ECE PARIS
ÉCOLE D'INGÉNIEURS

ING4 (MASTER1)
2017-2018

EMBEDDED SYSTEMS

SEMESTER 7	**1. Module ING-4S07-ELE: Embedded Hardware 1**
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	   b. COURSE: ING-ELE403 Sensors and Interfaces
	2. Module ING-4S07-SSE Module SE system 1
	   a. COURSE : ING-PRJ402 technological project SE
	   b. COURSE : ING-INF402 Advanced programming in C
	3. Module ING-4S07-SWE: Embedded software 1
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SEMESTER 8	**1. Module ING-4S08- SWE: Embedded Software**
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	2. Module ING-4S08-ELE: Embedded Hardware
	   a. COURSE: ELE-411 Digital Signal Processors
	   b. COURSE: ELE-412 Digital Circuit design FPGA-VHDL
	3. Module ING-4S08-NET: Networks
	   a. COURSE: NET-403 Industrial local networks
	4. Module LFH-Languages, Communication and Management
	   a. COURSE: ING-LFH408 Management of the individual relationship
	   b. COURSE: ING-LFH406 Business management
	   c. COURSE: English 8
	5. Module French as foreign language
	   a. COURSE :French for beginners
	   b. COURSE :French for intermediate
	7. Module French as foreign language
	   a. COURSE: French as foreign language courses beginner
	   b. COURSE: French as foreign language courses intermediate
	8. Module PPE

SEMESTER 7

ING-4S07-ELE **ING-ELE406 : Microcontrollers**	ING-4S07-ELE: Embedded Hardware 1	Référent : **Mr François Saidi**
Semester: S07	**No. of hours**: 47	Language of instruction: English
Mode of attendance: courses		HOUELLE Alain, SENOUCI Benaoumeur

<u>**Prerequisites**</u>	- Basic digital electronics: logic gates, memories, operation of a MUX, DEMUX, ALU - C Language Basics
objectives contents	- Recall the architecture of a computing unit (microprocessor) - Define a microcontroller - Introduce the architecture of a microcontroller - Compare a microcontroller with a microprocessor - Understand the step-by-step execution of instructions on a microcontroller - Learn programming (assembler and C) for microcontrollers
contents	The aim of this course is to discuss basic concepts in the field of microcontrollers. It starts with a reminder on the general architecture of a classical computing unit and then highlights the differences with the microcontrollers. The course focuses on Microchip PIC microcontrollers which have the advantage of being the most widely available on the market. Examples are developed on families PIC16F, PIC18F and PIC24F, illustrating the ideas introduced previously. Practical work : - The first sessions are dedicated to a general upgrade on the grip of the microcontrollers PEAK. Students have to implement practical applications such as alarm clocks, digital voltmeters, electronic diaries, etc. - The remaining TP sessions are dedicated to the development of a team project, a project based on a Microcontroller of choice.
Skills to be learned	Example: Compile code C. Know how to write technical specifications
Evaluation	1 DS one-hour course mid-course - 1 DS of 2 hours at the end of classes - 1 follow-up note for projects developed in lab
Bibliography	- http://www.microchip.com - http://www.atmel.com/ - http://www.nxp.com - http://www.freescale.com/

ING-4S07-ELE **ING-ELE403: Sensors & Interfaces**	ING-4S07-ELE: Embedded Hardware 1	Référent : **Mr François Saidi**
Semester: S07	**No. of hours**: 36	Language of instruction: English
Mode of attendance: courses		JUN KIM Jae Yun, LIN Chao

Prerequisites	Analog Electronics Course - Signal Processing Course
objectives contents	Knowledge and instrumentation of sensors used in embedded systems
contents	Magistral courses and Tutorial courses: 1) Introduction to the architecture of the acquisition chain and the restitution chain, 2) Sensors: definition, classification, measurement of performance, and set of sensors, 3) Conditioners: definition, classification, 4) Instrumentation amplifiers and common mode rejection rate, 5) Theory of sampling, the sample-and-hold, analog-to-digital converter and digital-to-analog converter 6) Case Study: Automotive Radio Receivers (at Continental) Practical work: 1) Construction of an electronic circuit which consists of a digital acquisition system: transmitter and sensor infra-red, active conditioner, amplifier, analog-to-digital converter, SPI interface, Raspberry Pi 3 and displaying the digitized sensor information on a screen. 2) Construction of an electronic circuit which consists of an analog reproduction channel: Raspberry Pi 3 (for the generation of PWM signals), half-bridge assembly to control motors, direct current motors, buzzer that generates sounds from PWM signals.
Skills to be learned	Theory and practice of the main topics of the measurement chains and interfaces.
Evaluation	Practical work and exam
Bibliography	www.analog.com (keywords : signal conditioning)

ING-4S07-SSE ING-PRJ402 : technical project SE	ING-4S07-SSE Module SE system 1	Référent : **Mr François Saidi**
Semester: S07	**No. of hours**: 12	Language of instruction: English
Mode of attendance: courses		RIQUIER Jean-Louis

Prerequisites	Digital and analog electronics courses. Technical systems design course. Programming of microcontrollers.
objectives contents	Validate the stages of the realization of a technical object, from the specifications to the prototype.
contents	Analysis of requirements based on specifications. - Functional Specifications. - Structural synthesis. - Validation of functional specifications in simulation. - Routing and printed circuit board. - Wiring of the prototype. - Unit tests of the functionalities on the prototype. - Integration and validation of the prototype
Skills to be learned	Know how to make simple electronic cards Know how to design and model electronic circuits
Evaluation	Presentation of simulation models. Demonstration of the prototype. Writing a report.
Bibliography	NA

ING-4S07-SSE ING-INF402 :Advanced C programming for Embedded Systems	ING-4S07-SSE Module SE system 1	Référent : **Mr François Saidi**
Semester: S07	**No. of hours**: 27	Language of instruction: English
Mode of attendance: courses		HOUELLE Alain, DROUIN François

Prerequisites	Knowledge of C-fundamentals
objectives contents	Understand and master C concepts specific to the constraints of embedded systems
contents	4 sessions of 2h of TPs to deepen the following points: 1st session: - detail of the compilation string with GCC - first use of structure, tables and pointers 2nd session: - deepening pointers and function pointers - dynamic allocation of memory 3rd session: - manipulating bit fields - use of appropriate operators 4th session: - concluding exercises containing all the points raised in previous sessions: these exercises Practice, information encryption, compression and decompression of information
Skills to be learned	Understand the different elements of the compilation chain Understand the role of a compilation chain Understand the role of the compiler, the role of the operating system and their interactions Mastering the stack, heap, and data segment functionality, Learn Standard Data Formats Mastering Pointers Manipulating Pointers on Functions Manipulate a sorting algorithm Manipulating threads Learn how to measure the temporal performance of an algorithm
Evaluation	exam
Bibliography	NA

Module: ING-4S07-SWE Course: NG-INF435 Analysis and design with SCADE	ING-4S07-SWE: Embedded software 1	Référent : **Mr François Saidi**
Semester: S07	**No. of hours**: 9	Language of instruction: English
Mode of attendance: courses		LE NAHEDIC Pierre

Prerequisites	Knowledge of an object-oriented language (Java or C ++) Knowledge of object model bases
objectives contents	Understand why we model - Introduction to the object model and the UML - Understand the tasks of requirements, analysis and design in the life cycle of a project - To know the main notations of the UML: Classes, sequences, cases of use, deployment - Know how to apply the MOU to document the life-cycle supplies of a project - Learn to use a systems engineering tool
contents	• Introduction to modeling, object model, UML • Functional modeling (use case) • Structural modeling (class diagrams) • Behavioral modeling (sequence diagrams) • Modeling of real-time systems with SCADE
Skills to be learned	Know how to model a problem
Evaluation	Exam, note
Bibliography	* The Object Primer: Agile Model-Driven Development with UML 2.0, 3rd Edition - Scott Ambler * UML et les Design Patterns, 2nd Edition - Craig Larman * Object-oriented Systems Analysis and Design using UML, 3rd Edition - Bennet, McRobb & Farmer * UML Distilled, 3rd Edition - Fowler & Scott * UML par la pratique, 2nd Edition - Rocques * Le Guide de l'utilisateur UML - Booch, Rumbaugh, Jacobson - Sites: http://www.omg.org Page

Module: ING-4S07-SWE Course: NG-INF408 Embedded Linux	ING-4S07-SWE: Embedded software 1	Référent : **Mr François Saidi**
Semester: S07	**No. of hours**: 21	Language of instruction: English
Mode of attendance: courses		MOUELHI Sebti

Prerequisites	Language C, Basic knowledge of computer architecture and Unix systems.
objectives contents	Advanced uses of the Linux operating system, configuration, modification, cross-compilation and Kernel Linux optimization for an embedded architecture, Introductions to module development Kernel, Practical work on an ARM-Cortex single card computer (Raspberry Pi).
contents	**1st session:** UNIX History, Terminologies and concept around the Linux OS, Kernel Linux, Linux from an embedded perspective **2nd session:** Course: Linux File System, Shell Commands, Users and Access Rights, Process: Life Cycle, Features, and Management, ... Labs: Installation and first manipulations of Linux Raspberry on the Raspberry Pi, Network Configuration, Creation of a modified Linux image. **3rd session:** Course: Shell scripts (variables, control structures, loops, ...), Regular expressions (grep, sed and awk commands), GNU make (Makefile files and development project management). Labs: Basic Commands and Redirection, Access Rights Management, Declaration and Handling of Environment Variables, Grep Command and Regular Expression, Process Management and the fork () System Call, Cross-compilation of a C program. **4th session:** Labs: Shell Scripts (Control Structures, Loops, ...), Advanced File Manipulation and String characters with the command sed, Project Management and GNU make (Makefile ...). **5th / 6th session:** Course: Kernel Linux: Component and Features, Kernel Source Structure, Compilation Process Cross, Kernel Patches, Kernel Modules. Labs: Downloading Sources and Tools for Cross-Compilation, Kernel Version Management, Applying a Kernel Patch, Configuring and Optimizing Kernel Size, Compiling and Transferring Images and Modules to the Raspberry Pi. **7th session:** Course: Kernel Modules (use, development and API); GPIO pins of the Raspberry Pi, Use and configuration of GPIOs by Kernel modules; Interrupt management, ... Labs: Development and Execution of Kernel Modules for Flashing an LED, Uses of kernel APIs and sysfs interfaces, Event handling by interrupts

Skills to be learned	Mastering the Linux operating system on embedded architectures, mastering the procedure of cross-compilation, introductions to the development of Kernel modules.
Evaluation	• Tracking mark based on TP renderings • Exam in multiple choice questions.
Bibliography	In the course

Module: ING-4S07-SWE Course: ING-INF404 Computer Networks	ING-4S07-SWE: Embedded software 1	Référent : **Mr François Saidi**
Semester: S07	**No. of hours**: 24	Language of instruction: English
Mode of attendance: courses		LI Xiaoting, HERMANT Jean-François

Prerequisites	N/A
Objectives contents	This course allows students to understand the basics of networks, switching technologies of LANs, IPv4 and IPv6 routing technologies, wide area network technologies, in network infrastructures, security and network management.
contents	This course is structured as follows: Cisco Online Course, Tutorial, Hands-On. The Cisco online course is a CCNA certification preparation course. The tutorials help to ensure that students have understood the different concepts of the course. The practical work allows the students to implement the different concepts of the course. The skills acquired are as follows (non-exhaustive list): OSI and TCP / IP models. IPv4 and IPv6 protocols. Static and dynamic routing. Intra-domain and inter-domain routing. In the IPv4 world: RIPv2, OSPFv2, EIGRP for IPv4. In the IPv6 world: RIPng, OSPFv3, EIGRP for IPv6. IPv4 to IPv6 transition mechanisms. Local and extended networks. Network Services. Network security. Network management. At the end of the course, students must be able to design, implement and optimize medium-sized networks. Directed work is delivered by a Cisco Certified Associate Teacher Researcher (CCNA). Practical work is delivered by a Cisco Certified Teacher-Researcher at a professional level (CCNPx3).
Skills to be learned	At the end of the course, students must be able to design, implement and optimize large networks average.
Evaluation	Final examination and continuous evaluation of the practical part.
Bibliography	http://www.cisco.com/ http://www.ciscopress.com/ https://www.redbooks.ibm.com/redbooks/pdfs/gg243376.pdf

Module Code ING-LFH – Languages, Communication and Management

COURSE ING-LFH405 - Budget management	Module: LFH ING-4S07	Referent : TURZI-TRIPODI Francesco
Semester: S07	No. of hours: 32	Language of instruction: English
Mode of attendance: Tutorial Classes		

Prerequisites	Knowledge of the elements provided in financial analysis and economic analysis.
objectives contents	- Ability to develop, in a simple way, the budget of a service or an SME. - In addition, students acquire the ability to locate the activity for which they can be Of the overall budget management of a large company.
contents	- Linkages between policy, strategy and budget. - Budget management: principle and methodology. - Different budgets by function, per management unit … - Financing problems. - Budgets by responsibility centers. - Budget control and gap analysis.
Skills to be learned	To dominate the financial tools (balance sheet, profit and loss account, financial flows). Build the ratios and be able to provide an analytical look.
Evaluation	Case study (no document is allowed.) Only a so-called operational calculator Be accepted.)
Bibliography	Course materials: The LDE Handout "Budget Management"

Module Code ING-LFH – Languages, Communication and Management

COURSE ING-LFH403 – team management	Module: LFH ING-4S07	Référent : DACHER Nicolas
Semester: S07	No. of hours: 18	Language of instruction: English
Mode of attendance: Tutorial Classes		

Prerequisites	None
objectives contents	Acquire methods of team management, meeting management and conflict management.
contents	- Session 1: Management at Google. - Session 2: History of Management Theories and Motivation. - Session 3: The art of teamwork. - Session 4: Roles of the manager & know how to communicate effectively. - Session 5: Facilitating a productive meeting. - Session 6: Managing and preventing conflicts
Skills to be learned	To anticipate. Motivate. Organize. Give instructions and delegate. Coordinate a team. Control the work. Conduct professional interviews. Manage conflicts
Evaluation	Exam (1h30)
Bibliography	Le management chez Google (documentaire France 5) - 100 ans de management - Bruno Jarrosson, Dunod - L'avenir du management - Peter Drucker, Village mondial - L'art de la guerre - Sun Tzu, Flammarion - Les illusions du management - Jean-Pierre Le Goff, La découverte - Le principe de Peter - Jean Peter, Livre de poche - Le Manager Minute - Ken Blanchard, Eyrolles - Le chef de projet efficace - Alain Fernandez, Editions d'Organisation - Le management pour les nuls - Bob Nelson Page

Module Code ING-LFH – Languages, Communication and Management

COURSE ING-LFH401 : English 7	module : ING-4S07-LFH Module Langues et Formations Humaines	Referent : BINI TISSIER Kristen
Semester : 07	Hours : 11	Language of instruction: English
Mode of attendance : tutorials		

Prerequisites	English 6 or equivalent
objectives contents	Fine tune linguistic abilities and develop fluency in English. (Oral and Written) Explore moral problems and look at ethical issues from a practical standpoint. (Learning to argue your point of view and develop concrete arguments) Work on presentation skills. Explore moral problems and look at ethical issues from a practical standpoint. (Learning to argue your point of view and develop concrete arguments) Work on presentation skills.
contents	As an engineer, your job will be to create and improve technology. But over the course of your career, you'll face not only technical challenges; you'll also encounter moral and ethical dilemmas, sometimes on a daily basis. How you resolve those dilemmas will inform your contribution to the future, for better or worse. What role will you play in shaping the future: your own future, the future of technology, the future of the planet? In this course, we will use communication techniques to develop your skills in articulating and defending your inherent values. Expectations: This course will focus on in-class role-play exercises, presentations, listening exercises, and debates, as well as a substantial, written case study. Class participation is essential for your success in this course, as well as your full participation in group work.
Skills to be learned	Reading, writing, speaking and listening in English. Negociation, Ethics training. Public Speaking, Argumentation and debate skills.
Evaluation	NS: (coefficient 3) In-class activities: 60% Role-plays, debates, presentations, oral activities: 40% Quizzes, questionnaires, writing assignments: 20% Response and research writing assignments: 40% DS: (coefficient 1)
Bibliography	Campus web page

4S07-FLE- French as a foreign language (FLE)

COURSE: 4S07-FLE- French as a foreign language (FLE) **Beginner Level**		Référent : Mrs. Patricia Farioli
Semester: S07	**No. of hours**: 30	Language of instruction: English
Mode of attendance: courses		Mrs. Caroline Langer / Mr. Sylvain Lerouvillois

Prerequisites	N/A
objectives contents	The main objective is to give students the fundamental elements for the progressive mastery of the language to communicate adequately in the contexts of personal, social and academic life and to be comfortable in the language. It is designed to assimilate the fundamental bases of the language. In a general way: understanding and adapting your communication in French according to the interlocutors, the contexts and the supports, taking into account the permanent evolution of the language. The general objectives are based on the progression of the ability to produce and understand personal information in short exchanges. Interact in simple dialogues by establishing social contacts in the different contexts of daily life (restaurant, grocery store, cafe etc.). As well as gradually participating with autonomy in conversations and understanding simple oral and written texts.
contents	A1: Discovering French - Greetings, take leave, introduce yourself - Ask and give personal information - Talk about your preferences, tastes and hobbies - Nationality / country - Say the time, give instructions, - Talk about your habits and activities
Skills to be learned	- Linguistic skills (lexical, semantic, grammatical, phonological, orthographic) - Sociolinguistic skills, socio-cultural and intercultural skills (politeness, knowledge of society and culture, understanding of relationships). - Pragmatic-functional skills (ability to manage and structure sentences to communicate appropriately)
Evaluation	On the one hand, the evaluation is done summatively through repetitive questions / answers for an intuitive and immediate appropriation, written as well as oral, interspersed with grammatical points. On the other hand formative, through the reading and understanding of the press, authentic documents videos, films that allow them a reflection on their own learning. Cultural outings prepared upstream, then returned as written reports, are also part of the evaluation.
Bibliography	C., Hugot, V.M., Kizirian, M.,Waendendries , A., Berthet, E.,Daill. (2012). Alter Ego +. Niveau A1. Méthode de Français. Hachette Français Langue Etrangère. V., Petitmengin, C., Fafa (2017). La grammaire en jeux. PUG FLE. Ressources Internet : http://www.bonjourdefrance.com/index/indexpedago.htm http://www.ciep.fr/assistants-francais-a-letranger/ressources-pedagogiques

4S07-FLE- French as a foreign language (FLE)

COURSE: 4S07-FLE- French as a foreign language (FLE) **Intermediate Level**		Référent : Mrs. Patricia Farioli
Semester: S07	**No. of hours**: 30	Language of instruction: English
Mode of attendance: courses		Mrs. Caroline Langer / Mr. Sylvain Lerouvillois

Prerequisites	A1 LEVEL of French
objectives contents	The main objective of this course is to use the language in situations close to the life of the learner and to enable him/her to develop essential skills to any successful communication. The various activities offered are a reflection of authentic situations and thus promote learner motivation and involvement in learning French. Many opportunities are offered to interact creatively and playfully according to his/her feelings, his /her experience and his/her culture. The guiding thread of the course booklets corresponds rigorously to the competences described by the Common European Framework of Reference for Languages (CEFR). In general, the objective is to train the students to use the language more fluently and a mastered understanding in order to pass in the final year the DELF B2.
contents	- Talk about your daily activities - Tell stories in the past - To give advice - Describe the character of a person - Express feelings - Make projects - Describe places - Express your opinions and argue
Skills to be learned	- Linguistic skills (lexical, semantic, grammatical, phonological, orthographic) - Sociolinguistic skills, socio-cultural and intercultural skills (politeness, knowledge of society and culture, understanding of relationships). - Pragmatic-functional skills (ability to manage and structure sentences to communicate appropriately)
Evaluation	This course is 100% validated by continuous monitoring. During the semester, several evaluations are planned. A mark for attitude and oral participation in the course is also awarded. The average of these grades is the final grade.
Bibliography	. Alter ego + A2, Hachette, 2012 . Communication progressive du français, Niveau intermédiaire, Clé International, 2014 . https://www.lepointdufle.net/ressources_fle/exercices_de_francais.htm . http://apprendre.tv5monde.com/fr/niveaux/a2-elementaire

ING-PRJ409: Multidisciplinary Team Project

COURSE: Multidisciplinary Team Project	ING-PRJ409: Multidisciplinary Team Project	Referent : BOUCHEZ David-Olivier
Semester: S07	**No. of hours**:	Language of instruction: English
Mode of attendance:		

Prerequisites	A reflection prior to the launch of the project (ideation) to convince cluster leaders of the interest in technological project with regard to socio-economic expectations.
objectives contents	On a development schedule of the PPE in agile mode (sprint weeks). In the first semester: - convince a jury of the EPP approach - define a valuation method - structure the project (specifications and functional and technical specifications).
contents	Project management in multidisciplinary team.
Skills to be learned	Soft skills / Hard skills.
Evaluation	- Pitch - Available CDC - Evaluation of the project management by the mentor
Bibliography	Literature, MOOC and course on project management + creativity and ideation.

SEMESTER 8

Module: ING-4S08-SWE Course: ING-INF426 Drivers Linux	ING-4S08-SWE :Embedded Software 2	Référent : **Mr François Saidi**
Semester: S08	**No. of hours**: 18	Language of instruction: English
Mode of attendance: courses		BENICOURT Delphine, BALERE Yannick, JOUBERT Thierry

Prerequisites	Proficiency in C language and multitasking.
objectives contents	Acquire the tools needed to design multi-task application architecture. Applying knowledge in a Linux environment with the pthread library (POSIX API) Understand the concept of driver model.
contents	Introduction and generalities • General presentation • UNIX System History Processes and threads • Scheduling • The process • Parallelism with fork • Threads • Parallelism with pthread • Managing priorities • TP - Multi-process • TP - Multi thread Synchronization • Competitive access • Mutual exclusion • Condition • Semaphore • TP - Thread Synchronization • TP - Process synchronization Memory management • Shared memory with mmap • Tail message template • TP - Implementation of a shared memory exchange between processes Dynamic Library & Driver Model • Presentation of the principle of a dynamic library • Concept of module • Model stream driver • TP - Implementation of a memory bank driver (simulated EEPROM)
Skills to be learned	Principle of multitasking architecture. Pattern-acknowledgment pattern. Synchronization by protection and signaling.
Evaluation	based on current participation and quality Of the work provided at the end of the module (TP renderings, ...) and on a note of duty on table of type QCM.
Bibliography	NA

Module: ING-4S08-SWE Course: ING-INF411 Real time	ING-4S08-SWE :Embedded Software 2	Référent : **Mr François Saidi**
Semester: S08	**No. of hours**: 39	Language of instruction: English
Mode of attendance: courses		LI Xiaoting, MOUELHI Sebti, CROS Olivier

Prerequisites	- Programming in C. - Good knowledge of PIC microcontrollers. - UNIX / LINUX operating system basics.
objectives	Sensitize students to the programming of real-time multitasking systems
contents	Operation under interruptions (Recall). Implementation of a real time clock (TR), (IRQ0 on PC) using a timer for TR systems. - Presentation of multitasking systems.Different states of a task.Role of the scheduler. - Mutual exclusion, semaphores. Problems related to the use of these techniques (interlocking and starvation). - Communication and synchronization between tasks. - Dynamic scheduling (towards time control). - Process creation and signal management on UNIX / LINUX. - Communication between processes on UNIX / LINUX (anonymous tube and named pipes). - System V IPC: communication between tasks by message queue and shared memory. - System V IPC: UNIX / LINUX semaphore mechanism. * Directed work: - Raise students' awareness of the programming of real-time multitasking systems. - Illustrate the different notions seen in progress through application exercises. - Have taken the course. - Programming in C. - UNIX / LINUX operating system basics. * Reminder: operation under interruptions and programming of peripherals such as the timer for the Development of a real-time clock. Scheduling 1st part. Scheduling 2nd part. Mutual exclusion, semaphores, philosophers' dinner problem. Different mechanism of synchronization between tasks. Dynamic scheduling. Linux: Process creation and recovery / Signal management and synchronization between Process / Communication between tube processes, shared memories and semaphore variables. TD summary and review for review.

Skills to be learned	-
Evaluation	Exam
Bibliography	- Programmation système en C sous Linux;signaux,processus, threads,IPC et sockets.(Christophe Blaess) - Le temps réel en milieu industriel (Alain Dorseuil et Pascal Pillot) - Introduction eux systèmes temps réel (Christian Bonnet et Isabelle demeure) - Gestion des processus industriels temps réel;des interruptions électroniques aux exécutifs multi tâches (Jean-Jacques Montois).

Module: ING-4S08-ELE Course: ING-ELE411 : Digital signal processors	Code ING-4S08-ELE Embedded Hardware	Référent : **Mr François Saidi**
Semester: S08	**No. of hours**: 35	Language of instruction: English
Mode of attendance: courses		HOUELLE Alain, SENOUCI Benaoumeur

Prerequisites	Electronics / Microprocessors
objectives contents	Study and implementation of CSPs
contents	**Course:** - Introduction to DSP * Overview: What is a DSP? * Architecture: what are the differences between a DSP and a mProc? * Specificity: why use a DSP? * Internal structure of the DSP * Function: what is the role of the DSP? * Categories: How to choose a DSP? * Examples of applications * Environment: how do we develop on DSP? - Develop on DSP - Memory organization of a DSP - Main components of a DSP **TP:** - Taking charge of the environment - Description of algorithms - Integration of algorithms - Configuration of the kit - Tests - Validation
Skills to be learned	Example: Compile C code Know how to write technical specifications
Evaluation	Exam
Bibliography	- http:dspvillage.ti.com - www.analog.com - www.motorola.com - www.lucent.com - www.metrowerks.com - www.cportcorp.com Documentation : - www.ieee.org - www.wiley.com

ING-4S07-ELE **ING-ELE412 :** Digital Circuit design FPGA-VHDL	ING-4S07-ELE: Embedded Electronics 1 Module	Référent : **Mr François Saidi**
Semester: S07	**No. of hours**: 32	Language of instruction: English
Mode of attendance: courses		HOUELLE Alain, SENOUCI Benaoumeur

Prerequisites	Knowledge of digital design. None on the VHDL language.
objectives contents	Master the design-flow applied to an FPGA, namely: - Defining a digital architecture - Writing descriptions synthesizable in VHDL - Understand the mechanisms of logical synthesis and placement-routing - Writing test-bench in VHDL and performing automatic simulations - Synthesize and integrate synthesizable VHDL descriptions
contents	Description of a digital architecture - Basic concepts of language - Design-flow - Combinatorial instructions (description of the most commonly used blocks) - Sequential instructions (flip-flops, state machine) - The VHDL for simulation (concept). Test bench simulation files (theory, exercises) - The effects of logical synthesis (timing: long string, short chain, optimization of architecture) - Realization of a complete project: Description, simulation, synthesis, placement routing and test - common core project: VGA controller - projects in small groups: applications handling the VGA controller (animations, games, etc.)
Skills to be learned	Example: Compile C code Know how to write technical specifications
Evaluation	Exam
Bibliography	- « VHDL, du langage à la modélisation », R. Airiau, J.M Bergé, V. Olive, J. Rouillard, CNET, Collection technique et scientifique des télécommunications - « VHDL », second édition, Douglas L. Perry, McGraw Hill Series on Computer Engineering - « Introduction to HDL-based design using VHDL », Steve Carlson, Synopsys Inc. - « VHDL Compiler , Reference Manuel » , Synopsys Inc.

Module: ING-4S08-NET Course: NET-403-Local and industrial networks	ING-4S08-NET Embedded networks systems	Référent : **Mr François Saidi**
Semester: S08	**No. of hours**: 39	Language of instruction: English
Mode of attendance: courses		LI Xiaoting, SAID Laurent

Prerequisites	Base in computer networks
objectives contents	To know the concepts related to the embedded networks and automatisms and their industrial applications, Particularly in the automotive and aeronautical fields. Know the main local industrial networks (Modbus, CAN, Ethernet, FlaxRay, etc.) and their efficiencies according to the field of application. Understand Communication protocols and learn how to implement them. Have an overview of the software and hardware components involved in an industrial system.
contents	1. Evolution and applications of embedded networks and automation in industry 2. The Modbus protocol, its opening on the Internet and its evolution towards industrial Ethernet 3. Detailed presentation of the CAN network (automotive, embedded systems) and a CAN FD evolution 4. Detailed presentation of the FlaxRay network in the automotive field and the TTEthernet network. Mechanism of Time-triggered and synchronization of the clock. 5. A new revolution in the automotive vehicle network: AVB 6. Knowledge of: ISO model and its parts related to industrial networks; Coding and transmission of Data (RZ, NRZ, etc.); Error detection techniques; Topologies of local networks (field bus, Star, ring, Ethernet switches, etc.); Media access techniques; Communication Socket. Laboratory work: 1. Project Lift: 1 practice session in VB (Visual Basic) and 2 sessions of implementation Objectives: Introduction to VisualBasic and Sockets; Implementation of the Modbus protocol Topic: Implement a VB elevator and a control part (floor calls). Implement the protocol Modbus based on communication Socket between the elevator and control. 2. CANoe project: 1 practice session and 2 sessions Objectives: Know a professional CANoe Vector software tool. Know the CAN modeling and simulation concept. Topic: Implement CAN communication (ECUs, CAN message mounting, etc.) in an automotive context with CANoe; Practice simulations and develop dynamic user / system interfaces; Carry out the analysis on such a network simulation.
Skills to be learned	Know the base of embedded network communication: field bus, Ethernet, communication protocol, etc.

	Knowledge of the industrial applications of embedded networks: automotive, aeronautics, automation, etc. Know how to implement a communication protocol in programming Know how to perform simulations of industrial networks with professional software
Evaluation	Exam
Bibliography	Réseaux multiplexés pour systèmes embarqués, DUNOD, Dominique PARET FlexRay et ses applications, DUNOD, Dominique PARET

Module Code ING-LFH – Languages, Communication and Management

ING-LFH408 : Management of the individual relationship	Module: LFH ING-4S08	Référent : DACHER Nicolas
Semester: S08	No. of hours: 13	Language of instruction: English
Mode of attendance: Tutorial Classes		

Prerequisites	N/A
objectives contents	Acquire methods of team management, meeting management and conflict management
contents	- Session 1: Introduction and tests. - Session 2: Analysis tools (introduction to NLP. - Session 3: Transactional Analysis / Evaluation.
Skills to be learned	Identify intellectual, personal and professional profiles. Practice the basics of NLP and transactional analysis.
Evaluation	1h30 test
Bibliography	

Module Code ING-LFH – Languages, Communication and Management

ING-LFH406: Business Management	**ING-4S08**	Référent : TURZI-TRIPODI Francesco
Semester: S08	**No. of hours**: 24	Language of instruction: English
Mode of attendance: Tutorial Classes	**Courses**	

Prerequisites	None, this module is specific for students who have no management training.
objectives contents	Encourage them to deepen for themselves all these new notions for them so that they do not " lose foot "in the" Budget Management "module.
contents	A summary (modules treated with ING2 and ING3) is made as follows: - 6 hours for the module "Manage, it's simple ..." - 6 hours for the "Financial Analysis" module - 6 hours for the module "Economic Analysis"
Skills to be learned	Know how to pilot and follow the management tools of a company
Evaluation	Realize a file
Bibliography	

Module Code ING-LFH – Languages, Communication and Management

ING-LFH401 : English 8	module : ING-4S08-LFH Module Langues et Formations Humaines	Referent : BINI TISSIER Kristen
Semester : 08	Hours : 11	Language of instruction: English
Mode of attendance : tutorials		

Prerequisites	English 7
objectives contents	Fine tune linguistic abilities and develop fluency in English. (Oral and Written) Explore moral problems and look at ethical issues from a practical standpoint. (Learning to argue your point of view and develop concrete arguments) Work on presentation skills. Explore moral problems and look at ethical issues from a practical standpoint. (Learning to argue your point of view and develop concrete arguments) Work on presentation skills.
contents	What will the world be like 30 years from now? What will your life be like? What role will you play in shaping this future? As an engineer, your job will be to create and improve technology. Over the course of your career you'll face not only technical challenges; you'll also encounter moral and ethical dilemmas. How you resolve those dilemmas will inform your contribution to the future, for better or worse. In this course we will work in the intersection of science fiction and ethics in order to imagine possible futures—and your part in building the kind of world you want to live in, and to pass on to your children. This course will focus on group and solo presentations, listening exercises, debates, and role plays.
Skills to be learned	Reading, writing, speaking and listening in English. Negociation, Ethics training. Public Speaking, Argumentaion and debate skills.
Evaluation	NS: (coefficient 3) Student-led lesson 50% Written work (quizzes, listening comprehension, etc.): 20% Class participation: 30% DS: (coefficient 1)
Bibliography	Campus course page

4S08-FLE- French as a foreign language (FLE)

COURSE: 4S08-FLE- French as a foreign language (FLE) **Beginner Level**		Référent : Mrs. Patricia Farioli
Semester: S08	**No. of hours**: 30	Language of instruction: English
Mode of attendance: courses		Mrs. Caroline Langer / Mr. Sylvain Lerouvillois

Prerequisites	N/A
objectives contents	The main objective is to give students the fundamental elements for the progressive mastery of the language to communicate adequately in the contexts of personal, social and academic life and to be comfortable in the language. It is designed to assimilate the fundamental bases of the language. In a general way: understanding and adapting your communication in French according to the interlocutors, the contexts and the supports, taking into account the permanent evolution of the language. The general objectives are based on the progression of the ability to produce and understand personal information in short exchanges. Interact in simple dialogues by establishing social contacts in the different contexts of daily life (restaurant, grocery store, cafe etc.). As well as gradually participating with autonomy in conversations and understanding simple oral and written texts.
contents	A1: Discovering French - Greetings, take leave, introduce yourself - Ask and give personal information - Talk about your preferences, tastes and hobbies - Nationality / country - Say the time, give instructions, - Talk about your habits and activities
Skills to be learned	- Linguistic skills (lexical, semantic, grammatical, phonological, orthographic) - Sociolinguistic skills, socio-cultural and intercultural skills (politeness, knowledge of society and culture, understanding of relationships). - Pragmatic-functional skills (ability to manage and structure sentences to communicate appropriately)
Evaluation	On the one hand, the evaluation is done summatively through repetitive questions / answers for an intuitive and immediate appropriation, written as well as oral, interspersed with grammatical points. On the other hand formative, through the reading and understanding of the press, authentic documents videos, films that allow them a reflection on their own learning. Cultural outings prepared upstream, then returned as written reports, are also part of the evaluation.
Bibliography	C., Hugot, V.M., Kizirian, M.,Waendendries , A., Berthet, E.,Daill. (2012). Alter Ego +. Niveau A1. Méthode de Français. Hachette Français Langue Etrangère. V., Petitmengin, C., Fafa (2017). La grammaire en jeux. PUG FLE. Ressources Internet : http://www.bonjourdefrance.com/index/indexpedago.htm http://www.ciep.fr/assistants-francais-a-letranger/ressources-pedagogiques

4S08-FLE- French as a foreign language (FLE)

COURSE: 4S08-FLE- French as a foreign language (FLE) **Intermediate Level**		Référent : Mrs. Patricia Farioli
Semester: S08	**No. of hours**: 30	Language of instruction: English
Mode of attendance: courses		Mrs. Caroline Langer / Mr. Sylvain Lerouvillois

Prerequisites	A1 LEVEL of French
objectives contents	The main objective of this course is to use the language in situations close to the life of the learner and to enable him/her to develop essential skills to any successful communication. The various activities offered are a reflection of authentic situations and thus promote learner motivation and involvement in learning French. Many opportunities are offered to interact creatively and playfully according to his/her feelings, his /her experience and his/her culture. The guiding thread of the course booklets corresponds rigorously to the competences described by the Common European Framework of Reference for Languages (CEFR). In general, the objective is to train the students to use the language more fluently and a mastered understanding in order to pass in the final year the DELF B2.
contents	- Talk about your daily activities - Tell stories in the past - To give advice - Describe the character of a person - Express feelings - Make projects - Describe places - Express your opinions and argue
Skills to be learned	- Linguistic skills (lexical, semantic, grammatical, phonological, orthographic) - Sociolinguistic skills, socio-cultural and intercultural skills (politeness, knowledge of society and culture, understanding of relationships). - Pragmatic-functional skills (ability to manage and structure sentences to communicate appropriately)
Evaluation	This course is 100% validated by continuous monitoring. During the semester, several evaluations are planned. A mark for attitude and oral participation in the course is also awarded. The average of these grades is the final grade.
Bibliography	. Alter ego + A2, Hachette, 2012 . Communication progressive du français, Niveau intermédiaire, Clé International, 2014 . https://www.lepointdufle.net/ressources_fle/exercices_de_francais.htm . http://apprendre.tv5monde.com/fr/niveaux/a2-elementaire

ING-PRJ410 : Projet Pluridisciplinaire en Equipe 2

COURSE: Multidisciplinary Team Project	ING-PRJ410 : Projet Pluridisciplinaire en Equipe 2	Referent : BOUCHEZ David-Olivier
Semester: S08	No. of hours:	Language of instruction: English
Mode of attendance:		

Prerequisites	Master the project management team.
objectives contents	On a development schedule of the PPE in agile mode (weeks of sprints): In the second semester, realize a functional technical prototype and expose the valuation arguments.
contents	Develop a project in a multidisciplinary team to produce a functional technical prototype and expose its added value.
Skills to be learned	Soft skills / Hard skills
Evaluation	- Livrable Specs - Evaluation de la gestion de projet par le mentor - Soutenance finale
Bibliography	Literature, MOOC and course on project management + creativity and ideation.