Academic year 2018/2019

Courses offered by the programme

Systèmes et Réseaux de Communications (SRC)
Communication Systems and Networks

Semester(s) :

Curricula are organized in groups of courses (Unités d’Enseignement (UE)), consisting of several courses (Eléments Constitutifs (EC)). An EC is a teaching module including lectures (cours magistraux (CM)), tutorials (travaux dirigés (TD)), laboratory work (travaux pratiques (TP)), projects (PR), conferences (CONF), personal work (TA) and possibly other pedagogical activities (DIV). Some internships (stages (ST)) are compulsory.

Commonly used abbreviations
CM : Lectures
TD : Tutorials
TP : Laboratory Work
CONF : Conferences
TA : Personal Work
PR : Project
ST : Internship
DIV : Miscellaneous
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<tr>
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<th>Embedded systems - Media - Networks</th>
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<td>1</td>
<td>EIIO9-CONSO</td>
<td>Energy consumption in embedded systems</td>
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<td>EIIO9-DSP</td>
<td>Digital Signal Processor</td>
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<td>EIIO9-PPEM</td>
<td>Parallel Programming for Embedded MPSoCs</td>
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<td>EIIO9-AHD</td>
<td>Advanced Hardware Design</td>
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<td>EIIO9-SYSC</td>
<td>SystemC</td>
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<td>SRC09-SOPC</td>
<td>System on Programmable Chips</td>
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<td>SRC09-REALTIME</td>
<td>Real Time Processing</td>
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<td>EIIO9-COTR</td>
<td>Video Compression and Transcoding</td>
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<td>EIIO9-VIS</td>
<td>Computer Vision</td>
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<td>Image Analysis II</td>
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<td>SRC09-USECASE</td>
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<td>SRC09-MOBILE</td>
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<td>HUM09-PM-C</td>
<td>Economics, Law and Business Studies C (human resource management)</td>
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<td>Economics, Law and Business Studies D (Marketing for ICT Companies)</td>
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<td>Economics, Law and Business Studies E (Industrial design and innovation)</td>
<td>2.00</td>
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<td>Economics, Law and Business Studies F (Mangement and decision making)</td>
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<td>HUM09-PM-G</td>
<td>Economics, Law and Business Studies G (serious game)</td>
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<td>EIIO9-POST</td>
<td>4 EII Work Placement - Evaluation</td>
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O = compulsory, C= in choice , F= optional
Objectives:
Energy consumption is a major challenge for electronic systems. For autonomous systems, managing energy consumption is essential to extend the autonomy or the system lifetime. Moreover, the significant increase of embedded electronic systems implies to reduce the energy optimization in order to limit the overall electricity consumption. The goal of this course is to manage and to optimize the energy consumption of embedded digital systems.

Content:
1. Introduction
2. Energy Consumption Modeling
   2.1 Transistor models
   2.2 Dynamic energy
   2.3 Static energy
3. Energy consumption reduction
   3.1 Dynamic energy reduction
   3.2 Static energy reduction
4. Low power & energy System design
   4.1 Power & energy estimation
   4.2 Hardware design
   4.3 Software design

Bibliography:
Low-Power Electronics Design, C. Piguet, CRC Press, 2004

Requirements:
EII08-LP -Programmable Logic Devices
EII08-SEE -Embedded Operating Systems
EII07-ARC -Computer Architectures 2

Organisation:
- Courses given by internal and external professors
- Practical work are based on managing energy and power consumption on embedded multi-core platform with Linux OS. The targeted platform is a Heterogeneous Multi-Processing (HMP) Octa Core Linux Computer (Odroid Exynos XU3).

Evaluation:
Practical work and project grading.

Target:
5EII, M&N students
Digital Signal Processor | EII09-DSP
---|---
Number of hours : 24.00 h | 2.00 ECTS credit
CM : 10.00 h, TP : 14.00 h | |
Reference Teacher(s) : MENARD DANIEL

Objectives:
More and more embedded applications integrate Digital Signal Processing to deliver innovative features. The goal of this course is to master the implementation of digital signal processing applications on single-core fixed-point DSPs.

Targeted main competences are:
- Develop C code for digital signal processing applications
- Optimize code for low power DSPs
- Optimize code for high performance DSPs
- Fixed-point conversion of digital signal processing systems

Content:
- Models for DSP applications
- Architecture of low power DSPs
- Architecture of high performance DSPs
- Fixed-point arithmetic
- Fixed-point conversion (dynamic range evaluation, fixed-point coding, numerical accuracy evaluation)

Bibliography:

Requirements:
EII07-ARC : Computer Architecture 2;
EII07-TSAN : Signal processing and Digital automatic

Organisation:
Pedagogy based on project.

Evaluation:
Exam 2h

Target:
5EII and 5M&N
Objectives:
For many years, following the ever-increasing number of transistors per chip, advances in computer architecture mostly consisted of adding complex mechanisms to mono-core processors to improve their computing performance. In the last decade, the continuous growth of computing performance was supported by the introduction of multi-core architectures, first for high-performance computing, then in mainstream desktop CPUs, and now in smartphones and embedded systems.

Embedded systems implementing modern applications such as telecommunication standard 3GPP Long Term Evolution (LTE) and video compression standard MPEG High Efficiency Video Coding (HEVC) require high execution speed, low power consumption and run-time adaptivity.

Adaptivity, memory limitation and load balancing between cores are hard to obtain. This course intends to give an overview of distributed high performance solutions and of the new challenges brought by latest applications and Multiprocessors Systems-on-Chips (MPSoCs) architectures such as the 8-core Texas Instruments TMS320C6678 or the 256-core Kalray MPPA. Solutions for programming such architectures will be discussed.

Targeted competences are:
- To understand internal mechanisms of multicore MPSoCs
- To program multi-core architectures using pthread, OpenMP, and Preesm
- To choose a multicore programming method while understanding its limitations
- To design a high performance embedded systems using available resources efficiently

Content:
Content:
- Models of Computation
- Multicore Architectures
- Architecture Models
- Assignment and Ordering Problem
- Multicore Programming Tools

Bibliography:
Hae-woo Park, Hyunok Oh, and Soonhoi Ha, "Multiprocessor SoC Design Methods and Tools", IEEE SPM, 2009

Requirements:
Computer Architecture I & II (EII05-ARC, EII07-ARC), C Language (ESM05-INFOC).

Organisation:
- Courses given by internal and external professors
- Practical work and project are based on pthread, OpenMP, and the dataflow-based programming.
- Target architectures are multicore x86 processors and the TMS320C6678 multi-DSP evaluation board
- The goal of practical work is for students to acquire competences for programming the platform
- The project aims at giving students some programming habits

Evaluation:
Practical work and project grading.

Target:
5EII and 5 M&N
Advanced Hardware Design

<table>
<thead>
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<td>CM : 4.00 h, PR : 8.00 h</td>
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Reference Teacher(s) : DARDAILLON MICKAEL

Objectives :
- Advanced hardware design method for complex digital systems
- Study and implementation of a complete design flow, from high-level description to hardware implementation

Targeted main competences are:
- To use efficiently available resources to design a digital system (documentation, internet, supervisor)

Content :
- Advanced synthesizable VHDL, design re-use, hardware IP blocks
- Tests and validation: verification methodology, automatic verification, testbed implementation
- Development software presentation of Mentor Graphics (HDL Designer, Leonardo Spectrum, Modelsim, RTL Precision)
- Project: design, implementation and test of a data transmission system under the HDL Designer environment

Bibliography :
- SCHNEIDER T., "VHDL - Méthodologie de design et techniques avancées", Dunod, 2001

Requirements :
- VHDL Programming (EII07-VHDL)
- Programmable Logic (EII08-LP)
- Methodology and Project Management (EII07-MCPJ)

Organisation :
- Active pédagogy
- Revision of lecture notes
- Preparation for project

Evaluation :
- Attendance at lectures and project sessions
- The project report

Target :
5EI, M&N
Objectives:
This lecture aims at presenting the System Design languages (SystemC) for complex system designing. Special emphasis will be given on modelling across different levels of abstraction from untimed via timed transaction level models down to register transfer models including the needed refinement steps.

Content:
1. Requirements for a system methodology in order to design a system. Overview of existing methodologies
2. Presentation of the System C language syntax. :
   - Programming environment.
   - Concepts of module, port, channel, interface.
   - Channels, ports, interfaces, Module constructor
   - Events, Event queue
   - Thread processes, Method processes
   - Module instantiation (in modules)
3. Simulation of complex systems with System C.
4. Labs on a transmission system. Simulation of the system and implementation on an embedded SOC.

Bibliography:

Requirements:

Organisation:

Evaluation:
1 hour exam

Target:
5EII, M&N
Objectives:
Introduction to embedded systems (technology, management, hardware/software co-design). Case study on a SOPC platform (Altera FPGA).

Content:
Technology of embedded systems: ASIC, FPGA, Study of different reconfigurable circuits (Xilinx, Altera, ...). Introduction to rapid prototyping tools from system to physical level.

Bibliography:

Requirements:
SRC07-LPROG

Organisation:

Evaluation:
Practical training session

Target:
Objectives:
Study of real time operating systems and application examples.

Content:
Various fields of applications, embedded systems, kernel architecture, Kernel services (tasks, synchronizations, communications), multi-processes/multi-processors programming, scheduling policies, memory management.

Applications: embedded systems for signal processing (telecommunication, image / video) in automotive, avionics, etc. ....
Systems with strong real time constraints, system management / supervision.

Practical work on MicroC-OSII.

Bibliography:

Requirements:

Organisation:

Evaluation:
2 hours exam

Target:
Digital Systems Lab | SRC09-SYSLAB
---|---
Number of hours : 24.00 h | 1.50 ECTS credit
TD : 24.00 h | hand-out in English and course taught in English

Reference Teacher(s) : PREVOTET JEAN-CHRISTOPHE

Objectives:
The role of this project is to apply all the concepts of Digital Design on a real application.

Content:
This 24 hours project aims to implement all the concepts learned in the SRC09-MOCNVHD and SRC09-SYSC module.
It starts with a SystemC modeling of a complex digital communication circuit (software and hardware blocks) for system simulation and platform sizing.
It ends up with the implementation of the circuit onto a real FPGA platform composed of software and hardware parts.

Bibliography:

Requirements:

Organisation:

Evaluation:
Project evaluation

Target:
Video Compression and Transcoding | EII09-COTR
--- | ---
Number of hours : 39.00 h | 3.00 ECTS credit
CM : 15.00 h, TP : 24.00 h |
Reference Teacher(s) : MORIN LUCE, ZHANG LU

Objectives:
This lecture aims at presenting fundamental and advanced methods dedicated to image and video compression. An overview of Audio/Video Standards and Codecs most commonly used in industry is presented. Practical work is done using didactic softwares (ImageINSA VCdemo), programming classical algorithms (in C and Matlab) and running classical codecs through opensource APIs allowing to analyse and transcode Audio/Video files (ffmpeg, directshow, mediaInfo).

Targeted skills are:
- To know image and video coding principles and methods
- To understand and build a coding scheme described as a block diagram
- To translate state-of-the-art algorithms into C or Matlab code
- To master parameter setting of encoders
- To transcoded a video

Content:
1. Transcoding of audio-visual contents : use-cases, codec, quality, containers
2. Introduction to image coding: entropy coding, PCM, DPCM, transform coding
4. Video compression principles : motion estimation, motion compensation
5. Standard video codecs: MPEG-2, MPEG-4, AVC, SVC, HEVC
6. Conferences by industrial partners ; conferences may vary each year examples :
- Standardization, Pierrick Philippe, Orange Labs
- Quality assessment for video coding, Jérome Fournier, Orange Labs

Bibliography:
- http://www.fourcc.org
- http://support.microsoft.com/kb/294880
- http://mpeg.chiariglione.org/
- T. Ebrahimi, C. Christopoulos, "JPEG 2000 The next generation still image coding system", EUSIPCO'00, 2000
- Bernd Girod, "Image and Video Compression", lecture notes, Standford University, 2005

Requirements:
Digital signal processing and automation (EII07-TSAN).
Image processing (EII08-AI)
Mathematical programming (EII08-OM)

Organisation:
- Revision of lecture notes. Preparation of practical works.
- Labs on transcoding with Visual Studio (C++, C#), ffmpeg, directshow, medialInfo.
- Labs on compression with ImageINSA and VCDemo softwares, implementation of coding algorithms in C and Matlab.

Evaluation:
Attendance,
Lab evaluation,
Written examination.
Target:
5EII and 5M&N students
Objectives:
This course is an introduction to computer vision techniques with a single camera or with several ones. Estimation processes used in computer vision are also studied.

The targeted skills are:
- Solve a pose computation problem by using a Gauss-Newton minimization
- Compute a depth map from stereoscopic images using the epipolar geometry properties
- Estimate a 2D transformation using a RANSAC algorithm

Content:
1. Monocular vision geometry (perspective projection, calibration and pose estimation)
2. Stereovision: 3D reconstruction, epipolar geometry, 2D homography, autocalibration

Practical exercises are in C++ language.

Bibliography:

Requirements:
Optimization (EII08-OM) and object oriented programming (EII07-POO).

Organisation:
Revision of lecture notes. Preparation of labs.

Evaluation:
Two-hour written examination (no documents) at the end of the semester.

Target:
5EII, Media and Networks semester
Objectives:
Given the measurement signals from the real world, how can the needed information be inferred? In other words, how should the measurements from a sensory system be processed in order to bring maximum information in an explicit and usable form? This is the main topic of this course - the same problem dealt with by the classification and the estimation. The state estimation (such as the Markov model) is out of the scope of the course.

Content:
1. Detection and classification
2. Parameter Estimation
3. Supervised Learning
4. Non-supervised Learning

Bibliography:

Requirements:
Mathematics (ESM05-ANAL, ESM05-PROBA), Signal processing and Digital automatic(EII07-TSAN), Numérical methods (EII07-MN)

Organisation:
Revision of lecture notes. Preparation of exercises and practical work.

Evaluation:
Course attendance and Project

Target:
5EII ad 5M&N
Digital Communications prerequisites

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Reference Teacher(s) : HELARD JEAN FRANCOIS

Objectives :
To deal with the basis digital communication techniques as channel coding, multicarrier modulations and single carrier transmissions on limited bandwidth channel.

Content :
1. Model of a digital communication system
2. Basis channel coding techniques
   Block codes and cyclic block codes. Codes construction. Decoding techniques. Performance and channel coding gain.

Bibliography :
M. Joindot, A. Glavieux, “Introductions aux communications numériques”, Ed. Dunod,
S. Benedetto, E. Biglieri, V. Castellani, “Digital transmission theory”, Prentice Hall International Editions,
C. Berrou, “Codes et turbocodes », collection IRIS, Springer,

Requirements :
Modules SRC05-PRER, SRC06-TSIA, SRC07-DESTI, SRC07-SINUM

Organisation :
Courses documents

Evaluation :
Un contrôle continu (Cours, Td, TP)
1 Devoir surveillé de 1 heure.

Target :
Objectives:
Build a real network, including VLAN, VPN, routing protocols and Qos services. This project will illustrate layers 1 up to layers 4.

Content:
In the first step, students will simulate the network using Packet tracer software. In this architecture, they will observe the influences of VLAN VPN strategies.
In the 2nd step, they will use equipments in order to build their real network. Typical equipments are: CISCO (wired and wireless), LINKSYS, DLink. They will analyse the traffic, the data rate, filter the messages (thanks to wireshark for example).

Bibliography:

Requirements:
SRC09-TCRC and SRC09-WIRED

Organisation:
labs= 24 hours

Evaluation:
course mark

Target:
Use Case in Network Security

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Reference Teacher(s) : AVOINE GILDAS

Objectives:
Study on additional mechanisms in IP network. Part 1: Security in LAN - IPSEc, attacks, from layer 7 down to layer 2. Part 2: use case: which network for which application. Two analyses, one based on IoT, one based on mobile communication 3G/4G

Content:
Part 1 - 8H, review of different security mechanisms and attacks. Part 2: 2*4H: two scenarios using IoT and mobile network (lessons given by network companies)

Bibliography:

Requirements:
SRC06-RES, SRC08-RES, any network lessons (MAC, IP, TCP, wireless communication)

Organisation:

Evaluation:
2-hour written exam

Target:
5th year SRC - Major track, Student of the M&N track
MASTER I-MARS
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Reference Teacher(s) : UZEL FABIENNE

**Objectives :**
2 parts: one on IPV6 and WLAN, one on WPAN based on IP

**Content :**
"Partie 1 - 8H : Network administration, ipv6, inter-as routing. Partie 2 - 8H - Introduction of some of wireless network using IP( bluetooth, wifi, wlan, wimax, ..)

"

**Bibliography :**

**Requirements :**
network, IP V4

**Organisation :**

**Evaluation :**
2-hour written exam

**Target :**
5th year SRC - Optional track "network design", Student of the M&N track
MASTER I-MARS
Mobile Networks | SRC09-MOBILE
---|---
Number of hours : 12.00 h | 1.00 ECTS credit
CM : 8.00 h, TD : 4.00 h

Reference Teacher(s) : EL ZEIN GHAIS

Objectives :
Acquisition of the fundamental foundations of the field of cellular and mobile radio networks through a description of the main techniques used and their applications, focusing on the physical layer of networks

Content :
1. Wireless Networks: history, market development, principle
2. Cellular Concept: frequency reuse, co-channel interference, traffic model, capacity, handover
3. Transmission Techniques (from 1G to 4G):
   - 1G (RC2000, NMT, AMPS, TACS, ...)
   - 2G (GSM/DCS, IS-95, PDC, D-AMPS, ...)
   - 2.5G (GPRS, HSCSD, EDGE, ...)
   - 3G (UMTS, cdma2000, IMT-2000, ...)
   - 3.5G (HSDPA) - 3.75G (HSUPA)
   - 3G++ (HSPA+)
   - 3.9G (LTE) - 4G (LTE-Advanced, WiMax, ...)
4. Emerging Technologies: 5G

Bibliography :

Requirements :
Network architecture - Radiocommunications

Organisation :

Evaluation :
1-hour written exam

Target :
5th year SRC - Major track, MASTER I-MARS
Technical project | M&N09-PROJ
---|---
Number of hours : 360.00 h | 8.00 ECTS credit
PR : 50.00 h | hand-out in English and course taught in English

Reference Teacher(s) : MORIN LUCE

**Objectives:**
- Manage a project within a team, on a technical topic proposed by an industrial partner.
- Collaborate with an industrial partner and take into account industrial requirements and organization.
- Apply technical and management skills acquired during academic courses.
- Practice report writing and oral presentation on technical topics.

**Content:**
1. Meet industrial partner and write project functional specifications.
2. Task scheduling and task repartition.
3. State of the art and bibliographic research.
4. Experimental development and validation ; regular meetings with project advisor.
6. Oral defense of the project.

Examples of project topics:
- Visual closed-loop control of an AR-Drone
- Audio bench test for mobile phones
- Calibration of a network of heterogeneous cameras
- Direct WI-FI remote control
- CPL transmission of video stream on an ETTUS card
- Optimization of a conversion of audio sampling rate library on ARM architecture
- RFID for electronic passport reading in multi-platform Windows/Linux environment
- Activity and physiologic parameters measurement with a Kinect sensor

**Bibliography:**

**Requirements:**

**Organisation:**
- Teams of 4 to 6 students, including a project leader
- Topics proposed by industrial partners and work at Insa research/teaching labs.
- Regular meetings with the project advisor (a professor).
- Autonomous work over the whole semester, with dedicated time shifts (6 hour/week)
- Free access to software and hardware to teaching and research labs, industrial partner might provide software/hardware if necessary for the project.

**Evaluation:**
The work realized by each group is subject to a written report and an oral presentation before an audience comprised of fellow students. The jury is composed of professors and industrial partners.
A final mark awarded based on the quality of the work, written report and oral presentation.

**Target:**
M&N students from 5EII/5SRC/5INFO
**Objectives:**
- Improving communication skills in everyday life situations as well as in a professional or social context.
- Obtaining or reinforcing C1 level, strongly advised/recommended by the CTI.

**Content:**
- Learning by doing: students will have to be able to speak and listen, write a document while showing they can solve problems, reason, convince and demonstrate in an articulate manner.
- Expressing oneself accurately and fluently: students will engage in activities requiring creative and reactive skills such as debates, role-plays, individual oral Power Point presentations, projects, based on scientific topics and current events.

**Bibliography:**
1. English Grammar in Use (Cambridge University Press)
2. Dictionnaire Collins Cobuild
3. Polycopié de l’INSA

**Requirements:**
Having taken and passed the TOEIC test during the previous two years (800 required)
or any other B2 certification recognized by the CTI.

**Organisation:**
- Each class lasts one hour and most classrooms are equipped with video and audio. A multimedia lab and computer rooms are also available for the students to work in a stimulating environment.
- Teaching resources include press articles, audio and video documents (TV reports, extracts from films and series) as well as the Internet.

**Evaluation:**
Continuous assessment: The final mark (out of 20) will be based on the attendance rate and the personal implication of the student during the class.

**Target:**
Objectives:
- Improving communication skills in everyday life situations as well as in company and business context.
- Obtaining or reinforcing the B2 level requested by the CTI.
- Obtaining 800 score at the final TOEIC test.

Content:
Learning by doing: students will have to be able to speak and listen, write a document while showing they can solve problems, reason, convince and demonstrate in an articulate manner.
Expressing oneself accurately and fluently: students will engage in activities requiring creative and reactive skills such as debates, role-plays, individual oral Power Point presentations, projects, based on scientific topics and current events.

Bibliography:
- English grammar in Use, Intermediate Edition (CUP)
- Robert and Collins bilingual dictionary or Collins Cobuild

Requirements:
Not having already taken and passed the TOEIC test during the previous two years
B1/B2 level advised

Organisation:
Each class lasts two hours and most classrooms are equipped with video and audio. A multimedia lab and computer rooms are also available for the students to work in a stimulating environment.
Teaching resources include press articles, audio and video documents (TV reports, extracts from films and series) as well as the Internet. B2 level tests are also taken throughout the course.

Evaluation:
Final mark based on:
TOEIC score at final exam + attendance (more than 4 non justified absences result in 0/20 mark).

Target:
5th year students who haven't already passed their TOEIC
Objectives:
This course aims to enable students to develop specific management skills in accordance with their personal objectives and professional motivations. Students chose one option among six.

Main learning outcomes are:
- Establishing a strong, specific vocabulary base
- Understanding the main issues that industrial companies deal with (in a specific management field).
- Understanding the importance of teamwork: making collective decisions and producing the expected work in time

Content:
* Lean Six Sigma (28h / in French)
  Lean Six Sigma is a methodology that enables firms to make their processes more effective and efficient. It’s the current industry standard for process improvement designed to reduce waste and enhance output quality.

* Law (8h / in French)
  Main principles of the French legal system

Bibliography:
Given during the course

Requirements:
ECONOMICS AND BUSINESS MANAGEMENT - 1
ECONOMICS AND BUSINESS MANAGEMENT - 2

Organisation:
This course is opened to students with different engineering backgrounds. Students work together in small groups and gather the necessary information and advices to set out a final report. Groups also benefit from conferences and tutorial sessions performed by professional speakers.

Evaluation:
Continuous assessment (collective work)

Target:
Objectives:
This course aims to enable students to develop specific management skills in accordance with their personal objectives and professional motivations. Students chose one option among six.

Main learning outcomes are:
- Establishing a strong, specific vocabulary base
- Understanding the main issues that industrial companies deal with (in a specific management field)
- Understanding the importance of teamwork: making collective decisions and producing the expected work in time

Content:
* Human Resource Management (20h / in French)
  - Main current challenges of Human Resource Management
  - Human Resource Management¿s tools and organization
  - Focus on how team managers deal with Human Resource Management

* Law (8h / in French)
  Main principles of the French legal system

* Social legislation (8h / in French)
  Main principles of French social legislation
  Employment contract

Bibliography:
Given during the course

Requirements:
ECONOMICS AND BUSINESS MANAGEMENT - 1
ECONOMICS AND BUSINESS MANAGEMENT - 2

Organisation:
This course is opened to students with different engineering backgrounds. Students work together in small groups and gather the necessary information and advices to set out a final report. Groups also benefit from conferences and tutorial sessions performed by professional speakers.

Evaluation:
Continuous assessment (collective work)

Target:
Objectives:
This course aims to enable students to develop specific management skills in accordance with their personal objectives and professional motivations. Students chose one option among six.

Main learning outcomes are:
- Establishing a strong, specific vocabulary base
- Understanding the main issues that industrial companies deal with (in a specific management field)
- Understanding the importance of teamwork: making collective decisions and producing the expected work in time

Content:
* Human Resource Management (20h / in French)
  - Main current challenges of Human Resource Management
  - Human Resource Management¿s tools and organization
  - Focus on how team managers deal with Human Resource Management

* Law (8h / in French)
  Main principles of the French legal system

* Social legislation (8h / in French)
  Main principles of French social legislation
  Employment contract

Bibliography:
Given during the course

Requirements:
ECONOMICS AND BUSINESS MANAGEMENT - 1
ECONOMICS AND BUSINESS MANAGEMENT - 2

Organisation:
This course is opened to students with different engineering backgrounds. Students work together in small groups and gather the necessary information and advices to set out a final report. Groups also benefit from conferences and tutorial sessions performed by professional speakers.

Evaluation:
Continuous assessment (collective work)
Objectives:
This course aims at enabling students to develop specific management skills in accordance with their personal objectives and professional motivations. Students chose one option among six.

Main learning outcomes are:
- Establishing a strong, specific vocabulary base
- Understanding the main issues that industrial companies deal with (in a specific management field).
- Understanding the importance of teamwork: making collective decisions and producing the expected work in time

Content:
The program's main objective is to provide a multidisciplinary approach to the field of innovation, strategy and industrial design. This course will give an overview of the innovative process. During this program, participants will have the opportunity to explore a business case covering the first stage of a product development project.

Bibliography:
Given during the course

Requirements:
ECONOMICS AND BUSINESS MANAGEMENT - S7 and S8

Organisation:
This course is opened to students with different engineering backgrounds. Students work together in small groups and gather the necessary information and advices to set out a final report. Groups also benefit from conferences and tutorial sessions performed by professional speakers.

Evaluation:
Continuous assessment (collective work)

Target:
**Objectives:**
This course aims to enable students to develop specific management skills in accordance with their personal objectives and professional motivations. Students chose one option among six.

Main learning outcomes are:
- Establishing a strong, specific vocabulary base
- Understanding the main issues that industrial companies deal with (in a specific management field).
- Understanding the importance of teamwork: making collective decisions and producing the expected work in time.

**Content:**
This course provides students with the tools necessary to understand and work effectively in today's international economic environment. It explores how innovative firms address new markets and compete outside their national frontiers. The course focuses on strategic choices regarding effective actions in international business.

**Bibliography:**
Given during the course

**Requirements:**
ECONOMICS AND BUSINESS MANAGEMENT - 1
ECONOMICS AND BUSINESS MANAGEMENT - 2

**Organisation:**
This course is opened to students with different engineering backgrounds. Students work together in small groups and gather the necessary information and advice to set out a final report. Groups also benefit from conferences and tutorial sessions performed by professional speakers.

**Evaluation:**
Continuous assessment (collective work)

**Target:**
Objectives:
This course aims to enable students to develop specific management skills in accordance with their personal objectives and professional motivations. Students chose one option among six.

Main learning outcomes are:
- Establishing a strong, specific vocabulary base
- Understanding the main issues that industrial companies deal with (in a specific management field).
- Understanding the importance of teamwork: making collective decisions and producing the expected work in time

Content:
- Project Management (28 h / in French)
  - Efficient Project Management tools and organization according to PMI (Project Management Institute)
  - Agility
  - SCRUM

- Law (8 h / in French)
  Main principles of the French legal system

Bibliography:
Given during the course

Requirements:
ECONOMICS AND BUSINESS MANAGEMENT - 1
ECONOMICS AND BUSINESS MANAGEMENT - 2

Organisation:
This course is opened to students with different engineering backgrounds. Students work together in small groups and gather the necessary information and advice to set out a final report. Groups also benefit from conferences and tutorial sessions performed by professional speakers.

Evaluation:
Continuous assessment (collective work)

Target:
Objectives:
This course aims to enable students to develop specific management skills in accordance with their personal objectives and professional motivations. Students chose one option among six.

Main learning outcomes are:
- Establishing a strong, specific vocabulary base
- Understanding the main issues that industrial companies deal with (in a specific management field).
- Understanding the importance of teamwork: making collective decisions and producing the expected work in time

Content:
* Business Simulation (serious game) (28h / in English)
The business simulation "Global Challenge" (a CESIM product) has been designed to improve the understanding and knowledge of the complexity of global business operations in a dynamic, competitive environment. It focuses on strategic management, international management and business policy.
The task for the student teams is to manage a global mobile telecommunications company as its technology and markets evolve. Students will develop and execute strategies for their simulated company operating in the USA, Asia, and Europe.
The simulation is based on an online platform that allows students to play in their own language (many languages available: English, Spanish, Portuguese, Chinese, ...).

* Law (8h / in French)
Main principles of the French legal system

Bibliography:
Given during the course

Requirements:
ECONOMICS AND BUSINESS MANAGEMENT - 1
ECONOMICS AND BUSINESS MANAGEMENT - 2

Organisation:
This course is opened to students with different engineering backgrounds. Students work together in small groups and gather the necessary information and advices to set out a final report. Groups also benefit from conferences and tutorial sessions performed by professional speakers.

Evaluation:
Continuous assessment (collective work)

Target:
Objectives:
Each student presents the work he accomplished during his fourth year work placement in the form of a poster.

Content:

Bibliography:

Requirements:

Organisation:

Evaluation:
- Oral presentation.
- Quality of the poster.
Evaluation is carried out by a jury composed of teachers from the EII department and constitutes part of the fourth year internship synthesis mark.

Target: