ESIEA 2015-2016

4th year course description

2nd semester

Susan Loubet
Director of International Relations and Language Teaching

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The 4th year in ESIEA

The objective of this year of study is to acquire knowledge and skills that will be directly applicable in the workplace in an international and complex environment. Students can tailor their studies to correspond to their talents, personality and personal and professional projects.

In the 4th year, our future engineers begin to specialise in order to be better prepared for their entry into the world of work.

►The students deepen their scientific and technical skills through the technical lectures in the core program:
Stochastic processes, digital and combinatorial optimisation, IP networks, systems programming and real time, virtual reality and digital imaging, senior project in digital sciences and technologies.

►They attend specific lectures depending on their elective program:

- **Embedded Systems**
- **Information Systems**

Embedded systems

Robotics, VHDL programming and random signal, real time OS software labs, control, estimation and identification, design of programmable components, serial transmission.

or

Information systems

Advanced Web programming, mobile programming and database management, software architecture, neural networks, information security and virology, distributed programming, estimation and data analysis.

►They consolidate their general engineering profile with lectures linked to business culture: introduction to sustainable development, introduction to law with an emphasis on labour law, project management and business projects, psychology of human relations, company management and language labs emphasising professional communication.

The core humanities program is completed by lectures and conferences on economy, law and business management. The business administration lecture contains a game simulation over several weeks bringing several student groups into competition.

During the seminar “environment and business strategy” (during a week in a ski resort) people from industry present hot topics in companies which the students develop in team work. The students then present their work to the experts.

This is an important and intense moment in the 4th year as the students are in contact with the business world for a whole week.

► The senior scientific project in the 4th year is carried out in teams of 3 or 4 students in partnership with a company or a research laboratory. This multidisciplinary project must be sustainable and must contain an innovative component.

► At the end of the 4th year, each student is ready for his/ her first real work experience and leaves for a technical internship of 4 months. The objective of the internship is to apply the acquired knowledge and skills in their study program to corresponding software or hardware projects in industry.

Program table

Module Code	Module Title	weighting	credits	work load	hours in class
HUM4BS2	Core program - Humanities and Corporate Culture	**6,5**	7	**165**	**82,5**
MAN4301C	Seminar	2		44	24
LAN4082AN	English - New Technology and TOEIC	3		65	21
MAN4308	APIC (Actions to Promote Information and Communication)				4,5
LANXX84XX	French for foreigners			23	15
ENT4110	Company management	1,5		33	18
TEC4BS2	Core program - Science and Technology	8	**8**	**162**	**112,5**
PLU4191	Senior project in digital sciences and technology	4		100	82,5
IMA4134	Virtual reality	2		18	9
INF4034	Digital imaging	2		44	21
FSE4BS2	Elective program - Embedded Systems	15	**15**	**325**	**96**
LAB4412	Lab on software real time OS	3		65	18
SYS4043	Control	3		65	18
SYS4045	Estimation and identification	3		65	24
SYS4046	Design of progammable components	3		65	18
LAB4411	Serial transmission	3		65	18
FSI4BS2	Elective program - Information Systems	15	**15**	**325**	**96**
INF4043	Software architecture	3		65	18
ICO4168	Neural networks	3		65	18
INF4036	Information security and virology	3		65	18
INF4039	Distributed programming	3		65	18
MAT4056	Estimation and data analysis	3		65	24
			30	**652**	**291**

Core program: Humanities and Corporate Culture

MAN4301C - SEMINAR

4th year – 2nd semester in Paris-Ivry, Laval
Core program - Humanities (HUM4BS2)
2.0 ECTS, 24 hours on site lectures
Taught in French/ English

OBJECTIVES:

Discover the various aspects of company culture through contacts with professionals.
1 - First contact with the major functions of a company
2 - Making new contacts
3 - A real-life experience of written and oral expression

PROGRAM:

I – PEDAGOGICAL OBJECTIVES:

Group presentations are made to a limited audience and to a large group and evaluated by a jury based on common marking schemes.

The seminar takes the form of a stay on a site and has three main pedagogical objectives:

1- A first contact with the major functions of the company

The seminar on the "company environment and strategy" will give you some keys to understand the major functions of a company necessary for your engineering training. Moreover, your knowledge of the major functions in a company will allow you to enlarge your employment opportunities by combining your scientific and technical training with one of these functions (sales, HR, etc).

2 - Making new contacts

The seminar is an opportunity for you to meet students, professors and alumni in a different atmosphere and to meet company managers to prepare yourself for the 5th year and your entry into professional life.

3 - A real-life experience of written and oral expression

On the one hand, this seminar enables you to put professional writing techniques into practice, and on the other hand, to experience public speaking in front of a large group.

II- PEDAGOGICAL ACTIVITIES
II-1 Before the seminar
II-1.1 Meeting with our industry partners
II-1.2 Document research and exploitation
II-1.3 Visit of companies in groups
II-1.4 Research report
II-2 The seminar
II-2.1 The oral presentation
II-2.2 Handwritten report on the seminar

PREREQUISITES:
6 hours in the first semester.

PEDAGOGICAL METHODS:
4 half days of conferences and presentations and one half day of forum

EVALUATION METHOD:

MATERIAL:
Report writing guide

BIBLIOGRAPHY:
Depending on focus chosen each year.

LAN4082AN - English – New Technologies and TOEIC

4th year – 2nd semester in Paris-Ivry, Laval
Core program - Humanities (HUM4BS2)
2.0 ECTS, 21 hours on site lectures
Taught in English

OBJECTIVES:
This module will make students better able to:
- Understand and use the vocabulary of engineering
- Understand scientific explanations and professional presentations
- Perform documentary research in English on a topic pertaining to their scientific activity
- Respect fundamental rules of in-text citation in their report writing
- Write a clear, professional report in English of their scientific and technical activity
- Give a clear, professional report in English of their scientific and technical activity
- Create clear slides in English to accompany oral presentations

-Speak in English in public more confidently
- Make themselves understood through clear, unambiguous pronunciation

PROGRAM:
The language of engineering in its largest sense: IT but also renewable energies, construction, and so on.
- Reading articles on engineering and innovative technologies from the print media; watching similar reports from television
- Presentation of the fundamentals of in-text citation, practice and feedback
- Multiple writing assignments with instructor feedback
- Preparation of a clear, professional report of scientific activity
- Preparation of a clear, professional oral presentation of scientific activity with slides

PREREQUISITES:
English B2 level according to the Common European Framework of References for Languages (CEFR)

PEDAGOGICAL METHODS:
Labs, projects, conferences, lectures and homework on Moodle, workshops

EVALUATION METHOD:
Oral presentations, defence, homework, project report, TOEIC session points taken into consideration in the final mark of the module.

MATERIAL:
Beamer, TV, DVD, language laboratory, student laptops, photocopies, CDs and DVDs, documents (text, audio, audiovisual) taken from the Internet
Moodle to publish lesson content and set homework assignments.

BIBLIOGRAPHY:
Most material is developed for the specific needs of our students by the English teaching team at ESIEA. The following website may be used: www.ted.com

MAN4308 - APIC (Actions to Promote Information and Communication)

4th year – 2nd semester in Paris-Ivry, Laval
Core program - Humanities (HUM4BS2)
ECTS, 4,5 hours on site lectures
Taught in French/ English

OBJECTIVES:
Continuation of the lectures started in the first semester.

PROGRAM:
Continuation of the course started in the first semester.

PREREQUISITES:
None

PEDAGOGICAL METHODS:
Conferences and projects

EVALUATION METHOD:
Quantitative and qualitative evaluation (bonus/ malus).
Each student has to perform at least one communication action per semester in the service of his/ her school allowing him/ her to put into practice the techniques.

MATERIAL:

BIBLIOGRAPHY:
« Art et science de l'Influence » Kevin Hogan. Collection Psychologie Communication – Ixelles Edition 2009
« L'argumentation dans la communication » de Philippe Breton. Collection Repères – La Découverte 2009
« Psychologie de la communication » de Jean ClaudeAbric. Collection Cursus Armand Colin 2010
« La communication efficace par la PNL » de René de Lassus. Marabout Psy 2009
« Le Mercator » de Bernard Brochand et Jacques Landevrie. le Publicitor 2008

LAN1234FR - FRENCH FOR FOREIGNERS

4th year – 2nd semester in Paris-Ivry, Laval
Core program - Humanities (HUM4BS2)
2.0 ECTS, 21 hours on site lectures, workshops in language lab
Taught in French

OBJECTIVES:
The objectives are twofold:

- on the one hand, the students acquire a sufficient level in French to be autonomous in its day to day use

- on the other hand, the students learn how to write and present scientific and technical reports in order to facilitate their scientific and technical studies in France.

TARGET COMPETENCES

- to be able to understand and speak in day to day situations
- to be able to write and present technical or scientific reports

PROGRAM:

Workshops on writing of scientific and technical reports
Focus on cultural competency
Study of authentic texts
Understanding of audio and video segments
Speaking about personal or professional issues
Writing about personal or professional issues
Grammar exercises
Vocabulary acquisition
Presentation of personal work orally or in written form
Interactive speaking/ debates
Workshops in the language lab

PREREQUISITES:

B1 level

PEDAGOGICAL METHODS:

Lab, lecture, interviews, workshops

EVALUATION METHOD:

Homework, written and oral exams

MATERIAL:

Beamer, television, DVD, language lab, laptops, photocopies, CDs and DVDs, documents (texts, audios, videos) taken from the Internet

BIBLIOGRAPHY:

Most materials are developed for the specific needs of our students by the French teaching team at ESIEA.

ENT4110 - COMPANY MANAGEMENT

4th year – 2nd semester in Paris-Ivry, Laval
Core program - Humanities (HUM4BS2)
1.5 ECTS, 18 hours on site lectures
Taught in French/ English

OBJECTIVES:

Acquire basic knowledge in business management and accountancy and get a vision of the main management functions.
Understand the interrelation between the two main financial documents, like the profit and loss account and the balance sheet.
Understand and know how to use the notions: working capital, working capital requirements and cash flow.
Establish the link between the coursework and real-life situations in companies.

PROGRAM:

Introduction/ points of view of company life / Marketing/ financial forecast/ results/ company's financial health
Chap 1: Company organisation/ financial statements/ working capital, working capital requirements, cash flow, company's sector code (code NAF in French)
Chap 2: Balance sheet and financial results/ accounting system and main accounting entries (customers, suppliers, VAT, payroll, fixed assets, stocks, provisions).
Chap 3: Principles of management control: the budgetary process

- First part: management control
- Second part: the budgetary process

Chap 4: Principles of management control: the operating budget

- First part: : Creating a budgetary architecture
- Second part: Creating an operating budget

Chap 5: Management principles and human resources management: sales qualification/ purchasing and supplier management/ general expenses control/ payment terms/ payroll/ cash flow/ investment plan/ human resources management
Chap 6: Accounting of exceptional events:
Company creation/ capital increase/ merger/ demerger

PREREQUISITES:

The lecture can be done without any prerequisites, but it will be more efficient if the two following modules have been done previously:
- Module CGI4401 – introduction to sustainable development
- Module ENT4113 – introduction to law

PEDAGOGICAL METHODS:

Lab, lecture, workshops

EVALUATION METHOD:
Written exams, oral presentation/ defence/ creation of company records

MATERIAL:
Beamer, Internet, Power Point, photocopies of exercices

BIBLIOGRAPHY:
Christian de Lauzeinghein, « Comptabilité », Dalloz
G. Enselme, « Comptabilité financière - comptabilité de gestion », Litec
Memento Francis Lefebvre

Core program: Science and Technology

PLU4191 - SENIOR PROJECT IN DIGITAL SCIENCES AND TECHNOLOGIES

4th year – 2nd semester in Paris-Ivry, Laval
Core program - Science and Technology (TEC4BS2)
4 ECTS, 82,5 hours on site lectures
Taught in French/ English

OBJECTIVES:

The objective is to carry out a project on topics related to:
- ESIEA's research areas related to its laboratories expertise
- Digital science and technologies related to the academic program (Information Systems, Embedded Systems).

PROGRAM

The project is carried out in three steps:
- Project framework (preliminary project)

During this step, why, what, how and when the project will be carried out, are defined
- Project development

During this step, the team carries out what has been defined in the first step and emits status reports.
- Project closure

During this step, the team checks if the work corresponds to what has been defined and evaluates the way it has been done as well possible changes for a future project.

PREREQUISITES:

Lecture in project management in second year, lectures in Information Systems/ Embedded Systems

PEDAGOGICAL METHODS:

Project

EVALUATION METHOD:

Each student gets an individual mark according to his/ her degree of implication in the project (the project leader gets a bonus). There is a collective mark for the three different steps.

MATERIAL:

BIBLIOGRAPHY:

IMA4134 - VIRTUAL REALITY

4th year – 2nd semester in Paris-Ivry, Laval
Core program - Science and Technology (TEC4BS2)
2 ECTS, 9 hours on site lectures
Taught in French/ English

OBJECTIVES:

Presentation of the fields of virtual and augmented reality:
1. Have a general understanding of virtual and augmented reality
2. Know the systems.
3. Know the peripherals
4. Know the fields of application

PROGRAM:

Displays, peripherals, tracking or locomotion systems are presented from a functional and a technical point of view. Presentation of their use and their different applications in order to understand the market opportunities of these technologies.

PREREQUISITES:

None

PEDAGOGICAL METHODS:

Lecture, conferences

EVALUATION METHOD:

Oral presentation, defence, written report

MATERIAL:

Beamer, pdf.files available on Moodle

BIBLIOGRAPHY:

INF4034 – DIGITAL IMAGING

4th year – 2nd semester in Paris-Ivry, Laval
Core program - Science and Technology (TEC4BS2)
2 ECTS, 21 hours on site lectures
Taught in French/ English

OBJECTIVES:

In this module, students get a global vision of digital imaging, the industrial stakes (such as for medical imaging, space imagery, vision and special effects), from image acquisition (origin and technologies like CCD, CMOS, optic) and its consequences to signal processing algorithms in order to improve the visual output or to extract information.
Students learn how to program operators for image manipulation, how to use an OpenCV library. They are introduced to vector spaces and learn how to use them in order to distort an image (perspective projection, orthographic, homographic, rotation, translation, ray tracing, etc.)

PROGRAM:

1- Industrial stakes through 2 examples: remote sensing and medical imaging
2- Image acquisition: passive vs. active imaging, optical distortion, different digital sensors
3- Algorithmic image processing: OpenCV, histograms, edge detection, Fourier transform, mathematical morphology

PREREQUISITES:

C programming

PEDAGOGICAL METHODS:

Lecture, labs

EVALUATION METHOD:

Written exam

MATERIAL:

Beamer, specific software

BIBLIOGRAPHY:

Specific teaching in the elective program Embedded Systems

4th year – 2nd semester
Elective program: FSE4BS2 EMBEDDED SYSTEMS
15,15.0 ECTS, 96 hours on site lectures
Taught in French

LAB4412 - LAB ON SOFTWARE REAL TIME OS

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Embedded Systems (FSE4BS2)
3 ECTS, 18 hours on site lectures
Taught in French

OBJECTIVES:
Exploration and operation of a calculator for multi-task hardware management.
Students learn how to take into consideration constraints of a multi task system and how to optimise an application in real-time.

PROGRAM:
- Basic real time notions,
- Management by interruption,
- Multi-task notion
- Priority

PREREQUISITES:
SYS4044 lecture and C programming

PEDAGOGICAL METHODS:
Labs, project

EVALUATION METHOD:
Oral presentation and/ or written exam, report

MATERIAL:

BIBLIOGRAPHY:
MONTOIS, Jean-Jacques. Gestion des processus industriel temps réel. Ellipses

SYS4043 - CONTROL

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Embedded Systems (FSE4BS2)
3 ECTS, 18 hours on site lectures
Taught in French

OBJECTIVES:

This module digs deeper into notions of automation.
- Introduction to the formalism of representing dynamic systems by state variables
- Output: access to advanced control techniques of complex systems (n order, MIMO, instable …)
- New control structures and strategies (soft sensors) in the space state

PROGRAM:

Chapter I.- State representation of systems by state variables and modelling
- Introduction
- Linearization of nonlinear systems
- Representation by state vectors (shift from fct tf towards state…)
- Resolution of a state equation
- Calculation of the transition matrix

Chapter II.- Controllability and observability of invariant linear systems
- Introduction
- Controllability
- Observability
- Controllability and canonical forms of controllability
- Observability and canonical forms of observability
- Minimal realisation

Chapter III.- Stability of invariant linear systems
- Stability of a non-controlled system
- Stability of a controlled system

Chapter IV.- The canonical form of controllability or companion form

Chapter V.- Stabilisation and trajectory tracking of linear invariant systems
Stabilisation
Trajectory tracking

Chapter VI.- The observers
- Introduction
- Synthesis of an observer
- Separation principle

Chapter VII. Optimal control and quadratic linear problem

PREREQUISITES :

1) Vector space: definition, properties
- linear applications, endomorphism,
- kernel subspace, image, injectivity, surjectivity, bijectivity
- basis of an e.v.
sum (direct) of an e.v.
- scalar product, orthogonality, projector
2) Matrix :

PEDAGOGICAL METHODS:

Lecture, lab and case study in computer labs

EVALUATION METHOD:

Written exam and random tests

MATERIAL:

Computing station + Matlab/ Simulink software+Control toolbox

BIBLIOGRAPHY:

Ostertag, E. “Commande et estimation multivariable – methods linéaires et optimization quadratique”.
Ellipses, technosup
Ph.De Laminat, “Automatique. Commande des systèmes linéaires”. Hermes

SYS4045 - ESTIMATION AND IDENTIFICATION

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Embedded Systems (FSE4BS2)
3 ECTS, 24 hours on site lectures
Taught in French

OBJECTIVES:

The “estimation” coursework deals with conceiving new input/ output models in the form of transfer functions (mainly in discrete time) for systems/ processes.
The “identification” coursework deals with conceiving new input/ output models in the form of transfer functions (mainly in discrete time) for dynamic systems/ processes (of any nature whatsoever) of which we would have collected experimental data on their input/ output behavior. The idea is to obtain a mathematical model exploitable for control without being an expert in the physics of the studied system.

PROGRAM:

1. Modeling: difference between knowledge-based models and behavior models, principles of parametric models
2. Identification by the step response study: Strejc & Broida methods
3. Identification by the frequency response study
4. Regression: linear regression for obtaining behavior laws, criterion of least squares, computing the gradient of the criterion…
5. Different structures of systems and noise: ARX, ARMAX, ARARX, ARARMAX, Box & Jenkins
6. Fundamental case study of the ARX structure: predictor formulation (linear in the parameters), prediction error, least squares criterion, necessary (and sufficient) optimality conditions, expression of the identification algorithm off-line by the pseudo inverse of the regressor, ...,deduction of the recursive parametric fitting algorithm (Lemme of matrix inversion).
7. Extension to the case of structures leading to a nonlinear predictor in the parameters (all structures except ARX). Formulation of the optimization criterion and use of algorithms of the Newton type and Quasi-Newton type in order to achieve a recursive identification algorithm on-line or off-line (iterative).
8. Case study on computer support (computer labs)

PREREQUISITES:

Good knowledge of invariant linear systems in continuous time and in discrete time, described by transfer functions (1^{st} order, 2^{nd} order, influence of zeros, …), calculate a gradient vector (partial derivatives), matrix algebra and property

PEDAGOGICAL METHODS:

Lecture, lab and case study in computer labs

EVALUATION METHOD:

Written exam and surprise quizzes

MATERIAL:

Matlab

BIBLIOGRAPHY:

Ljung, Lennart. System Identification – Theory for the user. Prentice et Hall (http://www.control.isy.liu.se/books/sysid/)
Walter E. & Prozanto, L. Identification de modèles paramétriques à partir de données expérimentales. Paris 1994, Masson

SYS4046 - DESIGN OF PROGAMMABLE COMPONENTS

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Embedded Systems (FSE4BS2)
3 ECTS, 18 hours on site lectures
Taught in French

OBJECTIVES:
Consolidate the knowledge of the 1st semester module (VHDL coding, development of FPGA process, ...)
Master RTL simulation step
Understand the requirements definition and design inside a mini-project
Consolidate the work done in the first semester: development and design of an FGPA, model verification of the FGPA and physical verification.

PROGRAM:
RTL simulation: principle, tools and implementation
Mini-project: requirements definition, specification and design (coding, simulation, target test)

PREREQUISITES:
VHDL language, what is an FGPA

PEDAGOGICAL METHODS:
Lecture, lab

EVALUATION METHOD:
Written exam and project report

MATERIAL:
Beamer, specific software, Power Point

BIBLIOGRAPHY:
VHDL du langage au circuit, du circuit au langage. Jacques Weber, Maurice Meaudre.
Edition : Masson

LAB4411 - SERIAL TRANSMISSION

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Embedded Systems (FSE4BS2)
3 ECTS, 22,5 hours on site lectures
Taught in French

OBJECTIVES:

- Basic knowledge about serial communication and introduction to serial transmission.
- Basic principles of asynchronous wired communication between several peripherals .
- Imagine and suggest a simple communication protocol of master/ slave type.

PROGRAM:

Presentation:

- Basics of serial communication
- General principles of serial transmission,
- Study of different serial transmission types.

Practical application

- Project design and development of a serial transmission

PREREQUISITES:

Programming in C Language

PEDAGOGICAL METHODS:

Lecture, lab

EVALUATION METHOD:

Oral presentation and/ or written exam, report

MATERIAL:

BIBLIOGRAPHY:

PARET, Dominique. Réseaux multiplexes pour systèmes embarqués. DUNOD

Specific teaching in the elective program Information Systems

4th year – 2nd semester
Elective program: FSI4BS2 INFORMATION SYSTEMS
15,15.0 ECTS, 96 hours on site lectures
Taught in French/ English

INF4043 - SOFTWARE ARCHITECTURE

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Information Systems (FSI4BS2)
3 ECTS, 18 hours on site lectures
Taught in French/ English

OBJECTIVES:

- Revise the concepts of object oriented programming
- Introduction to software architecture, test driven development
- Introduction to design patterns and framework conception
- Think about an architecture relative to a need
- Measure and improve the quality of a code base

PROGRAM:

- Revision of object oriented programming concepts
- Java Collection frameworks
- Introduction to unit tests
- Principles of application architecture
- Introduction to object design
- Framework conception

PREREQUISITES:

POO, Java language

PEDAGOGICAL METHODS:

Lecture and lab and project (case study)

EVALUATION METHOD:

Multiple choice test, group project validation

MATERIAL:

Power Point, beamer

BIBLIOGRAPHY:

ICO4168 - NEURAL NETWORKS

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Information Systems (FSI4BS2)
3 ECTS, 18 hours on site lectures
Taught in French/ English

OBJECTIVES:

Introduction to heuristic and bio mimetic solutions (inspired by nature) which are represented by neural networks. The aim is to show that it is possible to solve a complex problem by using statistical methods.
This is the case, especially for many prediction problems.
Overview of existing methods of data mining and machine learning to which neural networks belong.
These techniques are regularly used in 'Big Data' and will be even more important in the future as databases grow very fast.
Students learn:
- How to design a neural network capable of solving a data mining problem
- How to extract and standardise relevant data going into a neural network
- How to perform a functional neural network
- How to assess the performances of a neural network and to optimise it

PROGRAM:

- Presentation of data mining, its current scopes and overview of the different types of algorithms used.
- Presentation of machine learning and the different types of artificial learning
- Identification of problems which cannot be solved by standard algorithm-based software
- Short introduction to concepts in biology which have given rise to the idea of artificial neural networks
- How to identify the problems which can be solved by neural networks
- Study of a particular neural network: the multilayer Perceptron of backpropagation of the error gradient.
- A bit of theory (maths) in order to understand how we can "teach" a neural network how to solve a problem.
- How to do it in practice (use of libraries and tools).
- Study of problems occurring when neural networks are put into practice.
- Learning, ability to generalise, neural saturation

- Assessment of neural networks
- Study of different optimisation techniques of neural networks (crossed validation, premature learning stop, ROC variation curve of one parameter)
- Presentation of the latest developments in this science: deep learning

PREREQUISITES:
- Basic knowledge of Linux environment
- Know how to write C code, how to compile and debug it
- Knowledge about function analysis, particularly how to derivate a function

PEDAGOGICAL METHODS:
Lecture and lab

EVALUATION METHOD:
Written exam, Lab work (including the sources and the binaries)

MATERIAL:
A subject is available on my Blog including a system of comments for questions/ answers open to all students.
Computer science lab rooms and libraries or software (generally free of charge software).

BIBLIOGRAPHY:

INF4036 - INFORMATION SECURITY AND VIROLOGY

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Information Systems (FSI4BS2)
3 ECTS, 18 hours on site lectures
Taught in French/ English

OBJECTIVES:
Learn to use modern techniques of data mining in the area of information security (applications in virology and especially in cryptology)
Understand operational issues
Be able to transpose to other fields

PROGRAM:
1. Introduction to data mining and security problems
2. Methods of supervised learning
3. Partitioning techniques

4. Combination and algebraic techniques in data mining
5. Applications in virology and cryptology

PREREQUISITES:
Statistics – probabilities – mathematics – C programming

PEDAGOGICAL METHODS:
Lecture and lab

EVALUATION METHOD:
Projects

MATERIAL:
Photocopies, Linux – C compiler

BIBLIOGRAPHY:
Work on security, cryptography, web applications, network

INF4039 – DISTRIBUTED PROGRAMMING

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Information Systems (FSI4BS2)
3 ECTS, 18 hours on site lectures
Taught in French/ English

OBJECTIVES:
Understand the performance of a distributed system.
Understand the problems, know how to identify them and how to implement solutions.

PROGRAM:
Time and global states in distributed systems
Naming services
Coordination and consensus (election, detection and termination detection, …)
Fault tolerance
Replication
Distributed shared memory
Peer-to-peer systems

PREREQUISITES:

Basics in C programming, Java

PEDAGOGICAL METHODS:
Lecture and lab

EVALUATION METHOD:
Multiple choice test

MATERIAL:
Power Point presentation

BIBLIOGRAPHY:
Distributed Algorithms (Lynch), Distributed Systems (Couloris & Dollimore)

MAT4056 - ESTIMATION AND DATA ANALYSIS

4th year – 2nd semester in Paris-Ivry, Laval
Elective program – Information Systems (FSI4BS2)
3 ECTS, 24 hours on site lectures
Taught in French/ English

OBJECTIVES:
Know how to consolidate the main information of a database and know how to implement, if possible, a linear model set up from this database. This model is mainly designed for prediction.
Know how to make a digital and/or graphical summary of a database.
Know how to apply parametric tests in basic situations:
- Write a linear model which fits to the database (variance analysis or regression analysis)
- Choose a model according to the problem fixed

PROGRAM:
Descriptive statistics: characteristics of position, dispersion and form

PREREQUISITES:
Basic module in statistics and probabilities (3rd year lecture).

PEDAGOGICAL METHODS:
Lecture and lab

EVALUATION METHOD:
Written exam

MATERIAL:

Beamer, specific software, Power Point and Moodle

BIBLIOGRAPHY:

Frédéric Bertrand et Myriam Maumy-Bertrand, Initiation à la statistique avec R, Dunod, 2ème édition, 2014.