Meyer. Conception et programmation orientées objet Editeur(s) : Eyrolles 2008

- Marie-Claude Gaudel, Bruno Marre, Françoise Schlienger, Gilles Bernot. Précis de génie logiciel 1996

- Estimation des côuts et délais par la méthode COCOMO : 2015

- D. Floy et A. Vandam « Fundamentals of interactive computer graphics » Edition Wesley, 1983

- B. Shneiderman "Designing the user Interface: Strategies for effective human computers" Edition Wesley, 1987

- François Dress. TD de probabilités et statistique pour les sciences de la vie. Editions DUNOD. 2002.

- Gérald Tenenbaum. Introduction à la théorie analytique et probabiliste des nombres. Editions Belin. 2008

- Sheldon M Ross. Initiation aux probabilités. Presses Polytechniques et Universitaires Romandes (PPUR).1996

- Rémi Ruppli. Programmation linéaire. Idées et méthodes. Editions Ellipses. 2005

- Pierre Borne, Abdelkader El Kamel, KhaledMellouli. Programmation linéaire et applications. Editions Technip. 2004

- F. PAGAN " Formal specification of programing languages" Prentice-Hall International 1981

- D.A.WATT "Programing languages: Conceprts and paradigms" Prentice-Hall International 1990

- E. HOROWITZ "Fundamantals of programming languages" Computer Science Press, 1984

- Louis Frécon, OkbaKazar. Manuel d'Intelligence Artificielle ; Edition PPUR ; http://ppur.epfl.ch/livres/978-2-88074-819-7.html;ISBN:978-2-88074-819-7, 2009

- R. Forsyth. Expert Systems : Principles and Case Studies. Chapman and Hall, 1984.

- P. Jackson. Introduction to Expert Systems. Addition-wesley, 1986.

- G.F. Luger and W.A. Stubblefield. Artificial Intelligence : Structures and Strategies for Complex Problem Solving. Addition-wesley, 1999.

- S. Russel and P. Norvig. Artificial Intelligence : A Modern Approach. Prentice-Hall International, Inc., 1995.

**D- Personal work spaces and ICT available at department and faculty level:**

## II – Half-yearly organization sheet for specialty teaching (S5 and S6)
(include the annexes to the decrees of the common bases of the field and the sector)

**Common Core Mathematics, applied mathematics and computer science**

**Semester 1 :**

| Teaching unit | VHS 14 sem | Weekly V.H. | | | | Coeff | Credits | Evaluation mode | |
|---|---|---|---|---|---|---|---|---|---|
| | | C | TD | TP | personal work | | | Continuous | Exam |
| **fondamentals UE** | | | | | | | | | |
| **UEF11(O/P)** | | 4h30 | 4h30 | | 6h | 7 | 11 | | |
| **UEF111 :** Analysis 1 | 84h | 3h00 | 3h00 | | 3h | 4 | 6 | 40% | 60% |
| **UEF112 :** Algebra 1 | 42h | 1h30 | 1h30 | | 3h | 3 | 5 | 40% | 60% |
| **UEF12(O/P)** | | 4h30 | 3h | 3h | 6h | 7 | 11 | | |
| **UEF121 :** Algorithms and data structure 1 | 105h | 3h00 | 1h30 | 3h | 3h | 4 | 6 | 40% | 60% |
| **UEF122 :** Machine structure 1 | 42h | 1h30 | 1h30 | | 3h | 3 | 5 | 40% | 60% |
| **EU Methodology** | | | | | | | | | |
| **UEM11(O/P)** | | 3h | | | 4h | 2 | 4 | | |
| **UEM111 :** Scientific terminology and written expression | 21h | 1h30 | | | 2h | 1 | 2 | | 100% |
| **UEM112 :** Foreign language | 21h | 1h30 | | | 2h | 1 | 2 | | 100% |
| **Discovery EU** | | | | | | | | | |
| **UED11(O/P) Choose a subject among:** | | 1h30 | 1h30 | | 2h | 2 | 4 | | |
| - Physics 1 <br> - Electronics and system components | 42h | 1h30 | 1h30 | | 2h | 2 | 4 | 40% | 60% |
| **Total Semester 1** | 357h | 13h30 | 9h | 3h | 18h | 18 | 30 | | |

## Common Core Mathematics, applied mathematics and computer science

**Semester 2 :**

| Teaching unit | VHS 14 sem | Weekly V.H | | | | Coeff | Credits | Evaluation method | |
|---|---|---|---|---|---|---|---|---|---|
| | | C | TD | TP | personal work | | | Continuous | Exam |
| **fondamentals UE** | | | | | | | | | |
| **UEF21(O/P)** | | **4h30** | **3h** | | **6h** | **6** | **10** | | |
| **UEF211 :** Analysis 2 | **63h** | 3h00 | 1h30 | | 3h | 4 | 6 | 40% | 60% |
| **UEF212 :** Algebra 2 | **42h** | 1h30 | 1h30 | | 3h | 2 | 4 | 40% | 60% |
| **UEF22(O/P)** | | **3h** | **3h** | **1h30** | **6h** | **6** | **10** | | |
| **UEF221 :** Algorithms and data structure 2 | **63h** | 1h30 | 1h30 | 1h30 | 3h | 4 | 6 | 40% | 60% |
| **UEF222 :** Machine structure 2 | **42h** | 1h30 | 1h30 | | 3h | 2 | 4 | 40% | 60% |
| **UE methodology** | | | | | | | | | |
| **UEM21(O/P)** | | **4h30** | **1h30** | **1h30** | **6h** | **4** | **7** | | |
| **UEM211 :** Introduction to probability and descriptive statistics | **42h** | 1h30 | 1h30 | | 2h | 2 | 3 | 40% | 60% |
| **UEM212 :** Information and Communication Technology | **21h** | 1h30 | | | 2h | 1 | 2 | | 100% |
| **UEM213 :** Programming tools for mathematics | **42h** | 1h30 | | 1h30 | 2h | 1 | 2 | 40% | 60% |
| **Transversal EU** | | | | | | | | | |
| **UET21(O/P)** | | **1h30** | **1h30** | | **2h** | **2** | **3** | | |
| **UET211 :** Physics 2 (general Electricity) | **42h** | 1h30 | 1h30 | | 2h | 2 | 3 | 40% | 60% |
| **Total Semester 2** | **357h** | **13h30** | **9h** | **3h** | **20H** | **18** | **30** | | |

# Annexe du programme des enseignements de la 2ème année, licence
## domaine "Mathématiques, Informatique"  filière "Informatique"

**Semestre 3**

| Unités d'enseignement | Matières / Intitulé | Crédits | Coefficient | Volume horaire hebdomadaire | | | VHS (15 semaines) | Autre* | Mode d'évaluation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cours | TD | TP | | | Contrôle Continu | Examen |
| UE Fondamentale Code : UEF 2.1.1 Crédits : 15 Coefficients : 7 | Architecture des Ordinateurs | 5 | 2 | 1h30 | | 1h30 | 45h00 | | x | x |
| | Algorithmique et structures de données | 6 | 3 | 3h00 | 1h30 | 1h30 | 90h00 | | x | x |
| | Logique Matéhmatique | 4 | 2 | 1h30 | 1h30 | | 45h00 | | x | x |
| UE Fondamentale Code : UEF 2.1.2 Crédits : 13 Coefficients : 8 | Programmation Orientée Objet | 5 | 3 | 1h30 | 1h30 | 1h30 | 67h30 | | x | x |
| | Systèmes d'Information | 4 | 3 | 1h30 | 1h30 | | 45h00 | | x | x |
| | Une matière à choisir parmi: | | | | | | | | | |
| | Théorie des langages | 4 | 2 | 1h30 | 1h30 | | 45h00 | | x | x |
| | Méthodes numériques | | | | | | | | | |
| UE Méthodologie Code : UEM 2.1. Crédits : 2 Coefficients : 1 | Langue étrangère 2 | 2 | 1 | | 1h30 | | 22h30 | | x | x |
| | **Total semestre 3** | 30 | 16 | 10h30 | 9h00 | 4h30 | 360h00 | | | |
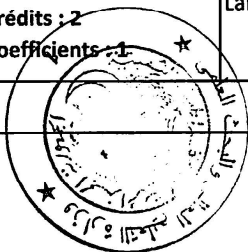
**Annexe du programme des enseignements de la 2ème année, licence**
**domaine "Mathématiques, Informatique"　　　　filière "Informatique"**

## Semestre 4

| Unités d'enseignement | Matières | Crédits | Coefficient | Volume horaire hebdomadaire | | | VHS (15 semaines) | Autre* | Mode d'évaluation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Intitulé | | | Cours | TD | TP | | | Contrôle Continu | Examen |
| UE Fondamentale Code : UEF 2.2. Crédits : 13 Coefficients : 7 | Bases de Données | 4 | 2 | 1h30 | 1h30 | 1h30 | 67h30 | | x | x |
| | Systèmes d'exploitation 1 | 5 | 3 | 1h30 | 1h30 | 1h30 | 67h30 | | x | x |
| | Génie Logiciel 1 | 4 | 2 | 1h30 | 1h30 | | 45h00 | | x | x |
| UE Fodamentales Code : UEF 2.2. Crédits : 13 Coefficients : 7 | Théorie des graphes | 4 | 2 | 1h30 | 1h30 | | 45h00 | | x | x |
| | Réseaux de communication | 5 | 3 | 1h30 | 1h30 | 1h30 | 67h30 | | x | x |
| | Développement d'applications Web | 4 | 2 | 1h30 | | 1h30 | 45h00 | | x | x |
| UE Méthodologie Code : UED 2.2. Crédits : 4 Coefficients : 2 | Aspects Juridiques et Economiques des Logiciels | 2 | 1 | 1h30 | | | 22h30 | | x | x |
| | Langue étrangère 3 | 2 | 1 | | 1h30 | | 22h30 | | x | x |
| Total semestre 4 | | 30 | 16 | 10h30 | 9h00 | 6h00 | 382h30 | | | |

## Semester 5 :

| Teaching unit | VHS | V.H weekly | | | | Coeff | Credits | Evaluation mode | |
|---|---|---|---|---|---|---|---|---|---|
| | 14-16 sem | C | TD | TP | other | | | Continuous | Exam |
| **Fundamental EU** | | | | | | | | | |
| **FU1** | | | | | | 6 | 12 | | |
| Operating system 2 | 67h30 | 1h30 | 1h30 | 1h30 | | 2 | 4 | 50% | 50% |
| Compilation | 67h30 | 1h30 | 1h30 | 1h30 | | 2 | 4 | 50% | 50% |
| Logic programming | 45h | 1h30 | | 1h30 | | 2 | 4 | 50% | 50% |
| **FU2** | | | | | | 4 | 8 | | |
| Software engineering 2 | 67h30 | 1h30 | 1h30 | 1h30 | | 2 | 4 | 50% | 50% |
| MHI | 67h30 | 1h30 | 1h30 | 1h30 | | 2 | 4 | 50% | 50% |
| **EU methodology** | Two subjects to choose from | | | | | 4 | 8 | | |
| **MU1** | | | | | | | | | |
| Probability and statistics | 45h | 1h30 | 1h30 | | | 2 | 4 | 50% | 50% |
| Linear programming | 45h | 1h30 | 1h30 | | | 2 | 4 | 50% | 50% |
| Programming paradigms | 45h | 1h30 | 1h30 | | | 2 | 4 | 50% | 50% |
| Artificial intelligence | 45h | 1h30 | 1h30 | | | 2 | 4 | 50% | 50% |
| **Transversal EU** | | | | | | 1 | 2 | | |
| **TU1** | | | | | | | | | |
| English | 22h30 | 1h30 | | | | 1 | 2 | 50% | 50% |
| **Total Semester 5** | 427h30 | | | | | | **30** | | |

## Semester 6 :

| Teaching unit | VHS | V.H weekly | | | | Coeff | Credits | Evaluation Mode | |
|---|---|---|---|---|---|---|---|---|---|
| | 14-16 sem | C | TD | TP | Other | | | Continu | Examen |
| **Fundamental EU** | | | | | | | | | |
| **FU3** | | | | | | 6 | 10 | | |
| Mobile applications | 67h30 | 1h30 | 1h30 | 1h30 | | 3 | 5 | 50% | 50% |
| Computer sciences security | 45h | 1h30 | 1h30 | | | 3 | 5 | 50% | 50% |
| **FU4** | Two subjects to choose from | | | | | 4 | 8 | | |
| Administration of BD | 45h | 1h30 | 1h30 | | | 2 | 4 | 50% | 50% |
| Infographics | 45h | 1h30 | 1h30 | | | 2 | 4 | 50% | 50% |
| Web semantics | 45h | 1h30 | 1h30 | | | 2 | 4 | 50% | 50% |
| Cryptography | 45h | 1h30 | 1h30 | | | 2 | 4 | 50% | 50% |
| **TU2** | | | | | | | | | |
| Scientific writing | 22h30 | 1h30 | | | | 1 | 2 | 50% | 50% |
| **MU2** | | | | | | | | | |
| Project | 200h | | | | | 4 | 10 | | |
| **Total Semester 6** | 425h | | | | | | **30** | | |

**Overall summary of the formation :** (indicate the separate overall VH in progress, TD, TP… for the 06 semesters of teaching, for the different types of EU)

| UE / VH | UEF | UEM | UED | UET | Total |
|---|---|---|---|---|---|
| Course | 697h30' | 112h30' | 45 | 67h30' | 922h30' |
| DW | 630 | 112h30' | 45 | 45 | 832h30' |
| PW | 225 | 67h30' | 0 | 0 | 270 |
| Personal work | | | | | |
| other (explain,) | | | | | |
| Total | 1552h30' | 292h30' | 90 | 112h30' | 2047h30' |
| Credits | 129 | 38 | 4 | 9 | **180** |
| % in credits for each EU | 71.67% | 21.11% | 2.22% | 5% | 100% |

III - Detailed program by subject of the semesters
(1 detailed sheet per subject)

(All fields must be completed)

**Semester : 01**
**Teaching unit: Fundamental**
**Module: Analysis 1**
**Credits : 6**

**Coefficient : 4**

**Course objective:**

The objective of this module is to familiarize students with set vocabulary, to provide different methods of convergence of real sequences and the different aspects of the analysis of functions of a real variable.

Recommended prior knowledge: Final year level.

## Chapiter I : The field of Real numbers

$\mathbb{R}$ is a commutative field, $\mathbb{R}$ is a totally ordered field, Reasoning by recurrence, $\mathbb{R}$ is a valued field, Intervals, Upper and lower bounds of a subset of $\mathbb{R}$, $\mathbb{R}$ is an Archimedean field, Characterization of the upper and lower bounds, The integer part function, Bounded sets, Extension of $\mathbb{R}$: Completed number line $\mathbb{R}$, Topological properties of $\mathbb{R}$, Closed open parts.

## Chapiter II : The field of complex numbers

Algebraic operations on complex numbers, Modulus of a complex number z, Geometric representation of a complex number, Trigonometric form of a complex number, Euler formulas, Exponential form of a complex number, Nth roots of a complex number.

## Chapiter III : Sequence of real Nombers

Bounded sequences, convergent sequences, Properties of convergent sequences, Arithmetic operations on convergent sequences, Extensions to infinite limits, Infinitely small and infinitely large, Monotone sequences, Extracted sequences, Cauchy sequence, Generalization of notion of the limit, Upper limit, Lower limit, recurring sequences.

## Chapiter IV : Real Functions of a real variable

Graph of a real function of a real variable, Even-odd functions, Periodic functions, Bounded functions, Monotonic functions, Local maximum, Local minimum, Limit of a function, Limit theorems, Limit operations, Continuous functions , Discontinuities of the first and second kind, Uniform continuity, Theorems on continuous functions on a closed interval, Continuous reciprocal function, Order of an equivalence variable (Landau notation).

## Chapiter V: Differentiable functions

Right derivative, left derivative, Geometric interpretation of the derivative, Operations on differentiable functions, Differential-Differentiable functions, Fermat's theorem, Rolle's theorem, Finite increment theorem, Higher order derivatives, Taylor formula, Local extremum of a function, Bounds of a function on an interval, Convexity of a curve. Inflection point, Asymptote of a curve, Construction of the graph of a function.

## Chapiter VI : Elementary Functions

Logarithme népérien, Exponentielle népérienne, Logarithme de base quelconque, Fonction puissance, Fonctions hyperboliques, Fonctions hyperboliques réciproques.

**Evaluation mode : Exam (60%) , continuous control (40%)**

**References**

- J.-M. Monier, Analyse PCSI-PTSI, Dunod, Paris 2003.
- Y. Bougrov et S. Nikolski, Cours de Mathématiques Supérieures, Editions Mir, Moscou, 1983.
- N. Piskounov, Calcul différentiel et intégral, Tome 1, Editions Mir, Moscou, 1980.
- K. Allab, Eléments d'Analyse, OPU, Alger, 1984.
- B. Calvo, J. Doyen, A. Calvo, F. Boschet, Cours d'analyse, Librairie Armand Colin, Paris, 1976.
- J. Lelong-Ferrand et J. M. Arnaudiès, Cours de mathématiques, tome 2, Edition Dunod, 1978.

**Semester : 01**
**Teaching unit: Fundamental**
**Module : Algebra1**
**Credits : 5**
**Coefficient : 3**
**Teaching objectives:**
This module introduces the basic notions of algebra and set theory.
Recommended prior knowledge: Basic algebra.
**Content of the module:**
**Chapter 1 : Notions of logic**

- Truth table, quantifiers, types of reasoning.

**Chapter 2 : Sets and applications.**
- Definitions and examples.
- Applications : injection, surjection, bijection, direct image, reciprocal image, restriction and extension.

**Chapter 3 : Binary relations on a set.**
- Basic definitions: reflexive, symmetric, antisymmetric, transitive relation.
- Order relationship - Definition. Total and partial order.
- Equivalence relation: equivalence class.

**Chapter 4 :  Algebraic structures.**
- Law of internal composition. Stable part. Properties of an internal composition law.
- Groups-Definitions. Subgroup-Examples-Homomorphism of groups-isomorphism of groups.Give examples of finite groups Z/nZ (n= 1, 2, 3,…) and the group of permutations $S_3$.
- Rings-Definition, Sub- rings. Calculation rules in a ring. Invertible elements, divisors of zero-Homomorphism of rings-Ideals.
- Field-Definitions-Treat the case of a finite body through the example Z/pZ where p is prime, R and C

**Chapter 5 :  Rings of polynomials.**

- Polynomial. Degree.
- Construction of the ring of polynomials.
- Arithmetic of polynomials-Divisibility-Euclidean division-Pgcd and ppcm of two polynomials-Polynomials prime to each other-Decomposition into product of irreducible factors.
- Roots of a polynomial - Roots and degree - Multiplicity of roots.


**Evaluation mode : Exam (60%) , continuous control (40%)**
**References**

- M. Mignotte et J. Nervi, Algèbre : licences sciences 1ère année, Ellipses, Paris, 2004.
- J. Franchini et  J. C. Jacquens, Algèbre : cours, exercices corrigés, travaux dirigés, Ellipes, Paris, 1996.
- C. Degrave et D. Degrave,  Algèbre 1ère année : cours, méthodes, exercices résolus, Bréal, 2003.
- S. Balac et F. Sturm,  Algèbre et analyse : cours de mathématiques de première année avec exercices corrigés,   Presses Polytechniques et Universitaires, 2003.

**Semester : 01**
**Teaching unit: Fundamental**
**Module : Algorithms and data structure 1**
**Credits : 6**
**Coefficient : 4**

**Teaching objectives:** Present the concepts of algorithm and data structure.
**Recommended prior knowledge:** Basic computer science and mathematics.

**Content of the module:**

**Chapter 1: Introduction**
      1. Brief history of computing
      2. Introduction to algorithms

**Chapter 2: Simple sequential algorithm**
      1. Concept of language and algorithmic language
      2. Parts of an algorithm
      3. Data: variables and constants
      4. Data Types
      5. Basic Operations
      6. Basic Instructions
                Assignments
                Input/Output Instructions
      7. Construction of a simple algorithm
      8. presentation of an algorithm by a flowchart
      9. C language translation

**Chapter 3: Conditional structures (in algorithmic language and in C)**
      1. Introduction
      2. Simple conditional structure
      3. Compound conditional structure
      4. Multiple choice conditional structure
      5. The hookup

**Chapter 4: Loops (in algorithmic language and in C)**
      1. Introduction
      2. The While loop
      3. The Repeat loop
      4. The Pour loop
      5. Nested loops

**Chapter 5: Arrays and strings**
      1. Introduction
      2. The array type
      3. Multidimensional arrays
      4. Character strings

**Chapter 6: Custom Types**
      1. Introduction
      2. Enumerations
      3. Records (Structures)
      4. Other type definition possibilities

*NB : TP of C, it must be complementary of TD .*


**Evaluation mode : Exam (60%) , continuous control (40%)**

**References**
- Thomas H. Cormen, Algorithmes Notions de base *Collection :  Sciences Sup, Dunod,* 2013.
- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest Algorithmique - 3ème édition - Cours avec 957 exercices et 158 problèmes Broché,  Dunod, 2010.
- Rémy Malgouyres, Rita Zrour et Fabien Feschet. *Initiation à l'algorithmique et à la programmation en C : cours avec 129 exercices corrigés*. 2$^{ième}$ Edition. Dunod, Paris, 2011. ISBN : 978-2-10-055703-5.
- Damien Berthet et Vincent Labatut. *Algorithmique & programmation en langage C - vol.1 : Supports de cours*. Licence. Algorithmique et Programmation, Istanbul, Turquie. 2014, pp.232.
- Damien Berthet et Vincent Labatut. *Algorithmique & programmation en langage C - vol.2 : Sujets de travaux pratiques*. Licence. Algorithmique et Programmation, Istanbul, Turquie. 2014, pp.258. <cel-01176120>
- Damien Berthet et Vincent Labatut. *Algorithmique & programmation en langage C - vol.3 : Corrigés de travaux pratiques*. Licence. Algorithmique et Programmation, Istanbul, Turquie. 2014, pp.217. <cel-01176121>
- Claude Delannoy. *Apprendre à programmer en Turbo C*. Chihab- EYROLLES, 1994.

**Semester : 01**
**Teaching unit: Fundamental**
**Module : Machine structure 1**
**Credits : 5**
**Coefficient : 3**
**Teaching objectives:**
The aim of this subject is to present and deepen the concepts concerning the different numbering systems as well as the representation of information, whether numerical or character. The basics of Boolean algebra are also covered in depth.

**Recommended prior knowledge:**
Elementary mathematics.

**Content of the module:**
**Chapiter 1 :**
-   General Introduction.
**Chapiter 2 : The systems of numbering**
-   Definition
-   Presentation of decimal, binary, octal and hexadecimal systems.
-   Conversion between these different systems.
-   Basic operations in the binary system:
    -   Addition
    -   Substraction
    -   Multiplication
    -   Division
**Chapiter 3 : The representation of information**
-   Binary coding:
    -   Pure binary coding.
    -   The reflected binary code (or DE GRAY code)
    -   The DCB code (Binary coded decimal)
    -   The code exceeds three.
-   Character representation:
    -   Code EBCDIC
    -   Code ASCII
    -   Code UTF.
-   Representation of numbers :
1-  Entire Numbers :
    -   Unsigned representation.
    -   Representation with sign and absolute value.
    -   Complement of 1 (or Restricted complement)
    -   2's Complement (or True Complement)
2-  Fractional numbers:
    -   Fixed comma.
    -   Floating comma (norm IEEE 754)
**Chapiter 4 : Binary Boolean algebra**
-   Definition and axioms of Boolean algebra.
-   Theorems and properties of Boolean algebra.
-   Basic operators:
    -    ET, OU, logic negation.
    -   Schematic representation.
-   Other logical operators:
    -   NAND and NOR circuits
    -   Or exclusive.
    -   Implication.

- • Schematic representation.
- Truth table.
- Expressions and logic functions.
- Algebraic writing of a function in first and second normal form
- Expression of a logic function with NANDs or NOR circuits exclusively.
- Logical diagram of a function.
- Simplification of a logical function:
  - • Algebraic method.
  - • Karnaugh paintings.
  - • Quine-McCluskey method.

**Evaluation mode : Exam (60%) , continuous control (40%)**
**References**

- • <u>John R. Gregg</u>, Ones and Zeros: Understanding Boolean Algebra, Digital Circuits, and the Logic of Sets 1st Edition , Wiley & sons Inc. publishing, 1998, ISBN: 978-0-7803-3426-7.
- • Bradford Henry Arnold , Logic and Boolean Algebra, Dover publication, Inc., Mineola, New York, 2011, ISBN-13: *978-0-486-48385-6*
- • Alain Cazes,Joëlle Delacroix, Architecture Des Machines Et Des Systèmes Informatiques : Cours et exercices corrigés, 3° édition, Dunod 2008.

**Semester : 01**
**Teaching unit: Methodological**
**Module : Scientific terminology and written and oral expression**
**Credits : 2**
**Coefficient : 1**

**Teaching objectives :**
- Written expression techniques: learn to write a dissertation, make a report or a summary.
- Oral expression techniques: giving a presentation or a defense, learning to express yourself and communicate within a group.
**Recommended prior knowledge:** Knowledge of the French language

**Content of the module:**

**Chapiter1 : Scientific Terminology**
**Chapter 2 : Written and oral expression technique** (report, summary, use of modern means of communication) in the form of presentations
**Chapter 3** : **Expression and communication in a group. In the form of a mini group project.**

**Evaluation mode : Exam (100%)**

**References**

- L. Bellenger, L'expression orale, Que sais-je ?, Paris, P. U. F., 1979.
- Canu, Rhétorique et communication, P., Éditions Organisation-Université, 1992.
- R. Charles et C. Williame, La communication orale, Repères pratiques, Nathan, 1994.

**Semester : 01**
**Teaching unit: Methodological**
**Module : English language 1**
**Credits : 2**
**Coefficient : 1**

**Teaching objectives:**
The aim of this subject is to enable students to improve their general language skills in terms of comprehension and expression, as well as the acquisition of specialized vocabulary of scientific and technical English.
**Recommended prior knowledge:** Basic knowledge of English

**Content of the module:**
1. **Reminders of the essential basics of English grammar**
   - Times (present, past, future, etc.)
   - Verbs: regular and irregular.
   - The adjectives.
   - The auxiliaries.
   - Construct sentences in English: affirmative, negative and interrogative, Sentence formation.
   - Other structures of English grammar.

2. **Vocabulary, expressions and construction of technical texts**
   - Computers and the internet: technical vocabulary.
   - Construction of technical texts in English**.**

**Evaluation mode : Exam (100%)**

**References**

- Murphy. English Grammar in Use. Cambridge University Press. 3$^{rd}$ edition, 2004
- M. Mc Carthy et F. O'Dell, English vocabulary in use, Cambridge University Press, 1994
- L. Rozakis, English grammar for the utterly confused, Mc Graw-Hill, 1$^{st}$ edition, 2003
- Oxford Progressive English books.

**Semester : 01**
**Teaching unit: Discovery**
**Module : Physics 1 ( Point mechanics)**
**Credits : 4**
**Coefficient : 2**

**Teaching objectives :**

At the end of this course, the student will have to acquire basic knowledge in point mechanics (point kinematics, point dynamics, work and energy in the case of a material point, non-conservative forces, etc.), so as to be able to analyze and interpret related phenomena.

**Recommended prior knowledge:** Basic notions of Physics

**Content of module :**

**Chapter 1: Point kinematics**
- Rectilinear movement-Movement in space
- Study of particular movements
- Study of movements in different systems (polar, cylindrical and spherical)
- Relative movements.

**Chapter 2: Point dynamics.**
- The principle of inertia and the Galilean frames of reference
- The principle of conservation of momentum
- Newtonian definition of force (3 Newton's laws) - Some force laws

**Chapter 3: Work and energy in the case of a material point.**
a) Kinetic energy-Gravitational and elastic potential energy.
b) Force field -Non-conservative forces

**Evaluation mode : Exam (60%) , continuous control (40%)**

**References**

- A. Thionne, Mécanique du point. 2008. Editions Ellipses
- [A. Gibaud, M. Henry. Mécanique du point. Cours de physique. 2007. Editions Dunod
- S. khène, Mécanique du point matériel. 2015. Editions Sciences Physique.

**Semester : 01**
**Teaching unit: Discovery**
**Module : Electronics, system components**
**Credits : 4**
**Coefficient : 2**

**Teaching objectives:**
Present the main units of a computer and explain their operation as well as the principles of their use.

**Recommended prior knowledge:** General computer knowledge.

**Content of module**

**Chapiter 1.** Preamble – Definitions and Generalities
**Chapiter 2. Parts of a computer**
**Chapiter 3**. Electronic components of a computer
      3.1. The main components of a computer and their role
          3.1.1. The motherboard
          3.1.2. The processor
          3.1.3. The memory
          3.1.4. The graphics card
          3.1.5. The hard drive
      3.2. The main elements connected to the computer motherboard
**Chapiter 4**. The different types of devices
      4.1. The input device
      4.2. Output devices
      4.3. Les Input-output devices
**Chapiter 5.** Connexions to computer
**Chapiter 6.** Operating systems
      6.1 Definition
      6.2 Missions
      6.3 Types of systems
      6.4 Elements of system
          6.4.1 Core: functionalities, -types, -typology of systems
          6.4.2  System libraries
          6.4.3 Systems Services
**Chapiter 7.** Introduction to Networks
      7.1  The Networks :
          7.1.1 Areas of network use
          7.1.2  The internet
          7.1.3. Objectives
          wanted (networks)
      7.2. Network Categories
      7.3. Physical and logical structuring
          7.3.1 Equipment
          7.3.2 The software
      7.4. Types of networks
          7.4.1. The "Peer to Peer"
          7.4.2. The "Client / Server
      7.5. Hardware
          7.5.1. Transportation media
          7.5.2. The Topologies
          -  Bus topology
          - Star topology
          - Ring topology

7.6. Software & protocoles
      7.6.1. ETHERNET
      7.6.2. Token Ring
      7.6.3. Popular protocols

**Chapiter 8.** Wireless networks
  8.1 Definition
  8.2 Applications
  8.3 Classification

**Evaluation mode : Exam (60%) , continuous control (40%)**

**References**

- T. Floyd. Electronique. Composants et systèmes d'application. 2000 Editions Dunod

- Jacques Lonchamp, Introduction aux systèmes informatiques Architectures, composants, prise en main, 2017 collection infosup, Dunod.

**Semester : 02**
**Teaching unit: Fundamental**
**Module : Analysis 2**
**Credits : 6**
**Coefficient : 4**

**Objectives of course:**

This module aims to give students the different aspects of integral calculus: Riemann integral, different techniques for calculating primitives, introduction to solving differential equations.

Recommended prior knowledge: Analysis 1.

**Chapiter I : Indefinite Integrals**

Indefinite integral, Some properties of the indefinite integral, Integration methods, Integration by change of variable, Integration by parts, Integration of rational expressions, Integration of irrational functions.

**Chapiter II : Definite Integrals**

Definite integral, Properties of definite integrals, Integral function of its upper bound, Newton-Leibniz formula, Cauchy-Schwarz inequality, Darboux sums-Conditions of the existence of the integral, Properties of Darboux sums, Integrability of continuous functions and monotonous.

**Chapiter III : First order differential equations**

General, Classification of first order differential equations, Equation with separable variables, Homogeneous equations, Linear equations, Bernoulli method, Lagrange constant variation method, Bernoulli equation, Total differential equation, Riccati equation.

**Chapiter IV : Second order differential equations with constant coefficients**

Homogeneous second-order differential equations with constant coefficients, Inhomogeneous second-order differential equations with constant coefficients, Methods for solving second-order differential equations with constant coefficients.

**Evaluation mode : Exam (60%) , continuous control (40%)**

**References**

- J.-M. Monier, Analyse PCSI-PTSI, Dunod, Paris 2003.
- Y. Bougrov et S. Nikolski, Cours de Mathématiques Supérieures, Editions Mir, Moscou, 1983.
- N. Piskounov, Calcul différentiel et intégral, Tome 1, Editions Mir, Moscou, 1980.
- K. Allab, Eléments d'Analyse, OPU, Alger, 1984.
- B. Calvo, J. Doyen, A. Calvo, F. Boschet, Cours d'analyse, Librairie Armand Colin, Paris, 1976.
- J. Lelong-Ferrand et J. M. Arnaudiès, Cours de mathématiques, tome 2, Edition Dunod, 1978.

**Semester : 02**
**Teaching unit: Fundamental**
**Module : Algebra 2**
**Credits : 4**
**Coefficient : 2**

**Teaching objectives:**
Establishment of the basic principles of vector spaces
Recommended prior knowledge: Basic algebra.

**Chapiter 1 : Vectorial space.**
   .   Definition.  vector subspace.
      Examples.
      Familles libres. Génératrices. Bases. Dimension.
      Finite-dimensional vector space (properties).
      Additional vector subspace.

**Chapiter2 : Linear Applications.**
   * Definition.
   * Image and kernel of a linear application.
   * Rank of an application, rank theorem.
   * Composed of linear applications. Inverse of a bijective linear map, automorphism.

**Chapiter 3 : Matrix.**
   a. Matrix associated with a linear application.
   b. Matrix operations: sum, product of two matrices, transpose matrix.
   c. Vector space of matrices with n rows and m columns.
   d. Ring of square dies. Determinant of a square matrix and properties. Invertible matrices.
   e. Rank of a matrix (associated application). Rank invariance by transposition.

**Chapitre 4 : Résolution de systèmes d'équations.**
   1. Système d'équations – écriture matricielle - rang d'un système d'équations.
   2. Méthode de Cramer.

**Evaluation mode : Exam (60%) , continuouss control (40%)**

**References**
   * S. Lang : Algèbre : cours et exercices, 3ème édition, Dunod, 2004.
   * E. Azoulay et J. Avignant, Mathématiques. Tome1, Analyse. Mc Graw-Hill, 1983.
   * M.Mignotte et J. Nervi, Algèbre : licences sciences 1ère année, Ellipses, Paris, 2004.
   * J. Franchini et  J. C. Jacquens, Algèbre : cours, exercices corrigés, travaux dirigés, Ellipses, Paris, 199

**Semester : 02**
**Fundamental teaching unit : UEF22**
**Module : Algorithms and data structure 2**
**Credits : 6**
**Coefficient : 4**

**Teaching objectives:** allow the student to acquire fundamental notions of programming
**Recommended prior knowledge:** Basic notions of mathematics

**Content of module :**

**Chapter 1: Subroutines: Functions and Procedures**
     1. Introduction
     2. Definitions
     3. Local variables and global variables
     4. Passing parameters
     5. Recursion

**Chapter 2: Files**
     1. Introduction
     2. Definition
     3. File Types
     4. File handling

**Chapter 3: Linked lists**
     1. Introduction
     2. Pointers
     3. Dynamic memory management
     4. Linked lists
     5. Operations on linked lists
     6. Doubly linked lists
     7. Special linked lists
           7.1. Batteries
           7.2. The lines

NB : TPs en C (Complementaires to TDs).

**Evaluation mode : Exam (60%) , continuous control (40%)**

**References**
- <u>Thomas H. Cormen</u>, Algorithmes Notions de base *Collection : <u>Sciences Sup, Dunod</u>,* 2013.
- <u>Thomas H. Cormen</u>, <u>Charles E. Leiserson</u>, <u>Ronald L. Rivest</u> Algorithmique - 3ème édition - Cours avec 957 exercices et 158 problèmes Broché, Dunod, 2010.
- Rémy Malgouyres, Rita Zrour et Fabien Feschet. *Initiation à l'algorithmique et à la programmation en C : cours avec 129 exercices corrigés*. 2$^{ième}$ Edition. Dunod, Paris, 2011. ISBN : 978-2-10-055703-5.
- Damien Berthet et Vincent Labatut. *Algorithmique & programmation en langage C - vol.1 : Supports de cours*. Licence. Algorithmique et Programmation, Istanbul, Turquie. 2014, pp.232.
- Damien Berthet et Vincent Labatut. *Algorithmique & programmation en langage C - vol.2 : Sujets de travaux pratiques*. Licence. Algorithmique et Programmation, Istanbul, Turquie. 2014, pp.258. <cel-01176120>
- Damien Berthet et Vincent Labatut. *Algorithmique & programmation en langage C - vol.3 : Corrigés de travaux pratiques*. Licence. Algorithmique et Programmation, Istanbul, Turquie. 2014, pp.217. <cel-01176121>
- Claude Delannoy. *Apprendre à programmer en Turbo C*. Chihab- EYROLLES, 1994.

**Semester : 02**
**Fundamental teaching unit: UEF22**
**Module : Machine structure 2**
**Credits : 4**
**Coefficient : 2**

**Teaching objectives:** At the end of the semester, students benefit from basic knowledge of computer architecture and the operating principle of each component. This knowledge will serve as a platform for other aspects related to the computer (programming, database, networks,…).

**Recommended prior knowledge:** Students must have basic knowledge of computer science.

**Content of module :**
**Chapiter 1 : Introduction**
**Chapiter 2 : Combinatorial logic**
- Definition.
- Combinatorial circuits.
- Steps in designing a combinational circuit:
  - Establishment of the truth table.
  - Simplification of logic functions.
  - Creation of the logical diagram.
- Study of some common combinatorial circuits:
  - The half adder.
  - The full adder.
  - The adder subtractor (in true complement)
  - Decoders.
  - Multiplexers.
  - Priority encoders.
  - Demultiplexers.
- Other examples of combinational circuits.
**Chapiter 3 : Sequential logic.**
- Definition.
- The seesaws (RS, JK, D)
- Registers (parallel loading and shift)
- The memories.
- Synthesis of a sequential circuit (automata):
  - Moore automaton and Mealy automata.
  - Transition graph and matrix.
  - Choice of flip-flops and coding of states.
  - Flip-flop excitation matrix.
  - Simplification of logic functions.
  - Establishment of the logical diagram.
- Creation of automata :
  - Counters/down counters.
  - Other examples of automata.

**Chapiter 4 : Integrated circuits.**
- Definition
- Study of the characteristics of a simple integrated circuit (example circuit or 7432)
- Notions on carrying out the assembly of a simple combinatorial circuit using integrated circuits.

**Evaluation mode : Exam (60%) , continuous control (40%)**

**References**

- <u>John R. Gregg</u>, Ones and Zeros: Understanding Boolean Algebra, Digital Circuits, and the Logic of Sets 1st Edition , Wiley & sons Inc. publishing, 1998, ISBN: 978-0-7803-3426-7.
- Bradford Henry Arnold , Logic and Boolean Algebra, Dover publication, Inc., Mineola, New York, 2011, ISBN-13: *978-0-486-48385-6*
- Alain Cazes,Joëlle Delacroix, architecture des machines et des systèmes informatiques : Cours et exercices corrigés, 3° édition, Dunod 2008.

**Semester : 02**
**Teaching unit: Methodological**
**Module : Introduction to probability and descriptive statistics**
**Credits : 3**
**Coefficient : 2**

**Teaching objectives:**
   Introduce the fundamental notions of probability and statistical series with one variable and two variables.
**Recommended prior knowledge**: Basic mathematics.

**Content of module :**

**Chapiter 1 :   Basic notions and statistical vocabulary**
- Basic concepts of statistics (Population and individual, Variable (or character))
- Statistical tables: Case of qualitative variables (Circular representation by sectors, Organ pipe representation, Bar chart), case of quantitative variables (Bar chart, Histogram, Polygon).

**Chapiter 2 : Numerical representation of data**

- Characteristics of central tendency or position (Median, Quartiles, Interquartile range, Mode, Arithmetic mean, Weighted arithmetic mean, Geometric mean, Harmonic mean, Quadratic mean).
- Dispersion characteristics (range, standard deviation, average absolute deviation, coefficient of variation).

**Chapiter3 : Calculation of probabilities**
- Combinatorial analysis: (Fundamental principle of combinatorial analysis, Arrangements, Permutations, Combinations).
- Probabilizable space: (Random experiment, Elementary and compound events, Realization of an event, Incompatible event, Complete event system, Algebra of events, Probabilizable space, Concept of probability).
- Probable space: (Definitions, consequence of the definition, conditional probability, independent events, independent experiments)
- Construction of a probability
- Conditional probabilities, independence and compound probabilities (Conditional probabilities, Independence, Mutual independence, Compound probabilities, Bayes formula).

**Evaluation mode : Exam (60%) , continuous control (40%)**
**References**
- G. Calot, Cours de statistique descriptive, Dunod, Paris, 1973.
- P. Bailly, Exercices corrigés de statistique descriptive, OPU Alger, 1993.
- H. Hamdani, Statistique descriptive avec initiation aux méthodes d'analyse de l'information économique: exercices et corriges, OPU Alger, 2006.
- K. Redjdal, Probabilités, OPU Alger, 2004

**Semester : 02**
**Teaching unit: Methodological**
**Module : Information and communication technology**
**Credits : 2**
**Coefficient : 1**
**Content of module :**
**Teaching objectives:** Familiarization with computer science tools and the Internet.

**Recommended prior knowledge:** General computer science knowledge.

**Content of module :**
**Chapiter 1 : The TIC : tools and applications**
  a. definition
  b. tools of TIC :
   i.  computers
   ii.  softwares
   iii.  communications networks
   iv.  smart chips
  c. applications of TICs
   i.  communications spaces: Internet, Intranet, Extranet
   ii.  databases
   iii.  multimedia: Audioconferencing, videoconferencing
   iv.  electronic data interchange (EDI)
   v.  the  workflows

**Chapter 2  Introduction to web technology**
  2.1 Presentation of the internet
    2.1.1 Definition
    2.1.2 Applications
    2.1.3 Terminologies
  2.2 Searching the web
    2.2.1 Search tools
      2.2.1.1 search engines
      2.2.1.2 directories
      2.2.1.3 automatic indexing
      2.2.1.4 browsers
    2.2.2 Search refinement
      2.2.2.1 choice of keywords
      2.2.2.2 boolean operators
      2.2.2.3 adjacency, truncation
    2.2.3 queries by fields, advanced search
    2.2.4 Other search tools
**Chapiter 3 : the contributions of NICTs to external communication**
  3.1 Advertising on the Internet
    3.1. 1. Banners
    3.1.2. Interstitials
    3.1.3. The Windows
  3.2 Online site promotion:
    3.2.1 The sponsoring
    3.2.2. The electronic community
    3.2.3. The'e-mailing
  3.3 The security of an online payment system
    3.3.1. Encryption
    3.3.2. Website data protection

**Evaluation mode : Exam (100%)**

**References**

- Collectif Eni **,** Microsoft Office 2016Word, Excel, PowerPoint, Outlook 2016 - Fonctions de base**,** Eni Collection : Référence bureautique,2016
- Dan Gookin, Greg Harvey, Word et Excel 2016 pour les nuls, First, Collection : Pour les nuls - Poche (informatique), 2016

- Myriam GRIS, Initiation à Internet, Eni editions, 2009

**Semester : 02**
**Teaching unit: Methodological**
**Module : Programming Tools for Mathematics**
**Credits : 2**
**Coefficient : 1**

**Teaching objectives:**   Mastery of scientific software.
**Recommended prior knowledge:** Basic programming

**Content of the subject:**

> **Chapter 1**: Mastery of Software (Matlab, Scilab, Mathematica, etc.)
> **Chapter 2**: Examples of applications and resolution techniques

**Evaluation mode : Exam (60%) , continuous control (40%)**

**References**

- Data Analysis Software: Gnu Octave, Mathematica, MATLAB, Maple, Scilab, Social Network Analysis Software, LabVIEW, Eicaslab. 2010. Editeur Books LLC., 2010.
- J.T. Lapresté., Outils mathématiques pour l'étudiant, l'ingénieur et le chercheur avec Matlab, 2008; Editeur ellipses.
- Grenier Jean-Pierre, Débuter en Algorithmique avec MATLAB et SCILAB, Editeur ellipses, 2007

**Semester : 02**
**Teaching unit: Transversal**
**Module : Physics 2 (general Electricity)**
**Credits : 3**
**Coefficient : 2**

**Teaching objectives:**
At the end of this course, the student will have to acquire basic knowledge in electricity and magnetism (Calculation of electric and magnetic fields and potentials, Calculation of currents, etc.), so as to be able to analyze and interpret the phenomena linked to it.
**Recommended prior knowledge:** Basic notions of Physics

**Content of module:**

**Chapter 1: Electrostatics**
- Electrostatic forces
- Fields
- Potential
- Electric dipole
- Gauss's theorem

**Chapter 2: Drivers**
- Total and partial influence
- Calculation of capacities – Resistances – Laws
- Generalized Ohm's law

**Chapter 3: Electrokinetics**
- Ohm's law
- Kirchoff's law
- Thévenin's law - Norton

**Chapter 4: Magnetostatics**
- Magnetostatic force (Lorentz and Laplace)
- Magnetic fields
- Law of Biot and Sawark

**Evaluation mode: Exam (60%) , continuous control (40%)**

**References**
- T. Neffati. Electricité générale. 2008. Editions Dunod
- D. Bohn.  . Electricité générale. 2009. Editions SAEP
- Y. Granjon.  Electricité générale. 2009. Editions Dunod

**Semester : 03**
**Unit teaching fundamental : UEF1**
  **Subject: Computer architecture**
  **Credits : 5**
  **Coefficient : 3**
  **Goals of teaching :** there matter has For objective of put in clear THE principle of functioning of the computer with a presentation detailed of architecture of the computer.
  **Knowledge prerequisites recommended :**
  **Content of there matter :**
  **Chapter 1:**
- Introduction to the notion of architecture of the computers
- There von machine Neumann and the machine Harvard.
  **Chapter 2 : Main components of a computer**
- Plan overall of a architecture
- UAL
- THE bus
- THE registers
- There memory internal : memory RAM (SRAM And DRAM), ROM, time access, latency,...
- There memory hidden : utility And principle, algorithms of management of hidden (Notions of base)
- Hierarchy of memories

  **Chapter 3 :** Notions on THE instructions of a computer :
- Language from above level, assembler, language machine
- THE instructions machines usual (arithmetic, logical, of comparison, loading, storage, transfer, jumps,…)
- Principle of compilation And assembly (Notions of base)
- The unit of control And of order
- Phases of execution of a instruction (search, decoding, execution, storage of the results)
- UCC pipeline
- The clock And the sequencer

  **Chapter 4 :  THE processor**

- Role of processor, calculation of CPI (Cycle per Instruction), THE processors CISC And RISC.
- THE microprocessor MIPS R3000
- Structure external of processor MIPS R3000
- Structure internal of processor MIPS R3000
- Game instructions, Formats And programming of MIPS R3000.
- Programming of MIPS R3000
  **Chapter 5: instructions special**
Notions on THE interruptions, THE entries exits And THE instructions systems (case of MIPS R3000)
  **Evaluation method: Examination (60%), continuous**
  **assessment (40%)References**

- Alan Cazes , Joelle Delacroix, Architecture of the machines And of the systems IT 4 thedition, *collection : Computer science, Dunod, 2011.*

- Andrew S. Tanenbaum, Todd Austin  Structured Computer Organization, Pearson, 2012.
- Paolo Zanella, Yves Ligier, Emmanuel Lazard , Computer architecture and technology: Courses and exercises - *Collection : Sup Sciences, Dunod* , 5th editing, 2013.
- Connections towards THE MIPS microprocessor R3000
- ftp://132.227.86.9/pub/mips/mips.asm.pdf
- ftp://asim.lip6.fr/pub/mips/mips.externe.pdf

- ftp://asim.lip6.fr/pub/mips/mips.interne.pdf

**Semester : 03**
**Unit teaching fundamental : UEF1**
**Subject Algorithmics and data structure 3**
**Credits : 6**
**Coefficient : 3**

**Teaching objectives:** this module will allow students to learn, on the one hand, the development of certain basic algorithm in computer science, on the other hand, they will learn to manipulate structure of data more developed.

**Knowledge prerequisites recommended** : algorithmic of base

**Content of there matter :**

**Reminder**

**Chapter 1 : Complexity algorithmic**
     1. Introduction has there complexity
     2. Calculation of complexity

**Chapter 2: Algorithms of sorting**
     1. Presentation
     2. Sorting has bubbles
     3. Sorting by selection
     4. Sorting by insertion
     5. Sorting merger
     6. Sorting fast

**Chapter 3 : THE trees**
     1. Introduction
     2. Definitions
     3. TREE binary
       Definition
       Passage of a TREE n-ary to TREE binary
       Course of a TREE binary
       *Course prefix (preorder Or RGD)*
       *Course infixed (projective, symmetrical Or Again GRD)*
       *Course postfixed (order terminal Or GDR)*
          Trees binary individuals
           *TREE binary complete*
        *3.5.3. TREE binary of research*

**Chapter 4 : THE graphs**
     1. Definition
     2. Representation of the graphs
     3. Course of the graphs

**NB : TP in vs.**

**Fashion devaluation : Exam (60%), control continuous (40%)**

- Thomas H. Cormen, Algorithms Notions of base *Collection : Science Sup, Dunod,* 2013.
- Thomas H. Cormen, Charles E. Leiserson , Ronald L. Rivest Algorithmic - 3rd editing - Course with957

exercises And 158 problems Pin, Dunod, 2010.

- Remy Malgouyres, Rita Zrour And Fabian Feschet. *Initiation has algorithmic And has there programming in*

  *VS : course with 129 exercises corrected* . 2nd <sup>Edition</sup> . Dunod, Paris, 2011. ISBN : 978-2-10-055703-5.
- Damien Berthet And Vincent Labatut. *Algorithmic & programming in language VS - vol.1 : Brackets of course* . Licence. Algorithmic and Programming, Istanbul, Türkiye. 2014, pp.232.
- Damien Berthet and Vincent Labatut. *Algorithmics & programming in C language - vol.2: Topics of practical work* . Licence. Algorithmics and Programming, Istanbul, Türkiye. 2014, pp.258. <cel-01176120>
- Damien Berthet and Vincent Labatut. *Algorithmics & programming in C language - vol.3: Answers to practical work* . Licence. Algorithmics and Programming, Istanbul, Türkiye. 2014, pp.217. <cel-01176121>
- Claude Delannoy. *Learn has program in Turbo VS* . Chihab- EYROLLES, 1994.

**Semester : 03**
**Unit teaching fundamental : UEF1**
  **Subject: Information systems**
  **Credits : 5**
  **Coefficient : 3**

**Teaching objectives:** Understand what a business information system is; (2) Understand the different constituent dimensions of an IS: a. Technical dimension b. Organizational dimension c. Managerial dimension (3) Understand the different elements of an IS: a. piloting system b. system decision-making vs. system operational (4) To understand the joint of IF with there strategy business (governance of IF - management IS projects)

**Knowledge prerequisites recommended:** algorithmic,

**Content of there matter :**
**Chapter 1 : Generality**

- Definitions And characterizations of the company (THE aspects functional And structural),
- Systemic approach to organizations: Overall presentation of the three systems (THE decision system, classification of decisions: by level and by method, a technique programmable decision, decision tables), The information system (Aspects functional and structural aspects: concept of station, workstation, flow, documents),The diagram of flow.

**Chapter 2: THE Techniques of representation of information**

Notion of information, Forms and manipulation of information, Study of information:Class and class realization, class description, etc. Schema and coding of information

**Chapter 3: Seizure And control of information**

Different types of control of information

**Chapter 4: Methodology of development of a IF: MERIS**

- Process of development of a IF
- Level of abstraction of model of data And treatments
- Methodology MERIS
- Concepts for static modeling (Notion of entity and association, a model conceptual data: the MERISE MCD. Concepts for dynamic modeling: MCTof MERISE.

**Evaluation method: Examination (60%), continuous**
**assessment (40%)References**

- Coord. P. Vidal, P. Planeix,  Systems of information organizational, 2005.
- Coord. ML. Caron-Fasan & NOT. Lesca, Present And future of the information system, 2003, PUG. p.
- Kalika Mr. & alii, THE e-management. What transformations For the company ? , 2003, Editions Connections.
- JLLemoigne, There theory of general system. PUF-
- v. Bertalanfy, Theory general of the systems. Dunod.
- x. Castellani, Method general analysis of a application computer science. Masson, 1975.
- Tardieu And al. , " there method cherry : principles And tools ", ed. organization, 1983.-
- Tardieu And al. , " there cherry method : Steps and practical » ed. organization, 1985.-
- Tambourier, " the other side of Merise », ed. organization, 1986.-
- J. P. Mathéron, " To understand Merise ", 1990

**Semester : 03**
**Unit teaching fundamental : UEF1**
  **Subject: Graph theoriesCredits**
  **: 4**
  **Coefficient : 2**

**Teaching objectives:** Graph theories have become a theoretical and practical foundation essential in the process of modeling certain problems in several domains. The contribution of graphs in problem solving lies in the graphic simplicity, the similarity with distributed aspects and the notions of traversal and path searches. The objective of this course is to present to the student on the one hand a solution modeling in the form of a graph, on the other hand this course will contain a set of techniques allowing the student to solve their problems through algorithms like research of path minimal, the flow maximum etc.

**Recommended prior knowledgeContent**

**of there matter :**
## Chapter I. Definitions of base
        I.1. Definition "intuitive" of a graph
        2. Definition mathematical of a graph
        3. Order, orientation And multiplicity
        Order
        Orientation
                    Multiplicity
        4. Relationships between THE elements of a graph
        Relationships between summits
        Relationships between bows And summits
        Qualifiers of the graphs
        5. Dies associated with A graph
        Matrix incidence arc-vertex
        Matrix of adjacency Or incidence summits-summits
        Shape condensed of the matrices hollow
        6. Vocabulary related to the connectedness
        Chain, path, length
                    Connectedness
                    Cycle And circuit
                    Cocycle And cocircuit.
## Chapter II. Cycles
1. Numbers cyclomatic And cocyclomatic
        1.   Decomposition of the cycles And of the cocycles in are elementary
        2.   Lemma of the bows colorful (Minty 1960)
        3.   Base of cycles and basis of cocycles
2. Planarity

        1. Graph Planar
        2. Formula of Euler
        3. Theorem of Kuratowski (1930)
        4. Graph Dual
3. TREE, forest And tree structure
    1.   Definitions
    2.   Properties
    3.   TREE maximum (Or covering).
## Chapter III. Flows
1. Definitions

2. Research of a flow maximum In A network of transportation
   4. Definition

5. Theorem of Ford-Fulkerson
6. Algorithm of Ford-Fulkerson
3. Research of a flow compatible

## Chapter IV. Problems of path
1. Research of the components related
    1. Presentation of the goals
    2. Algorithm of Trémeaux-Tarjan
2. Research of more short path
    1. Presentation of the terms
    2. Algorithm of Moore-Dijkstra
3. Research of a TREE of weight extreme
    1. Presentation of the goals
    2. Algorithm of Kruskal 1956

## Chapter v. Problems Hamiltonian And Eulerian
1. Issue Hamiltonian
    1. Definitions
    2. Condition necessary of existence of a cycle Hamiltonian
    3. Condition sufficient of existence of a circuit Hamiltonian
    4. Condition sufficient of existence of a cycle Hamiltonian
2. Issue Eulerian
    1. Definitions
    2. Condition necessary And sufficient of existence of a chain Eulerian
    3. Algorithm local for draw a cycle Eulerian
    4. Link between issue Eulerian And Hamiltonian

## Chapter VI. Coloring
    1. Definitions
    2. Coloring of the summits
    3. Coloring of the edges
    4. Proposals
    5. THE theorem of "4 colors"
    6. Graph Perfect

**Fashion devaluation : Exam (60%) , control continuous (40%)**

## References

- Claude Bank, Graphs And hypergraphs, Bordas 1973, (300 pages).
- Nguyen Huy Xuong, Mathematics discreet And computer science, Masson, 1997
- Love Know, There theory of the graphs, What-I-Know ?, 1974 ; reissue planned in 2004 at Cassini.
- Mr. Kaufmann, Of the points of the arrows, there theory of the graphs, Dunod, Sciencespoche, exhausted.
- Alan Gibbons, Algorithmic graph theory, Cambridge University Press, 1985
- Reinhard Diestel, Graph Theory, Second Editing, Springer-Verlag, 2000.
- Bojan Mohar, Carsten Thomassen, Graphs on surfaces, John Hopkins University Press, Baltimore, 2001.

**Semester : 03**
**Methodological teaching unit: UEM**
**Matter : Numerical methods**
**Credits: 4**
**Coefficient : 2**

**Goals of teaching :** this matter will allow to students to invest THE domain of the methods digital required has there resolution of the problems

**Knowledge prerequisites recommended:** mathematics of base

**Content of there matter :**

**Chapter 1 : General on analysis digital And THE calculation scientist**
> Motivations.
>> Arithmetic in comma floating And errors rounding
> Representation of the numbers in machine
> Errors rounding
>> Stability And analysis error of the methods digital And conditioning of a issue

**Chapter 2 : Methods direct of resolution of the systems linear**
> Remarks on there resolution of the systems triangular
>> Method elimination of Gauss
> Interpretation matrix of elimination of Gauss : there factorization READ

**Chapter 3: Methods iterative of resolution of the systems linear**
> General
>> Methods of Jacobi And of over-relaxation
>> Methods of Gauss-Seidel And of over-relaxation successive
> Remarks on the implementation of the methods iterative
> Convergence of the methods of Jacobi And Gauss-Seidel

**Chapter 4 : Calculation of values And of vectors clean**
> Location of the values clean
> Method of there power

**Chapter 5: Analysis matrix**
> Spaces vector
>> Dies
> Operations on THE matrices
> Connections between applications linear And matrices
> Reverse of a matrix
> Trace And determining of a matrix
> Values And eigenvectors
> Dies similar
> A few matrices particular
> Standards And products scalars
> Definitions
> Products scalars And standards vector
> Standards of matrices. . . . .

**Fashion devaluation : Exam (60%), control continuous (40%).**

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**References :**

- Mr. Schatzmann Analysis digital : a approach mathematical, Dunod 2004.
- PG Ciarlet, Introduction has analysis matrix And has optimization, Masson 1990.
- J. Demmel, Applied Digital Linear Analysis, SIAM 1997 ;
- vs. D. Meyer, Matrix Analysis and Applied Linear Algebra, SIAM 2000 ;
- P. Lascaux And J. Theodor, Analysis digital matrix applied has art of the engineer, 2 volumes, Masson 1988.
- G. H. Golub, C. f. van Loan, Matrix Computations, Tea Johns Hopkins University Press, 1989.

**Semester: 03**
**Methodological teaching unitSubject:**
**Mathematical logic Credits : 4**
**Coefficient : 2**

**Goals of teaching :** Formalization of reasoning human

**Recommended prior knowledge:** basic knowledge of mathematics and algebra ofBoole.
**Content of there matter :**
**Chapter 1: Introduction**

    a. Objects of there logic
    b. Syntax And semantics

**Chapter 2: Logic of the proposals**

    i. Syntax
      1. THE proposals
      2. THE logical connectors
      3. Variables And formulas propositional
      4. Substitution In a formula
      5. Formulas logical And trees
    ii. Semantics
      1. Interpretation
      2. Tables of truth
      3. Tautologies And antilogies
      4. Equivalence semantics
      5. Shapes normal conjunctiva And disjunctive
      6. Satisfaction And validity
    iii. Resolution
      1. Refutation
      2. Setting in shape clausal
      3. Ruler of resolution propositional
      4. There method of resolution propositional

**Chapter 3: Logic of the predicates**

    c. Syntax
      i. Terms
      ii. Predicates
      iii. Quantifiers
      iv. Formulas
        1. Scope of a identifier
        2. Variables free, variables linked
    d. Semantics
      i. Structure
      ii. Satisfaction of a formula

**Evaluation method: Examination (60%), continuous**
**assessment (40%)References**

1. SC Kleene. Logic mathematical. Collection U, Armand Colin, Paris 1971.
2. J.L. Krivine. Elements of Mathematical Logic. North Holland Publishing Company Amsterdam, 1967.
3. A. Cori. Mathematical logic. Volume 1: Propositional calculus, Boolean algebra, calculation ofpredicates. Dunod, 2003.

**Semester: 03**
**Transversal teaching unit: UTMatter :**
**Language foreigner 2**
**Credits: 2**
**Coefficient : 1**

**Teaching objectives** : Deepening and use of the English language in the handling of documents.

**Knowledge prerequisites recommended:** Good knowledge of English.

**Content of there matter :**
- Activities didactics.

- Understanding of documents writings in language English.

- Reformulations.

- Production written.

- Exercises of translation : French - English and English - French.

- Trials of writing of small reports techniques.

**Evaluation mode: Exam (100%)**

**References**

- Murphy. English Grammar in Worn. Cambridge University Press. 3rd‐editing, 2004
- Mr. Mc Carthy And f. O'Dell, English vocabulary in worn, Cambridge University Press, 1994
- L. Rozakis, English grammar for tea absolutely confused, Mc Graw-Hill, 1 st editing, 2003
- Oxford Progressive English books.

**Semester: 04**
**Fundamental teaching unit: UEF1Matter :**
**Theory of the languages**
**Credits: 5**
**Coefficient : 2**

**Goals of teaching** : to understand there theory and the tools of there theory of the languages

**Knowledge prerequisites recommended :** Knowledge of base in mathematics And in computer science

**Content of there matter :**
**Chapter 1: Introduction**
**(objectives…) Chapter 2: Alphabets,**
**Words, LanguagesChapter 3 :**
**Grammars**
1. Definitions
2. Derivation And language generates
3. TREE of derivation
4. Hierarchy of Chomsky

**Chapter 4** : Automata of states finished (AEF)
1. AEF deterministic
2. presentations of a automaton
3. Automata equivalents and complete
4. AEF No deterministic (determination)
5. Automata And languages regular (transformations And properties))

**Chapter 5: Phrases Regular**
1. Definitions
2. Theorem of Kleene
3. Star Lemma **Chapter 6:**

Minimizing an AEF**Chapter 7:**
Languages Algebraic
1. Properties of a grammar regular
2. Transformations of a grammar
3. Grammar scaled down
4. Grammar own
5. Elimination of the recursions to the left
6. Shapes normal

**Chapter 8:** Automata Battery
1. Definition
2. Configuration, transition And calculation
3. Criteria acceptance
4. Automata has Battery deterministic

**Chapter 9:** Machine of Turing
1. Definition
2. Configuration, transition And calculation
3. Acceptance

**Evaluation method: Examination (60%), continuous**

**assessment (40%)References**
1. P. Wolper. Introduction has there calculability. 2006, Dunod.
2. P. Séebold. Theory of the automata. 2009, Vuibert.
3. J.M. Autebert Theory of the languages And of the automata. 1994, Masson.
4. J. Hopcroft, J. Ullman. Introduction to Automata Theory, Languages and Compilation 1979, Addison-Wesley

**Semester : 04**
**Fundamental teaching unit: UEF1Matter : Operating system 1**
**Credits: 5**
**Coefficient : 3**

Teaching objectives: Introduce the basic notions of operating systems, their roles in the management of machine resources: processor and central memory then present the mechanisms and the techniques used has these purposes.

**Knowledge prerequisites recommended :** algorithmic And structures of data, structure machine.
**Content of there matter :**
**Chapter 1: Introduction**
- Notion of system operating.
- Functions And roles.
- Examples of systems operating (Windows, Unix, Android,…)

**Chapter 2 : There management of processor**
- Definitions
  - Notion of Program.
  - Notion of Process.
  - Notion of Thread.
  - Notion resource
  - Notion work (Job)
- Different states of a process.
- Hierarchies of process.
- Relationships between process (competition, cooperation And synchronization).
- Techniques scheduling of process :
  - Criteria (Equity, efficiency, time of answer, time execution, yield)
- Scheduling algorithms (among most used):
  - Turnstile (Round robin RR).
  - Algorithm of first entered, first served Or FCFS (First come First-Served).
  - Algorithm of work THE more short First of all Or SJF (Shorttest Job First).
  - Algorithm of time remaining THE more short Or SRT (Shorttest Remaining Time).
  - Algorithm with priority.

**Chapter 3 : Management of there memory**
- Goals.
- Monoprogramming.
- Multiprogramming :
  a) Sheet music multiple contiguous.
  - Sheet music contiguous fixed.
  - Sheet music contiguous dynamics:
    1- First Fit Strategy 2- Strategy of best Who agrees (Best Fist)3- Strategy of worse Who suitable (Worst Fit).
      a. Sheet music contiguous Siamese (Buddy system)
      b. Re-allocation And protection
      c. Go And come (Swap)
      d. Fragmentation And Compaction
- Multiprogramming And sheet music multiple No contiguous
  1. Paging
  2. Segmentation
  3. Segmentation paginated.
- There memory Virtual
  - Concept of memory Virtual.

- Overlays (segments of recovery)
- Paging has there request
- A few algorithms of replacement of the pages :

-Algorithm optimal

-Replacement Random

-Order Chronological of Loading (FIFO) (with REMARK on the anomaly of Belady).

- Order Chronological of use (LRU: Least Recently Used).

- Frequency of use (LFU: Least Frequently Used).

- Algorithm of there second chance.

**Chapter 4: The Unix system.**

**Works directed And practice**
THE TDs will wear on proposals of algorithms around of the different chapters. These algorithms will be developed in TP using the C language under Unix.THE
system Unix will do the object of the first sessions of TPs.

**Evaluation method: Examination (60%), continuous**

**assessment (40%)References**

- • Tanenbaum, Modern operating systems, third editing, Pearson, 2014
- • HAS. Tanenbaum, Systems operating, Dunod, 1994.
- • Michel Divay , Unix, Linux and operating systems: courses and corrected exercises , Dunod , collection : Science sup, 2004.
- • Crocus, Systems operating of the computers, Dunod, 1993.
- • Sasha Krakowiak, Principles of the systems operating of the computers, Dunod, 1993

**Semester : 4**
**Fundamental teaching unit**
**Matter : Basics of Data**
**Credits : 5**
**Coefficient : 3**

**Teaching objectives** : This course should allow the student to identify the interest in structuring and manipulate data in tabular form. Through the relational model and sub-relational algebra underlying oriented more towards the practical aspect, the student should understand the importance of structuring the data, the concept of independence of data and processing, as well as the integrity and consistency ofdata.

**Knowledge prerequisites recommended** : The student East sensible to understand This that it is of the files (texts,
binary or typed) and the having created with the languages previously studied.

**Content of there matter :**
**Chapter 1: Presentation of the basics of data**
    1. Notions of files (interests And boundaries)
    2. Definition of base of data
    3. Definition of system of management of base of data
    4. Types of models of data (semantics, entity-association, hierarchical, network, relational)

**Chapter 2 : Model relational**
    1. Definition of relational model
    2. Concepts of base (Attribute, Tuple, Domain, Relationship)
    3. Plan of relationship
    4. Standardization
    a. Key of relationship And addiction functional (Key primary And key foreign)
    b. Constraints of integrity
    c. Shapes normal (1FN, 2FN, 3FN, F.N. of Boyce-Codd)
    d. Plan of base of data
    5. Model logical relational (SQL)
    a. Table, column, And line
    b. Description of SQL (Structured Query language)
    c. Definitions of data
        i. Creation of table (CREATE)
        ii. Edit of plan (ALTER, DROP)
    d. Handling of the data (INSERT, UPDATE, DELETE)
**Chapter 3 : Algebra relational**
    1. Definition
    2. Operations And operators unary
    a. Selection
    b. Projection
    c. Translation in SQL
        i. Queries simple (SELECT-FROM)
        ii. Selection of column (clause WHERE)
        iii. Sorting of results (ORDER BY)
    3. Operations And operators set designers
    a. Union
    b. Intersection
    c. Difference
    d. Product Cartesian
    e. Join (Theta, natural, equijoin, external)
    f. Division
    g. Translation in SQL
        i. Operators of union, intersection, And of difference

ii.   Product Cartesian (without join)

iii. Join of tables (condition join)
iv. Functions aggregate
v. Clause G'OUP BY … HAVING

**Fashion devaluation : Exam (60%) , control continuous (40%)**

**References:**
- Basics of data. George Gardarin. 5th – editing 2003
- SQL THE fundamentals of language. Eric Godoc And Anne-Christine Bisson. Editing Eni. 2017
- Databases: concepts, use and development. Jean-Luc Hainaut. DUNOD edition.2015

**Semester : 04**
**Fundamental teaching unit: UEF2**
**Matter : Networks**
**Credits: 5**
**Coefficient : 3**

**Goals of teaching:** this matter has For objective of give to students THE Notions essential for a good understanding of networks. They must be able to explain what a network, of What he compound, how computers can communicate between them, describe THE different types of media, THE different types of topologies Thus that one study detailed on THE fivelayers of Internet model.

- Give back the student apt has to understand THE functioning, has to plan installation And has to useA network of computers.
- Familiarize the student to various layers of implantation of a network of computers.
- Initiate the student to main protocols of communication And of routing of the messages.
- Familiarize the student with THE main components of a network of computers.
- Give back the student apt has to use THE services of base of a network has the interior of a program.

**Knowledge prerequisites recommended :** Structure machine, components And systems.

**Content of there matter :**
**Chapter I : Introduction At Networks**
- Use of the networks
- Features Physical
- Topologies of the networks
- Models of references (OSI, TCP/IP)
- Types of gateways

**Chapter II: Layer Physical**
- Terminology of Networks
- Signals, decomposition, noise
- Brackets of transmission guided And unguided
- Transmission digital : Conversion of the analog At digital
- Transmission digital : Conversion of digital At digital
- Sampling
- Transmission similar : Conversion of digital has the analog
- Transmission similar : Conversion of the analog has the analog
- Multiplexer And Concentrator

**Chapter III: Layer Connection of Data**
- Addressing
- Control of flow
- Standard 802.3 and format Ethernet
- Control of the errors
- Control Access multiple
    - Switching of circuit

**Chapter IV: Layer Networks**
- Addressing IP, classes, notion of the subnets
- Protocol IP : IPV4, IPV6
- Fragmentation of the packages
- Switching of packages
- Routing : techniques centralized, techniques distributed
- Routing static And routing dynamic
- Hierarchical routing And external

**Chapter IV: Layer Transportation**
- Notion address transportation
- Protocols UDP And TCP
- Quality of service

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- Control of congestion
**Chapter IV: Layer Application**
- Protocol SMTP
- Protocol HTTP
- Protocol FTP
- Protocol DHCP
- Protocol DNS

**Works practice**
**Lab 1: Basic configuration of a**
**networkTP 2 : Programming**
**network (Socket) TP 3: Routing**
**TP 4: Analyzer of protocols**

**Fashion devaluation : Exam (60%) , control continuous (40%)**

**References**

- Forouzan, Behrouz HAS., and S. vs. Fegan. "Data communication and computer networks." (2007).
- Tanenbaum, Andrew S. "Computer networks, 4-th editing." ed: Prentice Lobby (2003).

**Semester : 4**
**Methodological teaching unit: UEM**
**Subject: Object Oriented Programming**
**Credits: 4**
**Coefficient : 2**

**Goals of teaching** : The objective of This course East the introduction of the concepts of base of there object-oriented programming (OOP) through practice using the Java language. Each chapter includes some Notions Who are translated has her END in Java For that the student can translate THE concepts theoretical acquired in practical. HAS there end of semester, the student East supposed to have acquired skills following :

1- Gasoline of there programming object And her transformation in language Java
2- Acquire A reasoning intuitive For give a solution has A issue simple according to The approach oriented object
3- To write A program in language Java Who either functional
4- Gasoline And the importance of reasoning OO And of there OOP

**Knowledge prerequisites** :Language VS
**Content of there matter :**
**Chapter 1. Basics of there OOP**

1. Introduction
2. Concepts fundamentals of there OOP
   a. Little historical of there OOP
   b. Programming procedural vs. programming by objects
   c. Reuse of coded
   d. Introduction to the modularity
3. THE of objects And THE classes
   a. Notions of object
   b. Notions class
   c. Attributes
   d. Notion of message
   e. Resolution of problems by exchange of messages
4. Introduction in Java
   a. Types And structures of control in Java
   b. Classes and instantiation
   c. Methods
   d. THE references And passage of settings
   e. Entries exits
   f. Builder by default And others builders
   g. Destroyers

**Chapter 2. Encapsulation**

1. Levels of visibility
2. Encapsulation
   a. Encapsulation of data (attributes)
   b. Encapsulation of coded (Posts)
3. Encapsulation in Java
   a. Control access (audience, private)
   b. Accessors (get and set)
   c. Access has the instance (this)
   d. Variables And methods of class (static)

**Chapter 3. Legacy**

1. Subclasses And legacy
2. Legacy simple, legacy multiple

3. Hierarchy of classes
4. Polymorphism
5. Legacy and polymorphism in Java
    a. Legacy simple (extends)
    b. Encapsulation In the inheritance
        i. Protection of the members (protected)
        ii. Builders of the classes (this(), great())
        iii. Class 'Object'
        iv. Typecasting implicit And explicit
        v. Limitation of the inheritance (final)
    c. Polymorphism
        i. Overload of methods
        ii. Redefinition of methods
    d. Classes abstract (use And importance)
    e. Interfaces (use And importance)

**Fashion devaluation : Exam (60%) , control continuous (40%)**

**References**

1. Learn there Programming Oriented Object with THE language Java. Luke Gervais. Eni. 2nd ‑ editing.
2. https://openclassrooms.com/courses/apprenez-a-programmer-en-java
3. Java 8 - Learn Object Oriented Programming and master the language. Thierry GROUSSARD Luc GERVAIS. Editing ENI. 2015.
4. There programming object in Java. Michael Divay. Editing DUNOD. 2006.

**Semester : 04**
**Methodological teaching unit: UEM**
**Subject: Web application development**
**Credits : 4**
**Coefficient : 2**

**Teaching Objectives:** The ultimate objective is to learn how to implement a web application.

**Knowledge prerequisites recommended :** Fundamentals on algorithmic and programming.Notions

basic on Internet and Networks.

**Content of there matter :**

**Chapter 1:** Introduction to world Wide Web
     1. Definition and history
     2. Architecture Client server
     3. Protocol HTTP.

**Chapter 2 :** Languages programming for the Web
     1. General : page static, page dynamic And apps Web
     2. Languages of tag : definition And historical
     3. HTML
       What is that HTML ?
       Context of execution HTML
       HTML of base
       Framework of a document HTML (on your mind, body, Connections, …)
       Paintings, Frames, Forms
            HTML 5.0
            Leaves of style (CSS 3)
            JavaScript
            Control of the forms HTML in JavaScript
     4. XML
         Structure of a document XML
         DTD (Document Kind Definition)
         XML Plan
         XSLT

**Chapter 3 :** Language of programming side server (PHP)
     1. Introduction
     2. Syntax of base
       THE passage of HTML At PHP
       THE separators Instructions
       THE comments
     3. Kinds, variables And operators
     4. Structures of controls
     5. Classes And objects
     6. Features
         Management of the errors
         Management of the loadings of files
         Use of the files has distance
         Management of the connections
         Connections persistent to Basics of Data.
         Management of the sessions
         Applications Web 3rd in PHP

**Chapter 4:** Services Web: Notions of base
   1. Introduction
   2. Architecture oriented services (SOA)
   3. Features of the services Web
      Definition of the services Web
            Architecture of the services Web
   4. Standards For THE services Web
      SOAP
            WSDL
      UDDI
   5. Platforms of development of the services Web
      Development of the services Web (side supplier)
            Development of the services Web (side consumer)
   6. Platform .NET And Java.
            JSP
            ASP


**Chapter 5:** Study of case : development of a web service (side supplier And Then client side)

**Evaluation method: Examination (60%), continuous**

**assessment (40%)Reference :**

Web development course. Available on the website:

https://openclassrooms.com/courses.Jean ENGELS. " *PHP 5 – Courses and exercises*

".  Editions Eyrolles, 2005

Matthew The cross, " *Introduction Web: Course* ". University Paris 13, 2013.

Company Digimind. " *THE Web 2.0 For there day before And there research of information, Exploit THE resources of*
      *web social* ", Digimind, June 2007.

**Semester : 04**
**Transversal teaching**
**unitSubject: foreign**
**language 3 Credits : 2**
**Coefficient : 1**

**Goals of teaching:** Techniques of expression written And oral in English : exposed, defense, group communication. This course should leave students as much freedom as possible to be able to express yourself in English around a specific theme. Each group of students prepares a presentation that he will support in front his comrades in English.

**Knowledge prerequisites Recommended** *Material of English of L1 And Semester 3*

**Content of there matter :**

Techniques of expression oral And written in language English :
- Presentations
- Defense
- Communication in groups
- ...

**Fashion devaluation :** Exam (100%)**Semester : 5**

**Teaching unit: UF1**

**Matter : Operating systems 2**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).
Introduce the problem of parallelism in operating systems and study the implementation of synchronization mechanisms, mutual exclusion and deadlock detection and prevention techniques in a centralized environment.

**Recommended prior knowledge** (brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
1) Basics of operating systems
2) Process concepts

**Content of the subject:**
1) **Notions of cooperation, competition and parallelism**
2) **Mutual exclusion**
3) **Synchronization and communication tools**

**4) Interbocage**
      **a. Detection and healing**
    **b. Prevention**

**Evaluation mode :**

**Exam : 50%**

**TD : 25%**

**TP : 25%**

**References bibliographics** *(Books and mimeographed internet sites, etc.)* :

- A. Silberschatz, P. Galvin Principes des Systèmes d'Exploitation, Addison-Wesly, 1994
- A. Tanenbaum Systèmes d'Exploitation : Systèmes Centralisés, Systèmes Distribués Prentice-Hall 1994
- Andrew Tanenbaum, Jean-Alain Hernandez, René Joly. Corrigés de systèmes d'exploitation. Pearson Education. septembre 2008
- BouzefraneSystèmes d'exploitation - Cours et exercices corrigés. Editions Dunod. 2003

**Semester : 5**

**Teaching unit: UF1**

**Matter : Compilation**

**Credits : 4**

**Coefficient : 2**


**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).
Introduction to the compilation problem:
• from the source text to the assembly code via the abstract syntax tree
• based on a small compiler made in C, in three versions of increasing complexity. The assembler targeted is that of the Architecture course. Classic syntactic analysis technique: Lex and Yacc. The goal of the course is to show the role of the stack in compiling functions on the C model.

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


**Content of matter :**
1) Introduction, problem position, course plan.
2) Abstract syntax and interpretation of the Assembler of the architecture course.
3) Generation of code for arithmetic expressions and for control structures (Assembler Architecture course).
4) Lexical analysis – Lex.
5) Syntactic analysis – Yacc.
6) Application: A lexer-parser for Architecture course assembly.
7) Blocks: principle (Assembler Architecture course).
8) Blocks: creation (Assembler Architecture course).
9) Functions: principle (Assembler Architecture course).
10) Functions: production (Architecture course assembler).
11) Procedures (Architecture Course Assembler).

**Evaluation mode :**

**Exam : 50%**

**TD : 25%**

**TP : 25%**


**References bibliographics** *(Books and mimeographed internet sites, etc.)* :
• Aho, Sethi, Ullman : Compilers (Addison-Wesley) Trad. française chez InterÉditions
• Christopher Fraser and David Hanson. A Retargetable C Compiler : Design and Implementation. Benjamin/Cumming, 1995.

**Semester : 5**

**Teaching unit: UF1**

**Matter : Logic programming**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).

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

**Algorithmic and programming.**

**Content of matter :**
- Introduction to logic programming: PROLOG language
- Main characteristics of this type of programming
- Syntax and data structures – break operator
- Semantics of PROLOG programs
- The problem of negation in PROLOG: the closed world hypothesis and negation by failure.
- Use of the resolution method in the machine implementation of this type of language.

**Evaluation  mode:**
**Continuous : 50%, Exam : 50%**

**References bibliographics** *(Books and mimeographed, websites, etc.)* :
- Chazarain, Programmer avec SCHEME . De la pratique à la théorie. Thomson International, 1996.
- Hoogger. Programmer en logique. Masson, 1987
- Weis& Leroy. Le langage CAML. Interéditions, 1993.

**Semester : 5**

**Teaching unit: UF2**

**Matter : Software engineering 2**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).

This subject represents the second part of the GL1 subject of the second year. The student must deepen his knowledge in software development and software project management. The student must have knowledge of the development of quality software, which requires two types of knowledge: Technical knowledge (software quality testing activity, verification and validation activity, etc.) as well as knowledge of software management. software product life cycle. The student must understand the complexity of managing a software production team, interaction problems, cooperation problems, planning, cost estimation, etc.

**Recommended prior knowledge** (brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
3) Knowledge of the software production life cycle: Phases and Activities;
4) Mastery of object-oriented modeling activities: UML language

**Content of the material:**
   **1) Object-Oriented Design: Agile method, MDA, etc.**
   **2) Software Testing Activity: Objective, Types, Tools;**
   **3) Verification and Validation Activity: Objective, Types, Tools;**
   **4) Planning and Estimation in the software process**

**Evaluation mode :**

**Exam : 50%**

**TD : 25%**

**TP : 25%**

**Bibliographic references** (Books and mimeographed, websites, etc.) :
   **1) Object Oriented Design and Programming 2008**
   - Auteur(s) : Bertrand Meyer
   - Editeur(s) : EyrollesCollection : Blanche
   **2) Software engineering primer  1996**

   de Marie-Claude Gaudel  (Auteur), Bruno Marre  (Auteur), Françoise Schlienger  (Auteur), Gilles Bernot (Auteur)

   **3) Estimation of costs and deadlines using the COCOMO method: 2015**

**Semester : 5**

**Teaching unit: UF2**

**Matter : Human Machine Interaction**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).
The objective of this course is to introduce students to producing ergonomic software that takes the user aspect into account. To do this, it is necessary to study the different interface specification formalisms. Example environments are also provided. It is recommended to carry out practical work on a human-machine interface environment.

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

**Content of mattter:**

I - Introduction.
II- Methodology for HMI design.
III- The different interface specification formalisms.
IV- Ergonomic aspect involved in the design of interfaces.
V- Study of some interface development environments.

**Evaluation mode.**

50 % Exam + 25 % TP +  25 % Personal work.

**References.**

1.D. Floyet A. Vandam « **Fundamentals of interactive computer graphics** » Editon Wesley, 1983
2.B.Shneiderman "Desig**ning the user Interface: Strategies for effective human computers**" Edition Wesley, 1987

**Semester :***5*

**Teaching unit: UM1**

**Matter : Probability and  statistics**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).

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

- Probability Theory.
  * Pair of random variables, study of the Gaussian case, independence conditioning
  * Elementary study of a pair of discrete random variables, extension to absolutely continuous random variables, independence.
  * Convergences (almost sure, in probability, in law).
- Inferential statistics
  • Sampling:
    constitution of samples,
    sampling distributions.
  • Estimate:
    elementary theory,
    point estimation and confidence interval.
  • Hypothesis testing:
    introduction to test theory,
    comparison of two averages,
    comparison of two proportions.

**Evaluation mode.**

50 % Exam + 50% continuous.

**References.**

1. **François Dress. TD de probabilités et statistique pour les sciences de la vie**
   **Editions DUNOD. 2002.**


2. **Gérald Tenenbaum. Introduction à la théorie analytique et probabiliste des nombres. Editions Belin. 2008**

3. **Sheldon M Ross. Initiation aux probabilités. Presses Polytechniques et Universitaires Romandes (PPUR).1996**


**Semester :*5***

**Teaching unit: UM1**

**Matter : Linear programming**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).
This subject is intended to be a progressive discovery of Linear Programming using first an optimization vocabulary, then presenting the different techniques.

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

**Linear algebra**

**Content of matter.**

- Introduction to linear programming
- Canonical forms, vocabulary
- Gauss-Jordan method
- Exploration of basic solutions
- General theorems of linear programming
- The simplex method
- Second type of two-phase method
- Improvement, incidents, and criticisms of the simplex method
- Deep convexity
- Recessions, representations of convexes
- All solutions
- Basic changes in Rp space
- Simple duality
- Generalized duality
- Parameterization, post-optimal analysis
- Transportation problems

**Evaluation mode.**
- 50 % Exam + 25 % TD + 25 % Personal work.

**References.**
1- Rémi Ruppli. Programmation linéaire. Idées et méthodes. Editions Ellipses. 2005
2- Pierre Borne, Abdelkader El Kamel, KhaledMellouli. Programmation linéaire et applications. Editions Technip. 2004

**Semester :*5***

**Teaching unit: UM1**

**Matter : Programming paradigms**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).

This subject allows the student to have an idea of the different programming styles.

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

Algorithmic notions, Object-oriented programming.

**Content of matter.**

I - Imperative Programming.
II- Object Oriented Programming.
III- Functional Programming.
IV- Logic Programming.
V- Concurrent Programming.

**Evaluation mode.**

50 % Exam + 25 % TD + 25 % personal work.

**References.**

1. F. PAGAN " **Formalspecification of programinglanguages**" Prentice-Hall International 1981
2. D.A.WATT  "**Programinglanguages: Conceprts and paradigms**"  Prentice-Hall International 1990
3. E. HOROWITZ "**Fundamantals of programming languages**" Computer Science Press, 1984

**Semester :***5*

**Teaching unit: UM1**

**Matter : Artificial intelligence**

**Credits :4**

**Coefficient :2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).
This module will set the new trend in computer programming, it will introduce the intelligent approach via the expert system. The student will have a vision of the approach based on heuristics manipulating knowledge as opposed to the algorithmic approach exploiting data.


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

**Content of  matter :**
    1. Generalities
       1.1 Fields of artificial intelligence
       1.2 History
       1.3 Definition
    2 Expert systems technology
       2.1 Introduction
       2.2 Structure and operation of an expert system
       2.3 Areas of application
       2.4 Problems adapted to expert systems
       2.5 Knowledge engineering process
       2.6 Acquisition of knowledge
    3 Systems based on production rules
       3.1 Example of modeling by rule
       3.2 Rules and inference engine
          3.2.1 Backward chaining: goal-guided reasoning
          3.2.2 Forward chaining: data-driven reasoning
          3.2.3 Small comparison
    4 Prolog language: Basic notions

**Evaluation mode :**

**50% Continuous et 50 % Exam**

**Bibliographic references** (Books and mimeographed, websites, etc.):

[1] Manuel d'Intelligence Artificielle ; Edition PPUR ; Louis Frécon, OkbaKazar, http://ppur.epfl.ch/livres/978-2-88074-819-7.html;ISBN:978-2-88074-819-7, 2009
[2] R. Forsyth. Expert Systems : Principles and Case Studies. Chapman and Hall, 1984.
[3] P. Jackson. Introduction to Expert Systems.Addition-wesley, 1986.
[4] G.F. Luger and W.A. Stubblefield.Artificial Intelligence : Structures and Strategies for ComplexProblem Solving. Addition-wesley, 1999.

[5] S. Russel and P. Norvig. Artificial Intelligence : A Modern Approach. Prentice-Hall International, Inc., 1995.

**Semester :** *S6*

**Teaching unit: UF3**

**Matter : Mobile Applications**

**Credits : 5**

**Coefficient : 3**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).

The student will have learned to design, implement, test, debug, and publish mobile applications for Android smartphones. Specifically, the student will have learned to use eclipse, the Android SDK, the smartphone emulator, UI design (views and activities), SQLite, phone sensors, location-based services, etc.

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

The student should have knowledge of programming in Java and notions of communication networks and databases*.*

**Content of matter :**
- **Introduction – Hello world applications**
- **Activity Lifecycle**
- **User Interface**
- **Using Camera and Data Storage**
- **Debugging**
- **SQLite database**
- **Location-based services**
- **Google Maps**
- **Service and notifications**
- **Sensor Manager**
- **Google App Engine**
- **Publishing Apps**

**Evaluation mode :  50 % TP + 50 % Final exam**

**Bibliographic references** (Books and mimeographed, websites, etc.) :
- The Busy Coder's Guide to Android Development. http://commonsware.com/Android/
- https://developer.android.com/training/index.html

**Semester :***S6*

**Teaching unit: UF3**

**Matter :** IT security

**Credits : 5**

**Coefficient : 3**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).
Have knowledge of the principles and concepts of computer security. Cybercrime and security malice (attacks, intrusion, risk and problems). Also, IT security strategies, policies, mechanisms and risk management. Definition and study of encryption and cryptography. Explanation of network security and wireless networks**.**

**Recommended prior knowledge** (brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
The student must have general knowledge of the computer network and the operating system and mastery of programming language for the development of applications and web applications.

**Content of matter:**
- Principles and notions of computer security, and security criteria, security architecture
- Introduction to computer crime and vulnerabilities
- Computer cybercrime (attacks, exploits, risks...etc.), types of attacks, Methodologies of an intrusion.
- Missions, importance of security. IS governance. IT security strategies and policies. IS mechanisms.
- Encryption and cryptography. Limits and complexity of computer security.
- Basic notions of network and wireless network security.

**Evaluation mode :**
**Continuous and exam**
**Bibliographic references** (Books and mimeographed, websites, etc.) :
- Cours et exercices Sécurité informatique et réseaux, Cours avec plus de 100 exercices corrigés, Solange Ghernaouti.
- Sécurité informatique, Principes et méthode à l'usage des DSI, RSSI et administrateurs, Laurent Bloch, Christophe Wolfhugel

**Semester :  S6**

**Teaching unit: UF4**

**Matter : DB Administration**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).



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

Data base

**Content of matter :**

       1- Architecture of the Database Management System (DBMS) and administration techniques.

      2- Backups/restores and tuning.

1- 3- Backup strategies in response to crisis situations.

**2-** 4- Improvement of database performance.

**Evaluation mode :  50% continuous work and 50% exam**


**Bibliographic references** (Books and mimeographed, websites, etc.):

**Semester :  6**

**Teaching unit: UF4**

**Matter : Infographics**

**Credits : 4**

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).

Acquire fundamental notions in computer graphics and more precisely Modeling and Rendering, Acquire know-how in Opengl for Modeling objects, Geometric Transformations and animation

**Recommended prior knowledge (**brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
No prior knowledge to study this subject.
**Content of matter :**

> 1-Introduction
> 2. 3D object modeling
> 3. Introduction to Povray
> 4. Ray tracing rendering
> 5. Real-time rendering
> 6. Introduction to OpenGL
> 7. Geometric transformations
> 8. Local lighting models
> 9. Computer animation

**Evaluation mode :  50% continuous work et 50% exam**

**Bibliographic references** (Books and mimeographed, websites, etc.):

- http://www.sgi.com/Technology/openGL
- http://www.opengl.org
- The OpenGL Programming Guide 3rd Edition ("The Red Book")
  Addison-Wesley.
- The OpenGL Reference Manual 3rd Edition ("The Blue Book")
  Addison-Wesley & Benjamin Cummings.
- Advanced Animation and Rendering Techniques: Theory and Practice,
  by Alan Watt and Mark Watt, Addison-Wesley

**Semester :***S6*

**Teaching unit: UF4**

**Matter :** Web semantics

**Credits :**4

**Coefficient : 2**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).
Basic concepts of semantic web including ontologies and their uses and elements. Knowledge of ontology languages: XML, RDF, DAML-OIL, OWL. Information representation approaches and models. The contribution of semantic web technology compared to the classic web. Ontology development tools.

**Recommended prior knowledge** (brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
The basic notions of the classic web and networks. Mastery of web application development: Languages and tools.

**Content of matter :**
  - - Introduction to the semantic web and its contributions compared to the classic web.
  - - Semantic web elements and layers
  - - Metadata and information representation models
  - - Ontologies (definition, classification, their components, their uses).
  - - Methodologies for constructing ontologies
  - - Ontology languages: XML, RDF, RDFS, DAML-OIL, OIL, OWL
  - - Study of the use of the ontology in a particular field e.g.: information search, E-learning, etc.
  - - Practical use of ontologies by: JAVA, JENA, SPARQL and protected.

**Evaluation mode :**
Continuous and  Exam

**Bibliographic references** (Books and mimeographed, websites, etc.):

  - Web sémantique et modélisation ontologique (avec G-OWL) : Guide du développeur Java sous Eclipse, de Michel HÉON
  - Semantic Web for the Working Ontologist, Effective Modeling in Rdfs and Owl, de Dean Allemang, James A. Hendler

**Semester :***S6*

**Teaching unit: UF4**

**Matter : Cryptographics**

**Credits :**4

**Coefficient : 2**


**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).
Introduction to the basic principles of cryptography


**Recommended prior knowledge** (brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
No prior knowledge to study this subject*.*


**Content of matter :**
- -Introduction to the fundamental concepts and methods of contemporary cryptography.
- -Principles of public key cryptography, its advantages compared to classic cryptography which requires the encryption and decryption keys to be kept secret.
- -Study of some cryptosystems such as the famous RSA, and key exchange, authentication and encryption protocols.
-  Generation of pseudo-random numbers.


**Evaluation mode :**
Continuous and Exam


**Bibliographic references** (Books and mimeographed, websites, etc.) :

**Semester :** *S6*

**Teaching unit: UF4**

**Matter : Scientific writing**

**Credits : 2**

**Coefficient : 1**

**Teaching objectives** (Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines).

The objective of this course is to enable the student to acquire the method and knowledge enabling them to write a final dissertation, a presentation, a report, etc.

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

Language mastery

**Content of matter :**
1. Writing methodology
2. Different Types of Scientific Reports
3. Writing a report
4. Writing a scientific article
5. Writing an end-of-study dissertation
   5.1. General presentation
   5.2. Cover page
   5.3. Summary
   5.4. Contents
   5.5. Introduction
   5.6. Methods
   5.7. Results
   5.8. Structure of tables, figures and annexes
   5.9. Discussion
   5.10. Conclusion
   5.11. Bibliographic references
6. Preparing a scientific presentation

**Evaluation mode :  Exam (50%) + Personal work(50 %)**

**Bibliographic references** (Books and mimeographed, websites, etc.):
1- Rédiger pour être publié, Conseils pratiques pour les scientifiques, Eric Lichtfouse, Springer
2- Eléments de rédaction scientifique en informatique.
(http://www.ulb.ac.be/di/map/tlenaert/Home_Tom_Lenaerts/INFO-F-6308_files/redacSci.pdf)
3- GUIDE DE RÉDACTION ET DE PRÉSENTATION D'UN TEXTE SCIENTIFIQUE
(http://www.uqac.ca/deptdsf/cyclessup/guides/guidederedaction.pdf)

# IV- Agreements / Conventions

# STANDARD LETTER OF INTENT

## (In case of license co-sponsored by another academic establishment)

## (Official paper on the letterhead of the university establishment concerned)

## Subject: Approval of co-sponsorship of the license entitled:

The university (or university center) hereby declares to co-sponsor the license mentioned above throughout the license authorization period.

To this end, the university (or university center) will assist this project by:

- Giving his point of view in the development and updating of teaching programs,
- Participating in seminars organized for this purpose,
- By participating in defense juries,
- By working to pool human and material resources.

SIGNATURE of the legally authorized person:

FUNCTION :

Date:

# STANDARD LETTER OF INTENT

## (If licensed in collaboration with a user sector company)

## (Official company letterhead)

**SUBJECT: Approval of the project to launch a Bachelor's degree course entitled:**

Provided to:

The company hereby declares its willingness to demonstrate its support for this training as a potential user of the product.

To this end, we confirm our support for this project and our role will consist of:

- Give our point of view in the development and updating of teaching programs,
- Participate in seminars organized for this purpose,
- Participate in defense juries,
- Facilitate as much as possible the reception of interns either as part of end-of-study dissertations or as part of tutored projects.

The means necessary to carry out the tasks incumbent on us to achieve these objectives will be implemented on a material and human level.

Mr. (or Madam)*……………………is designated as external coordinator of this project.

SIGNATURE of the legally authorized person:

FUNCTION :

**Date :**

**CACHET OFFICIEL ou SCEAU DE L'ENTREPRISE**

**V – Brief CV**
**From the teaching team mobilized for the specialty**
**(Internal and external)**
**(according to attached model)**

# Curriculum Vitae succinct

**First and last name: DJEDI NourEddine**

**Date and place of birth: 06 May 1963  à Tolga (W Biskra)**

**Email and phone: n.djedi@univ-biskra.dz**

**Grade : Professeur**

**Establishment or institution: University of Biskra**

- **Diplomas obtained (graduation, post-graduation, etc.) with date and place of obtaining and specialty:**

- **Baccalaureate in Mathematics Techniques, 1981, Honors.**
- **Computer Engineering (Software), USTHB, June 1986, Honors.**
- **DEA in Computer Science, Paul Sabatier University (Toulouse III), June 1987, Honors.**
- **Doctorate from Paul Sabatier University, Specialty in Computer Science, November 1991, Very Honorable Mention.**
- **Equivalence to the Algerian state doctorate in Computer Science, June 1992.**

- **Professional teaching skills (subjects taught, etc.)**

- **Professional skills**
- **Director of the LESIA Laboratory (2007-2011)**
- **Head of the "Artificial life and bio-inspired techniques" team (2007-2015)**
- **Agreement-Program Manager "Image synthesis and artificial life" (2008-2011)**
- **Scientific Director Doctorate "Image and AI" (2010-2012)**
- **Scientific Director Doctorate "Image Techniques" (2013-2015)**

- **Teaching skills (subjects taught)**

- **Mathematical logic (L2)**
- **Object-oriented programming (L2)**
- **Research methodology (M1)**
- **Image synthesis (M2)**
- **Modeling for image synthesis (M1)**

# Brief CV

**First and last name: Kazar Okba**

**Date and place of birth: 02/12/1962**

**Email and phone :kazarokba@yahoo.fr  0557218802**

**Grade : Professeur**

**Establishment or institution: department of computer science, University of Biskra**

**Diplomas obtained (graduation, post-graduation, etc.) with date and place of obtaining and specialty:**

♦ **Computer engineering June 1987, University of Constantine**

♦ **Master in computer science 1996, University of Constantine**

♦ **State doctorate in computer science 2005, University of Constantine**

♦ **Professional teaching skills (subjects taught, etc.)**

♦ **Graph theories**

♦ **IT application development methodology**

  **Information system**

♦ **•Introduction to the expert system**

  **Artificial intelligence**

♦ **Productive**

♦ **Knowledge engineering**

♦ **Knowledge-based system**

♦ **Information system and database**

♦ **Looking for information and web services, E and M-learning, E-commerce, E-business..**

♦ **Multi-agent system**

♦ **Web intelligence**

# Brief CV

**First and last name: Bachir Abdelmalik**

**Date and place of birth: 12-08-1978 a Biskra**

**Email and phone : abdelmalik.bachir@gmail.com 0557 24 62 85**

**Grade : MCA**

**Establishment or institution: Mohamed Khider University of Biskra**

**Diplomas obtained (graduation, post-graduation, etc.) with date and place of obtaining and specialty:**

**- State computer engineer: INI, Oued Smar, September 2001**
**- DEA in computer science, University of the Mediterranean, Marseille, June 2002**
**- Doctorate in computer science, INPG, Grenoble, January 2007.**
**- University accreditation, Mohamed Khider University, Biskra, July 2010.**

**Professional teaching skills (subjects taught, etc.)**
**- TD – Communication networks (IUP of Avignon, France)**
**- Course + practical work – Performance evaluation, (IUP of Avignon, France)**
**- Communication networks TP (ENSIMAG, France)**
**- Course + TD + TP – Java language (University of Biskra)**
**- Course + TD + TP – Formal Calculation (University of Biskra)**
**- Course + TD + TP – Communication networks (University of Biskra)**
**- Course + TD + TP – Algorithmics and data structure (University of Biskra)**

# Brief CV

**First and last name: KAHLOUL LAID**

**Date and place of birth: 22/09/1978**

**Email and phone :kahloul2006@yahoo.fr,  07 92 41 98 78**

**Grade : MCB**

**Establishment or institution: Department of Computer Science, University of Biskra**

**Diplomas obtained (graduation, post-graduation, etc.) with date and place of obtaining and specialty:**

| Diploma | Speciality | Place | Date |
|---|---|---|---|
| State Engineer in computer science | Hardware, Software | University of Biskra | June 2001 |
| Master in computer science | IA & Image | University of Biskra | September 2004 |
| Doctor of Science in Computer Science | Computer science | University of Biskra | FEBRUARY 2012 |

**Professional teaching skills (subjects taught, etc.)**

1) **Software engineering: For 3rd year students (computer engineers);**
2) **Logic for AI: For 5th year students (computer engineers);**
3) **Algorithmic: For 2nd year students (computer engineers);**
4) **Simulation and modeling: For 4th year students (computer engineers);**
5) **Formalisms of Formal Specification: For 2nd master's students, option: Verification and Diagnosis of Critical Systems;**
6) **Semantics of Mobile Systems: For 2nd master's students, option: Verification and Diagnosis of Critical Systems;**
7) **Verification techniques and tools: For 1st master's students, option: GLSD;**
8) **High-level Petri nets: For 2nd master's students, option: GLSD;**
9) **Verification of mobile systems: For 2nd master students, option: GLSD.**

# Brief CV

**First and last name:** Cherif Foudil

**Date and place of birth:** 05/02/1962 - Biskra

**Email and phone :foud_cherif@yahoo.fr**    **Tel** :   0772195557

**Grade : MCA**

**Establishment or institution: Department of Computer Science, University of Biskra**

**Diplomas obtained (graduation, post-graduation, etc.) with date and place of obtaining and specialty:**

- Computer engineering in June 1985 from the University of Constantine
- Research Master (Magister) in computer science in March 89 from the University of Bristol, Great Britain
- State doctorate in computer science in December 2006 from the University of Biskra

**Professional teaching skills (subjects taught, etc.)**

Teacher at the University of Biskra since September 1989 having provided a significant number of graduation and post-graduation modules:

Language theory, Networks, Algorithms and data structures, Artificial life and emerging systems, Virtual reality and virtual humans, Video, Computer animation, Artificial intelligence, Advanced classifications, Virtual humans and virtual environments,

# Brief CV

**First and last name: Bourekkache Samir**

**Date and place of birth : 28/07/1983-Biskra**

**Email and phone :s.bourekkache@gmail.com  ,  0793673647**

**Grade : MCB**

**Establishment or institution: Department of Computer Science, University of Biskra**

**Diplomas obtained (graduation, post-graduation, etc.) with date and place of obtaining and specialty:**

2001,2002,2003: Baccalaureate in nature and life science series.

2006: State engineer in IT (major of the 2006 class) - Industrial IT option, University of Biskra.

2008: CCNA 1 – Networking Basics of the Cosco Networking Academy Program.

2009: Master in Computer Science: Option Artificial Intelligence and distributed systems, "An agent-based approach for distance learning", University of Biskra.

2009: Bachelor's degree in English, University of Biskra.

2014: Doctorate in computer science: Option Artificial Intelligence and distributed systems, "A semantic environment based on agents for distance training (E-Learning)».

**Professional teaching skills (subjects taught, etc.) 2006 – 2015**

> 2006 – 2007: Computer science (SPSS), department of information and communication sciences.
>
> 2007 – 2008: Algorithmics, common core technology, IT department (SPSS), department of information and communication sciences.
>
> 2008 – 2009: Algorithmics, common core technology department.
>
> 2006 – 2009: Teacher in a private school (computer science).
>
> 2009 – 2010: Computer Science Module 1 and Computer Science 2 department of MI (Mathematics and Computer Science: LMD), University of Biskra.
>
> 2010 – 2011: Computer science module 1 and computer science 2, first year license, department of MI (LMD Mathematics and Computer Science), University of Biskra.
>
> 2009 – 2010: Computer science module 1 and computer science 2, first year license, department of MI (LMD Mathematics and Computer Science), University of Biskra.
>
> 2011 – 2012: Computer Architecture Module, Computer Science Module 2, Department of Mathematics and Computer Science, University of Biskra.
>
> 2012 – 2013: Computer Architecture Module, Machine Structure Module, Department of Mathematics and Computer Science, University of Biskra.
>
> 2013 – 2014: Computer Architecture Module, Machine Structure Module, Department of Mathematics and Computer Science, University of Biskra.
>
> 2014 - 2015: Computer Architecture Module, 2nd year computer science degree, department of computer science, University of Biskra.

2014 – 2015: Information systems security, 1st year master's degree in computer science Option; RTIC, Department of Computer Science, University of Biskra.

# Brief CV

**First and last name:** Babahenini Mohamed Chaouki

**Date and place of birth:** 15/08/1963- Biskra

**Email and phone :  Chaouki.Babahenini@gmail.com   Tel** :   0556503939

**Grade : MCA**

**Establishment or institution: Department of Computer Science, University of Biskra**

**Diplomas obtained (graduation, post-graduation, etc.) with date and place of obtaining and specialty:**

- Computer engineering in June 1986 from the University of Constantine
- Master's degree in computer science in March 1997 from the University of Setif
- State doctorate in computer science in December 2006 from the University of Biskra

**Professional teaching skills (subjects taught, etc.)**

Teacher at the University of Biskra since November 1986 having provided a significant number of graduation and post-graduation modules:

-Operating systems 1 and 2
- Distributed systems
- Machine structure
-       Infographics
- Advanced rendering in image synthesis
- Global illumination techniques

# Brief CV

**First and last name: Benharzallah Saber**

**Date and place of birth : 16/02/1978 in Seggana (W. Batna)**

**Email and phone :sbharz@yahoo.fr (0551008781)**

**Grade : MCA**

**Establishment or institution: University of Mohamed Khider Biskra**

**Diplomas obtained (graduation, post-graduation, etc.) with date and place of obtaining and specialty:**
- 2002: Computer Engineering, obtained from the University of Batna (09/14/2002)
- 2005: Master in Computer Science, obtained from the Mentouri University of Constantine (04/16/2005)
- 2010: Doctorate in Computer Science, obtained from Mohamed Khider Biskra University (10/12/2010)
- •2015: University accreditation, obtained from Mohamed Khider Biskra University (05/02/2015)

**Professional teaching skills (subjects taught, etc.)**

- XML and Web services course, TP (Master1 RTIC Informatique) S1, year 2014/2015.
- logic programming (PL) course, TD (3LMD Informatique) S1, since 2009/2010.
- logic for artificial intelligence (LIA) course, TD (Master 2 Computer Science) S1, since 2009/2010.
- development of Web applications courses, TP (Master 1 Computer Science) S2, since 2009/2010.
- language theory (course, tutorial) 2nd year S2 LMD Computer Science, since 2006/2007 to 2007/2008.
- logic for artificial intelligence course, TD (5th Computer Engineer, AI option) (year 2009/2010)
- Programming languages (courses, tutorial) 2nd year S2 LMD SM/ST, since 2006/2007 to 2007/2008.
- Algorithmics 2 (course, TD), 1st year LMD MI S2, (year 2005/2006)
- Algorithmics 1 (course, TD), 1st year S1 LMD SM/ST, since 2005/2006 to 2006/2007.
- Office automation and Web technologies (courses) 1st year S1 LMD SM/ST (year 2005/2006)
- Structure of computers (course, tutorial), 1st year S1 LMD SM ST (year 2005/2006)
- TD Software Engineering 2nd year LMD S2 Computer Science, (year 2012/2013 and 2013/2014)
- TD language theory 2nd year S2 LMD Computer Science, (year 2008/2009).
- Operational research practical work 2nd year DEUA Computer Science (year 2006/2007)
- Computer science (TP) 2nd year veterinary doctor, department of veterinary sciences, University of Batna (year 2004/2005).
- Practical work "DOS command and C language", 2nd year DEUA Informatique, Department of Informatics, University of Batna (year 2003/2004).
- Handouts: SaberBenhrzallah, Logic programming, Course support for 3rd LMD degree in Computer Science, Mohamed Khider Biskra University, 2014.

# VI - Avis et Visas des organes Administratifs et Consultatifs

**Intitulé de la Licence : Systèmes informatiques (SI)**

| Chef de département + Responsable de l'équipe de domaine |
|---|
| Date et visa                                    Date et visa |
| **Doyen de la faculté (ou Directeur d'institut)** |
| Date et visa : |
| **Chef d'établissement universitaire** |
| Date et visa |

# VII– Notice and Visa of the Regional Conference
## (Only in the final version sent to the MESRS)

# VIII – Opinion and Visa from the National Educational Committee of the Domain
## (Only in the final version sent to the MESRS)