ENSEA
Ecole Nationale
Supérieure
de l'Electronique
et de ses Applications

FAME
French
American
Exchange
Program

ENGINEERING COURSES TAUGHT IN ENGLISH

SPRING SEMESTER

Catalog for Spring 2022

Students participating to the FAME program have the possibility to choose:
- FAME courses (specific for international students)
- One ELECTIVE course (mixed with ENSEA students in their 8^{th} semester). *Indeed all the elective courses taught in English during Spring semester are scheduled in parallel.*

The French Language and Culture course is compulsory (3 c.h.). For non-beginner students, an intermediate or advanced French course are also available.

The number of scientific courses is flexible but a minimum of 12 credit-hour and a maximum of 18 credit-hour is recommended.

2022 dates for FAME Program are:
January 22^{th} to June 3^{rd} (15 weeks of class, 4 weeks of break)

On Saturday January 22^{th} is organized an airport pickup in the morning.
Classes start on Monday January 24^{th} and end on Friday June 3^{rd}, students can leave as early as June 4^{th}. Earlier departure can be considered upon request.

The semester includes two breaks of two weeks each:
Winter Break: February 19^{th} to March 6^{th}
Spring Break: April 23^{th} to May 8^{th}

FAME	ENSEA	
	French Language and Culture	
US Credits : 3	Lecture : 48 h	Language : English and French

Summary

The main aim is to reach basic knowledge (CEFR A2 level) in French by developing linguistic and pragmatic competences and being acquainted with social and cultural conventions.

A2 level: Students have a repertoire of basic language that enables them to deal with everyday situations with predictable content, though they will generally have to compromise the message and search for words/signs.

Prerequisites

No prerequisites

Contents

French Language: 2 x 16h (students may switch for an intermediate group after the first 16 hour-unit)
Students will be involved in a variety of activities, mostly interactive with maximum use of French. Attention will be devoted to explaining the fundamentals of French. Students will develop their oral, aural, reading and writing skills in French. The course will provide a good understanding of grammar, syntax, lexis and phonology.

- Linguistic competences: morphology, syntax, lexis and phonology.
- Pragmatic competence: functions and speech acts.

French culture:
Students will broaden their knowledge of French culture and social conventions.
Unit 1: **Survival French** (8h)
This unit will be based on the observation of the French way of life and culture and socio-linguistic conventions. Students will develop and broaden their knowledge of French customs and habits. The course will focus on daily life activities and fundamental social conventions.
Unit 2: **Exploring Art and Culture in France** (8h)
This unit will focus on the French way of life in Paris, its suburbia and French regional peculiarities. Students will explore a broad range of subjects (gastronomy, painting, literature, architecture…) Visits of local cultural spots will be prepared and encouraged.

Organization

- Duration: 32 h for French Language + 16 h for French Culture
- Mid-tem and final exam (50%)
  Role-plays, quizzes, homework and presentations (50%)
- Optional conversation workshops are offered (45 min-session during lunch time every week)

Textbook

Similar to the following courses

GENERAL EDUCATION
HUMANITIES

FAME	ENSEA	
	Intermediate French Language and Culture	
US Credits : 3	Lecture : 48 h	Language : English and French

Summary

The main aim is to reach the threshold level (CEFR B1+ level) in French by developing linguistic and pragmatic competences and being acquainted with social and cultural conventions.

B1+: students have a sufficient range of language to describe unpredictable situations, explain the main points in an idea or problem with reasonable precision and express thoughts on abstract or cultural topics.

Prerequisites

A2 level. Students have a repertoire of basic language that enables them to deal with everyday situations with predictable content, though they will generally have to compromise the message and search for words/signs.

Contents

French language: 2 x 16h (students may switch for an advanced group after the first 16 hour-unit)

Students will be involved in a variety of activities, mostly interactive with maximum use of French. Attention will be devoted to explaining the fundamentals of French. Students will develop their oral, aural, reading and writing skills in French. The course will provide a good understanding of grammar, syntax, lexis and phonology.

- Linguistic competences: morphology, syntax, lexis and phonology.
- Pragmatic competence: functions and speech acts.

French culture:

Students will broaden their knowledge of French culture and social conventions. These units include role-plays and interactive activities.

Unit 2: **Exploring Art and Culture in France** (8h)

This unit will focus on the French way of life in Paris, its suburbia and French regional peculiarities. Students will explore a broad range of subjects (gastronomy, painting, literature, architecture…) Visits of local cultural spots will be prepared and encouraged.

Unit 3: **Professional French** (8h)

Students will explore professional conventions and differences. This unit will focus on socio-linguistic peculiarities in terms of variation, register and intercultural knowledge and teach students to identify and use them with ease. Students will write resumes and cover letters, conduct mock interviews and get acquainted with the French working world and its conventions. It will include interviews with some executives in French companies.

Organization

- Duration: 32 h for French Language + 16 h for French Culture
- Mid-tem and final exam (50%)
  Role-plays, quizzes, homework and presentations (50%)
- Optional conversation workshops are offered (45 min-session during lunch time every week)

Textbook

Similar to the following courses

GENERAL EDUCATION

HUMANITIES

FAME	ENSEA	
	Advanced French Language and Culture	
US Credits : 3	Lecture : 48 h	Language : English and French

Summary

The main aim is to reach proficiency (CEFR C1 level) in French by developing linguistic and pragmatic competences and being acquainted with social and cultural conventions.
C1 level: students can select an appropriate formulation from a broad range of language to express themselves clearly, without having to restrict what they want to say.

Prerequisites

B1+, B2 level. Students have a sufficient range of language to be able to give clear descriptions, express viewpoints and develop arguments without much conspicuous searching for words/signs, using some complex sentence forms to do so.

Contents

French language: 20h + 12h
Students will be involved in a variety of activities, mostly interactive with maximum use of French. Attention will be devoted to explaining the fundamentals of French. Students will develop their oral, aural, reading and writing skills in French. The course will provide a good understanding of grammar, syntax, lexis and phonology.

- Linguistic competences: morphology, syntax, lexis and phonology.
- Pragmatic competence: functions and speech acts.

French culture:
Students will broaden their knowledge of French culture and social conventions. These units include role-plays and interactive activities.
Socio-cultural competence: cultural and socio-linguistic conventions. Recognising and using aspects of variation, register and intercultural competence.
Unit 2: **Exploring Art and Culture in France** (8h)
This unit will focus on the French way of life in Paris, its suburbia and French regional peculiarities. Students will explore a broad range of subjects (gastronomy, painting, literature, architecture…) Visits of local cultural spots will be prepared and encouraged.
Unit 3: **Professional French** (8h)
Students will explore professional conventions and differences. This unit will focus on socio-linguistic peculiarities in terms of variation, register and intercultural knowledge and teach students to identify and use them with ease. Students will write resumes and cover letters, conduct mock interviews and get acquainted with the French working world and its conventions. It will include interviews with some executives in French companies.

Organization

- Duration: 32 h for French Language + 16 h for French Culture
- Mid-tem and final exam (50%)
  Role-plays, quizzes, homework and presentations (50%)
- Optional conversation workshops are offered (45 min-session during lunch time every week)

Textbook

Similar to the following courses

GENERAL EDUCATION
HUMANITIES

FAME	ENSEA	
	Electronic Circuits & Laboratory	
US Credits : 3+1	Lecture : 44h ; Laboratory : 24h	Language : English

Summary

Analog circuits modelling, analysis and design for modern electronic systems. Analysis of integrated amplifiers with bipolar junction transistors and field-effect transistors. Frequency response of transistor amplifiers. Operational amplifiers and filter circuits. Non-ideal operational amplifier. Introduction to microelectronics.

To reinforce concepts, laboratory experiments involve work with real components on didactic circuits and PSpice simulations.

Prerequisites

Completion of at least one introductory course to electronic circuits

Contents

- Review of basic circuit analysis method (superposition, Thevenin, Norton)
- Models of components, dependent sources and amplifiers
- Small signal analysis
- Amplifier design with BJT and MOSFET
- BJT and MOSFET amplifier large signal analysis
- Frequency domain characterisation of transistor circuits
- Operational amplifier circuit architecture
- Characteristics and operating principles of operational amplifiers
- Positive and negative feedback principles
- First and second order active filters with operational amplifiers
- Introduction to transistor level design of CMOS digital circuits

Laboratory topics:

- Measurements on linear circuits
- BJT characteristics and applications
- MOSFET characteristics and applications
- Op-amp based amplifiers and limitations
- Op-amp based filters
- CMOS logic gates

Organization

- One or two 2-hour session of lecture per week. The group of students is small enough to intertwine formal lecturing and exercises. The marking will be based on written tests and homework.
- Eight 3-hour session of laboratory experiments. The marking will be based on preparations, work during the sessions and lab reports.

Textbook

A. Sedra and K. Smith, Microelectronic Circuits, Oxford University Press, 7th Edition

Similar to the following courses

- IIT Chicago ECE 312
- University at Buffalo EE 310&312
- Univ. of Pittsburgh ECE 0102
- University of Illinois at U-C ECE 342&343
- Mississippi State University ECE 3434
- University of Michigan at AA EECS 311
- Michigan Tech EE 3131

FAME	ENSEA	
	Computer Architecture: Introduction to Microprocessors and Embedded systems	
US Credits : 3	Lecture : 17h ; Laboratory : 28h	Language : English

Summary

The goals of this course are to understand the main principles of a microprocessor system. It's both based on basic courses about microprocessor and laboratory works on a real embedded system.

Prerequisites

- Digital Electronics
- C or C++ language

Contents

This is a lab-oriented course in which classroom topics are explored through in-depth experiments in laboratory projects.
First, the students work on a simulator with a simplified model of a microprocessor. Here, basic concepts are described: data representation, arithmetic and logic unit, RISC principles, pipelining, memory types, assembly language.
Then students have to program a Cortex M7 microcontroller (ARM) based board in assembly language and C. Thanks to this work they discover more advanced topics such as: procedure, compiler, linker, the relation between assembly code and high-level language...
Then students program their own board with a personal project with switches, LEDs, a LCD screen and other peripherals. This is a way to introduce other concepts: I/O, peripheral devices, interrupts.
Courses and laboratory works are mixed. At the beginning, there are mostly courses then at the end mostly laboratory sessions.

Topics:

- Basic microprocessor principles: fetch, decode and execute cycle + pipeline, memory.
- Machine code, assembly language, assembler, number system.
- From C to assembly language: compiler.
- Exception handling and interrupts.
- Microcontroller and embedded systems.

Organization

Mix of 2-hour sessions and 4-hour sessions. The group of students is small enough to intertwine formal lecturing, exercises and laboratory. The grading is based on written tests and homework.

Textbook

Similar to the following courses

- IIT Chicago CS 470
- University at Buffalo CSE 341
- University of Pittsburgh CS 0447
- University of Illinois at U-C CS 231 & 232
- Mississippi State University ECE 3724/ECE 4713
- University of Michigan at AA EECS 300 level
- Michigan Tech

FAME	ENSEA	
	Probability and Statistics	
US Credits : 3	Lecture; Tutorials : 45h	Language : English

Summary

This course allows students to understand the basis principles in Probability and Statistics. The first three chapters cover basics of probability and introduce many fundamentals that are later necessary in statistical inference studies. Chapter 4 define the mathematical expectation. Chapters 5 and 6 introduce some discrete and continuous distributions. Chapter 5, 6 and 7 represent the central core of statistical inference, estimation (point and interval) and hypothesis testing. A major feature of these chapters is the division into methods of finding appropriate statistical techniques and methods of evaluating these techniques. Chapter 8 treats the theory of linear regression; the major purpose of regression is to explore the dependence of one variable on others.

Prerequisites

- Calculus and analytical geometry (including vector analysis)
- Usual functions. Euclidian space. Partial differentiation. Multiple integrals. Line and surface integrals. Integral theorems of vector calculus

Contents

- Elementary Probability Theory including discrete and continuous distributions:
    - Discrete Uniform Distribution, Hyper geometric Distribution, Binomial Distribution, Poisson Distribution.
    - Continuous Uniform Distribution, Exponential Distribution, Normal Distribution
- Multiple Random Variables.
- Properties of a Random Sample:
    - Strong Law of Large Numbers.
    - Central Limit Theorem.
    - Slusky's Theorem.
- Estimation: the Likelihood Principle, Maximum Likelihood Estimators, Methods of Evaluating Estimators.
- Confidence intervals: Methods of finding interval estimators, Methods of evaluating interval estimators.
- Hypothesis Testing: Methods of finding tests, Methods of evaluating tests.
- Simple Linear Regression.
- Applications.

Organization

One or two 2-hour session of lecture per week. The group of students is small enough to intertwine formal lecturing and exercises. The marking will be based on homework (20%) and written tests : midterm exam (40%), final exam (40%).

Textbook

Walpole, Meyers, Meyers, Ye, *Probability and Statistics for Engineers and Scientists*, 9th ed., Prentice Hall

Similar to the following courses

- IIT Chicago MATH 374/ 474/ 475
- University at Buffalo STA 301 & 302
- University of Pittsburgh ENGR 20
- University of Illinois at Urbana-Champaign
- Mississippi State University IE 4613
- University of Michigan at AA STAT 412
- Michigan Tech MA 4760

FAME	ENSEA	
	Fundamentals of Power Engineering	
US Credits : 3	Lecture : 33h, Laboratory : 12h	Language : English

Summary

The goal of this course is to understand and to apply the basic principles involved in the design and the modelling of Power Engineering systems.

Prerequisites

- Mathematics basis including integrals, differential equations, complex numbers and matrices.
- Physics basis in Electronics (e.g. voltage, current, resistance, inductance and capacitance). Students are also supposed to have basic knowledge about electronic circuit analysis.

Contents

Lecture

- Power definitions: active and reactive power, power factor, linear and non-linear receptors.
- Magnetic circuits and coils: magnetic materials, magneto-motive force, reluctance, magnetic energy, self and mutual inductances, hysteresis and Eddy current losses, equivalent circuits.
- Three-phase systems: definitions, coupling, power measurement.
- Single and three-phase transformers: Kapp assumptions, equivalent circuits, losses and efficiency, parameter identification using no load test and short-circuit test.
- DC motors: Structure and model, operating modes and power (motor, generator), efficiency.
- Three-phase AC motors: Structures, models, equivalent circuits, power losses and efficiency.
- Power electronics: Elementary components (Diode, IGBT, FET) and design rules (association of voltage and current sources), power bridges (rectifier, chopper, inverter) and introduction to variable speed drives,
- Brief introduction to power networks and smart grid.

Labs

- Transformers (single phase and 3-phase transformer).
- Synchronous generator (parameters of a 3-phase synchronous generator)
- Induction motors (parameters, speed-torque characteristic)
- Four-quadrant chopper driving a DC motor (static and dynamic characteristics)

Organization

One 2-hour session of lecture per week. The group of students is small enough to intertwine formal lecturing and exercises. Four 3-hour session of laboratory experiments.
Grading is based on mid-tem and final exam (50%), Laboratory (40%), Homework (10%)

Textbook

Electrical Energy an Introduction, Mohamed A. El-Sharkawi, CRC, **3rd Edition**

Similar to the following courses

- IIT Chicago ECE 319
- University at Buffalo EE 425
- University of Pittsburgh ECE 1771
- University of Illinois at U-C ECE 330
- Mississippi State University ECE 3414/3614
- University of Michigan at AA EECS 419
- Michigan Tech EE 4219 (2 cr)

FAME	ENSEA	
	Signals and Systems	
US Credits : 3	Lecture : 30h ; Tutorials : 15h	Language : English

Summary

The goals of this course are to understand the main characteristics about continuous and discrete time signals and the basis needed for their further processing (filtering for example).

Prerequisites

Students are supposed to have knowledge about circuit analysis with sinusoidal signals and some ideas about Fourier series representation of periodical signals. They must of course know how to calculate basic integrals (mainly exponential functions and rectangular window) and finite and infinite geometrical series.

Contents

Continuous time signals

- Fourier and Laplace transforms
- Time invariant linear systems and convolution
- Transfer functions, stability, frequency response, Bode representation, poles / zeros diagrams
- Application to physical systems (electrical, mechanical)

Discrete time signals

- Sampling theorem. Fourier equivalence of sampled signals and sequences. Practical sampling and converters. Problem of practical reconstruction (blocker effects).
- Linear systems, time invariant and non-time invariant (i.e. compressor and oversampler)
- Fourier and Z transforms
- Convolution, transfer functions, stability, frequency response, poles / zero diagrams
- Convolution / product duality. Windowing.
- Frequency sampling : Discrete Fourier Transform and applications
- Introduction to filter design.

Organization

- Approximately 40 % on continuous time signals, 60 % on discrete time signals
- Approximately 2/3 of the time will be used for formal lecturing, the remaining third being in form of tutorials (tutorials and lecture will be intertwined, as the group will be small enough to do it in the same place).

Textbook

1. B. P. Lathi, Linear Systems and Signals, Oxford Univ. Press, 2nd edition

Similar to the following courses

- IIT Chicago ECE 308
- University at Buffalo EE 303
- University of Pittsburgh ECE 1552
- University of Illinois at Urbana-Champaign ECE 310
- Mississippi State University ECE 3443
- University of Michigan at AA EECS 351 or EECS 216
- Michigan Tech EE 3160

FAME	ENSEA	
	Communications Systems	
US Credits : 3	Lecture : 33h, Laboratory 12h	Language : English

Summary

This course introduces analog and digital techniques for signal transmission. By the end of the course students should be able to analyze basic communication systems and specify their performances.

Prerequisites

- Fourier analysis of signals and systems
- Probability and random variables

Contents

Signals and Systems review
- Fourier series and transforms
- Linear systems theory, impulse response and transfer functions

Continuous waveform modulation systems
- Amplitude modulation: study of AM signal in time and frequency domains, AM modulator and demodulator circuits
- Angle modulation: study of FM signal in time and frequency domains, FM modulator and demodulator circuits
- Noise effects in analog modulations

Probability, radom variables and stochastic processes
- Statistical averages, mean, correlation and covariance functions
- Transmission of a random process through a linear filter, power spectral density
- Gaussian process, white Gaussian noise

Digital communication systems
- Baseband transmission of digital signals: representation of digital information, M-ary symbols, intersymbol interference, matched filter detection, eye pattern, probability of error due to noise
- Band-pass transmission of digital signals: QAM, PSK and FSK modulations

Organization

- Includes 12h of laboratory (8h of measurements on real circuits with oscilloscope and spectrum analyzer, 4h of simulations of digital systems with Matlab Simulink)
- Computer projects using MATLAB software as homeworks

Textbook

Simon Haykin & Michael Moher, Communication Systems, John Wiley, 5th Edition

Similar to the following courses

- IIT Chicago ECE 405
- University at Buffalo EE 483
- University of Pittsburgh ECE 1472
- University of Illinois at Urbana-Champaign ECE 459
- Mississippi State University
- University of Michigan at AA EECS 400 level
- Michigan Tech EE 3250

FAME	ENSEA	
New!	**Object oriented programming in Java through video games**	
US Credits : 3	Lecture; Tutorials : 45h	Language : English

Summary

This course addresses all students with a minimum skill in procedural programming. Main goals are:

- to discover object oriented programming and design through the example of video games.
- discover game design theory and history
- to build a strong skill in complex software development
- to master most of Java and JavaFx features.

Prerequisites

Completion of at least one course of procedural programming (like C language)

Contents

Object oriented programming and Java:

- Class factory
- Inheritance
- Polymorphism
- Lambda expression
- Threads
- Design patterns
- 3D object manipulation
- Object oriented design

Game design:

- History of video games
- Gameplay modes
- Type and structure of video games
- Video games design documents.
- Storytelling

Laboratory projects:

Two labs will be on video games design: brainstorming and design thinking.

The other labs will be on Java, using IntelliJ IDE on your laptop. During these labs, we will create three gaming structure to introduce OOP concepts (a console game, a 2d platformer, a 3d gui).

Organization

- Mashup of academic courses and labs, on your own laptop.
- The final mark will be composed at 30% by a written midterm exam, 10 % by an introductory project and at 60% by a final project.

Textbooks

Let us Java, by Yashwant Kanetkar (BPB)

Killer Game Programming in Java, by Andrew Davison (O'Reilly)

Fundamentals of Game Design, by Ernest Adams (New Riders)

Similar to the following courses

- Illinois Tech
- University at Buffalo
- University of Pittsburgh
- University of Illinois at Urbana-Champaign
- Mississippi State University
- University of Michigan at AA
- Michigan Tech

FAME	ENSEA	
	Operating Systems	
US Credits : 3	Lecture; Tutorials : 45h	Language : English

Summary

The purpose of this course is to understand and use the basic concepts of operating systems.

Prerequisites

- C programming language
- Linux Basics: The Command Line Interface

Contents

The basic concepts of operating systems are common to most computer systems, and enable the interfaces between the computer and the programmer. The Linux kernel will be taken as example to analyze common mechanisms. Concepts listed below will be discussed:

- process management, process data structures, scheduling
- memory management, virtual memory
- inter-process communication, signal, shared memory, semaphores, message queues
- threads, condition variables
- kernel initialization, kernel modules programming

Laboratory project:

- Development of a micro shell: display of output codes and execution times of programs launched, concatenation of commands, redirection of inputs and outputs to files.
- Memory allocator: rewrites malloc() and free() functions of the C standard library, to detect any buffer overflows.
- Inter-Process Communications: error-free communication of 3 processes using pipes, signals and shared memories.
- Threads: error-free synchronization between multiple threads.

Organization

- Approximately 1/3 of the time will be used for formal lecturing, the remaining time being used for tutorials (lecture and tutorials will be intertwined, as the group will be small enough to do it in the same place).
- The final mark will be composed at 1/3 by a written exam, and at 2/3 by the work done in practical work.

Textbook

1. D. P. Bovet, M. Cesati, Understanding the Linux Kernel, O'Reilly Media (October 2000)
2. A.S. Tanenbaum, Modern Operating Systems, Prentice Hall, 3 edition (December 21, 2007)

Similar to the following courses

- IIT Chicago CS 450
- University at Buffalo CSE 421
- University of Pittsburgh CS 1550
- University of Illinois at Urbana-Champaign CS 423
- Mississippi State University CSE 4733
- University of Michigan at AA EECS 300 level
- Michigan Tech

ELECTIVE	ENSEA	
	Internet of Things	
US Credits : 3	Lecture: 36h, Laboratory 28h	Language: English

Summary

IoT networks interconnect embedded physical objects such as distributed control systems used in autonomous vehicles and sensor networks used in structural health monitoring and smart cities. According to predictions, IoT will account for 45% of all Internet traffic by 2020, showcasing the importance of IoT applications.

This module focuses on the architectures and protocols of IoT communication networks; we will study cases such as wireless sensor networks and vehicular IoT networks (V2V, V2X, X2V to assist driving). The option covers a wide range of topics, starting from the physical layer (PHY), and moving to IoT MAC and network layers (802.15.4, 6LoWPAn, ZigBee, etc.). Special topics, including IoT security protocols – IPSec. DTLS, etc., will also be covered. Students will have the chance to get introduced to the realm of IoT and experiment with intelligent, interconnected objects, they can potentially conceptualize, design and develop in the future as engineers.

Prerequisites

- Digital communications
- Networking fundamentals

Contents

- Communication networks for IoT
- Fundamental trade-offs between rate, connectivity, latency
- Wireless sensor networks
- Energy consumption, energy harvesting
- IoT PHY: NB-IoT
- Networking for IoT, TCP-IP, IPv6, 6LoWPAN, ROLL/RPL
- IoT Protocols, 802.15.4, ZigBee, RIOT, CoAP
- IoT Security, DTLS, IPSec
- Automotive IoT, V2V, V2X, X2V

Laboratory topics:

Laboratory sessions include MatLab® based experiments, experimentation with real IoT devices and remote access experimentation using the IoT FIT Lab at INRIA Saclay https://www.iot-lab.info/.

Textbook

- Moodle online resources

Similar to the following courses

- IIT Chicago
- University at Buffalo
- University of Pittsburgh
- Mississippi State University
- University of Michigan at AA
- Michigan Tech

ELECTIVE	ENSEA	
	Image and Virtual Reality	
US Credits : 3	Lecture : 36h, Laboratory 28h	Language : English

Summary

This course introduces digital signal processing for images, computer vision, virtual and augmented reality. After formal lecturing on these concepts, students will develop a project in teams of two students.

Prerequisites

- Imperative programming (C language)
- Object oriented programming (JAVA)
- Algorithms design

Contents

- Image generation, camera types
- Image processing, linear filtering
- Mathematical morphology, pattern recognition (Hough transform), segmentation
- Computer vision: camera calibration, stereovision, structured light
- Virtual reality: VR helmets technology, 3D modeller, 3D engine
- Augmented reality: effects insertion, image synthesis

Textbooks

- Digital Image Processing, Gonzales & Woods, 3rd edition, Pearson
- Unity 5.x Game Development Blueprints, John P. Doran, 2016, PACKT
- Game Engine Architecture, Jason Gregory, 2014, CRC press

Similar to the following courses

- IIT Chicago
- University at Buffalo
- University of Pittsburgh
- University of Illinois at Urbana-Champaign
- Mississippi State University
- University of Michigan at AA
- Michigan Tech

ELECTIVE	ENSEA	
	Artificial Intelligence and Big Data	
US Credits : 3	Lecture : 36h, Laboratory 28h	Language : English

Summary

This course is an introduction to artificial intelligence and its application to the processing of big quantities of data. Classification and prediction questions will be studied through different AI methods in order to find solutions for automatic image indexation or for recommendation systems.

Prerequisites

- Programming skills (Python language)
- Linear Algebra
- Basic Probability and Statistics

Contents

- Data mining, introduction to data bases
- Statistical learning, linear classifier, neuron networks, decision trees
- Introduction to deep learning
- Visual recognition, image interpretation
- Recommendation systems, user profile generation

Textbook

- Deep Learning, Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016, http://www.deeplearningbook.org
- Pattern Recognition and Machine Learning, Christopher Bishop, Information Science and Statistics, 2006

Similar to the following courses

- IIT Chicago
- University at Buffalo
- University of Pittsburgh
- University of Illinois at Urbana-Champaign
- Mississippi State University
- University of Michigan at AA
- Michigan Tech

ELECTIVE	ENSEA	
New !	**User-centric Design**	
US Credits : 3	Lecture : 36h, Laboratory 28h	Language : English

Summary

This course is an introduction to user-centric design, in which designers focus on the users and their needs throughout the design process.

Prerequisites

Contents

- This course is based on the assumption that engineers have a responsibility in designing new products that are not useless, counter-intuitive or difficult to use. It is focused on efficient user-friendly embedded interfaces and related design and evaluation tools. It also introduces principles and models that make it possible to better understand what users need and want when interacting with systems (e.g., decision making, cognitive bias, user experience). The course ranges from software (information visualization, interaction techniques, Artificial Intelligence) to hardware (STM, sensors and actuators) and to human factors (user experience, prototyping, evaluation, perception).

- Goals:
  - Understanding the principles of user-centric design.
  - Understanding the design and development process of an interactive system.
  - Understanding how to analyse user needs and how to prototype and evaluate a system.

  The methods taught in the course are directly implemented in a project through the iteration of low-fidelity prototypes.

Textbook

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Similar to the following courses

- IIT Chicago
- University at Buffalo
- University of Pittsburgh
- University of Illinois at Urbana-Champaign
- Mississippi State University
- University of Michigan at AA
- Michigan Tech