FAME Program, Online Edition

By
ENSEA
Ecole Nationale Supérieure de l'Electronique et de Ses Applications
STEM Graduate School since 1952
Cergy, FRANCE

Academic offer: A special research project module for 4-student groups, supervised by ENSEA professors. Each group will have his own academic supervisor and special research subject. The training will be proposed entirely online and based on 4 hours of weekly live meeting with the supervisor. Each live training session will give the students the theoretical bases and practical guidelines in order to achieve the technical project proposed and to reach the scientific goal proposed.

Transferable credits: 3 US Credits / 6 ECTS.

Duration: 12 weeks, 4 direct instruction hours per week (48 hours)

Language of instruction: English

Period: January 25th to May 21st 2021 (detailed schedule depending on project and supervisor)

Experience high level French engineering training from home

ENSEA, the most innovative Independent Grande Ecole in France:

ENSEA prepares students for general engineering careers in electronics, IT, telecommunications and embedded systems. Based in Cergy-Pontoise in the Val d'Oise (95), it is an autonomous public institution, authorized by the CTI to award the "Diplôme d'Ingénieur" since 1952.

More than 7,500 alumni
30 km from Paris, gateway to Europe
800 students
100 apprentices
250 graduated students per year
20% of final year students are in exchange or double degree programs
152 international agreements with 30 double degree programs
70 PhD and post-doctoral students
90 tenured professors
27 teaching laboratories
200 corporate partners
180 visiting professors from industry and partner institutions
35 student associations

A taste of French Tech from home, specifically tailored for your needs

As the sanitary situation does not allow us to propose our usual FAME Program, we are offering a brand new online solution to allow all US students to have a taste of our latest academic offer, specially built for smooth integration in your main curriculum, but with a nice hint of French academic approach:

- Very small study groups to adapt the teaching to every need and bring very flexible instruction and individualized learning. Each professor will take charge of 4 students and carefully lead them to their technical goal through theoretical and practical formation adapted to the requirements of the research project.

- 48 hours of live interaction with the teacher and a very progressive learning track divided in 12 weeks of class.

- Projects built for team learning and team work for a nice collective research experience from anywhere you want.

- 3 US credits upon validation of the module directly transferable into your semester curriculum.

- An exploration of French industry and research through projects adapted to French companies' technical expectations.

Special Projects at ENSEA
Courses Catalogue - Spring 2021

Project 1
Object oriented programming in Java through video games

Faculty	Prof. Antoine TAUVEL
Description	This special project addresses all students with a minimum skill in procedural programming. The main goal is to discover object oriented programming and design through the example of video games. Major object oriented concepts will be seen through a first small project : inheritance, overriding, polymorphism etc. After those first 12 hours, we'll introduce GUI coding in JavaFx, and multithreading. Finally, the design problems that are specifics to 2D video games (image rendering, physics engine etc) will be seen during the last part. Assessment will be made through a personal project of small game developpement : plateformer, point and click, tower defense… Indicative contents and structure : • 12 hours : inheritance, overriding, polymorphism… • 8 hours : GUI & multithreading • 12 hours : video game basics • 16 hours : student project's developpement
Field	Computer Science
Prerequisites	Completion of at least one course of of procedural programming (like C language)
Schedule	Spring Semester 2021 Tuesday 4:00PM to 6:00PM (French time) Thursday 6:30PM to 8:30PM (French time)
Bibliography	• *Let us Java,* by Yashwant Kanetkar (BPB) • *Killer Game Programming in Java,* by Andrew Davison (O'Reilly)

Project 2
Introduction to Wireless Communication Electronics

Faculty	Prof. Robert SOBOT
Description	An introduction to design of circuits used for wireless transmission and reception of analog modulated signals. The course objective is to study and design key sub-circuits of a heterodyne radio receiver: RF/IF amplifiers, matching networks, oscillators, mixers, modulators, and demodulators. The circuits are designed at the transistor level using SPICE based simulators and models of discrete components. During each stage of the development, a brief theoretical background is given that is followed by techniques for practical implementation. At the end of course, the students will demonstrate functionality of their designs by simulations.
Field	RF Electronic Circuits Design and Simulation with LT Spice
Prerequisites	Completion of at least one "Circuits analysis" course
Schedule	Spring Semester 2021 Tuesday 6:00PM to 8:00PM (French time) Thursday 6:00PM to 8:00PM (French time)
Bibliography	Recommended textbooks: 1. *R. Sobot*: "Wireless Communication Electronics – Introduction to RF Circuits and Design Techniques", 2nd ed., Springer 2020 (ISBN-13 978-3-030-48629-7) 2. *R*. Sobot: "Wireless Communication by Example", 2nd ed., Springer 2020, (ISBN-13 978-3-030-59497-8) 3. *Sedra/Smith*: "Microelectronic Circuits", 7th ed., Oxford University Press 2015, (ISBN 978-0-19-933913-6)

Project 3
Introduction to Quantum Information and Quantum Computation
An overview of theory and experiment

Faculty	Prof. Quentin DUPREY
Description	The goal of the work is to become familiar with the basic concepts of quantum computation and its issues. During the lecture, we will learn quantum algorithms and compile them on an IBM interface of quantum coding, keeping in mind the practical realization. A first part will be dedicated to the understanding of new mathematical tools, operators, quantum phenomena (in particular, the entanglement phenomena) and to their implementation in simple algorithms. Next, we will go further in the issues of Quantum Information and we will focus on the Quantum Error Correction codes and Communication Chains.
Field	Quantum Mechanics – Quantum Computing
Prerequisites	Linear Algebra - Fourier Transform – Hilbert Spaces and Quantum Mechanics Formalism (Dirac Notation) Please, note that we will provide tutorial videos as initiations to the prerequisites.
Schedule	Spring Semester 2021 Monday 6:00PM to 8:00PM (French time) Wednesday 6:00PM to 8:00PM (French time)
Bibliography	1. *"Quantum Computing"*, Stolze and Suter 2. *"Quantum Information Theory"*, Timpson 3. *"Quantum Computation and Quantum Information"*, Nielsen and Chuang