

# INSA

INSTITUT NATIONAL  
DES SCIENCES  
APPLIQUÉES  
LYON

WELCOME TO FRANCE  
**FOR A 6-CREDIT\***  
SUMMER PROGRAM

4 WEEKS IN LYON!

IN  
ENGLISH



# INNOV@INSA

MAY 17<sup>TH</sup> - JUNE 14<sup>TH</sup> 2019

EUROPEAN PERSPECTIVES  
IN ENGINEERING AND INNOVATION

*\*US credits*

## **LYON – AN ESSENTIAL EUROPEAN CITY**

When you choose Lyon, you choose one of the most attractive cities in Europe, an international competitor and a gateway to the rest of the world. Being France's 2<sup>nd</sup> most important city, it is located in the heart of the thriving Rhône-Alpes region. The city was classed a World Heritage Site by UNESCO in 1998. Ancient capital of the Gauls, there are 2000 years of history here. Lyon has been named France's number 1 city for culture outside of Paris and is indeed characterized above all by the perfect balance between its cultural institutions of excellence offering quality programming, its large-scale festivals, and cultural venues that are open to everyone.

Numerous fields of excellence make Lyon a major international hub: Life Sciences, Clean technologies, Tertiary sector, ITC to name a few. The city is also home to internationally-renowned companies and major players, including: Sanofi, Merial, Lafarge, GL Events, Bank of China, Solvay Rhodia. In addition, many world-renowned organizations have chosen Lyon as the location for their headquarters: Handicap International, World Health Organization, CIRC (International Cancer Research Center), Interpol, Euronews.

Lyon is also a favorite city for foreign students who represent 10% of the student population in Lyon and strengthen the city's international character.

## **INSA LYON – A LEADING ENGINEERING SCHOOL IN FRANCE**

INSA Lyon is one of the great French universities for science and technology. In a five-year program, it trains multi-skilled, humanist, innovative engineers equipped with an entrepreneurial spirit and a strong international culture.

Diversity, excellence, openness and innovation are the driving forces behind INSA Lyon, which, over the course of after almost 60 years of existence still embodies an avant-garde and resolutely modern vision of engineering.

INSA engineers boast excellent scientific and technical expertise, are capable of understanding the issues at the heart of their companies, and actively contribute to the evolution of their world.

On the higher education scene, it ranks among the top 10 engineering schools in Europe. It also has the vocation to become a center for research and innovation recognized throughout the world, a partner of choice for business and industry.

## **INNOV@INSA SUMMER PROGRAM**

### **EUROPEAN PERSPECTIVES IN ENGINEERING AND INNOVATION**

During this 4-week Summer Program, students will learn about European Perspectives in Engineering and Innovation through innovative and interactive teaching. They will acquire valuable international experience, get to know French culture and learn some French.

This Summer Program is also a perfect opportunity for students to discover INSA Lyon, a place they may want to come back to.

# - COURSE DESCRIPTIONS -

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# TRACK 1: CONNECTED DEVICES AND SMART SERVICES

Hours and Credits: 45 total contact hours; 3 credits

Prerequisites: algorithmic and any programming language

Academic coordinator: Youakim Badr – [youakim.badr@insa-lyon.fr](mailto:youakim.badr@insa-lyon.fr)

Instructor, Section Introduction to IoT, IoT programming languages (Node.js, Java Script, HTML):

**Dr. Youakim Badr** [youakim.badr@insa-lyon.fr](mailto:youakim.badr@insa-lyon.fr)

Instructor, Section Biomedical sensors

**Dr. Eric McAdams** [eric.mcadams@insa-lyon.fr](mailto:eric.mcadams@insa-lyon.fr)

Instructor, Section sensor design, data acquisition

**Dr. Claudine Gehin** [claudine.gehin@insa-lyon.fr](mailto:claudine.gehin@insa-lyon.fr)

Instructor, Section Signal Processing, Arduino/ Intel Edison Lab,

**Dr. Arthur Gatouillat** [arthur.gatouillat@insa-lyon.fr](mailto:arthur.gatouillat@insa-lyon.fr)

Instructor, Section BlueTooth 4.0

**Dr. Bertrand Massot** [bertrand.massot@insa-lyon.fr](mailto:bertrand.massot@insa-lyon.fr)

Instructor, Section Power management

**Dr. Norbert Noury** [norbert.noury@insa-lyon.fr](mailto:norbert.noury@insa-lyon.fr)

Instructor, Section IoT security

**Dr. Thomas Grenier** [thomas.grenier@insa-lyon.fr](mailto:thomas.grenier@insa-lyon.fr)

Instructor, project Tutoring

**Dr. Loïc Sevrin** [loic.insa@sevrin.me](mailto:loic.insa@sevrin.me)

## Part I: Introduction to The Internet of Things (IoT)

### OBJECTIVES AND METHODS

This lecture series provides an overview of the concepts and challenges of the Internet and its ever evolving ability to interconnect people, processes, data, and things that we call the Internet of Things. The course is practical and case-study based. To enhance learning and retention, this course introduces practical “How-to” guidance, tools and design methods that students can apply immediately. Classes will typically consist of lectures, guest speakers, rapid prototyping tools, in-lab exercises, and discussions of case studies.

### Syllabus

- Introduction to the Internet of Things
- Principles of sensors, actuators and their connectivity
- Overview from sensor physical layers to signal processing
- Overview from signals to raw data
- Data transmission with Wireless networks, Bluetooth Communication
- Data streams, storage and processing
- Overview of IoT computing boards: Arduino and Intel Edison
- Introduction to Javascript, NodeJS, HTML
- Security and privacy in IoT
- IoT case-studies: wearable IoT, connected cars IoT, smart grids IoT, healthcare IoT, ...

This is an entry-level course and does not have any prerequisites.

Students will also visit one or more major industrial actors in the field of the Internet of Things in the city of Lyon including Orange IoT Lab, and attend on-site demonstrations of innovative services (smart home prototypes, smart cars, robotics, ...).



## Part II: Smart and Assistive Environment Project

### OBJECTIVES

Students will collaborate with classmates on a health-monitoring infrastructure for elderly people at their assisted- living home. The infrastructure provides smart services and relies on easily programable and interconnected devices.

The goals for the health-monitoring infrastructure include:

- Build wearable devices for mobile health monitoring (temperature sensor, blood pressure sensor, heart rate)
  - Connect sensors with Arduino
  - Record sensors' information and send them wirelessly (Bluetooth module) to the monitoring dashboard
- Build an assisted environment with connected devices.
  - Build an ambient environment with Intel Edison modules
  - Define and build smart services for the ambient environment to assist elderly
- Build a browser-based dashboard with Javascript to monitor health data and manage the assistive environment

### FINAL EVALUATION

Open Q&A session, which takes place after each presentation, offer audiences the opportunity to interact and evaluate their classmates' project from different perspectives.

## TRACK 2: MANAGEMENT & INNOVATION IN EUROPE

Hours and Credits: 45 total contact hours; 3 credits

Prerequisites: basic economics

Academic coordinator: Béatrice Frézal – [Beatrice.frezal@insa-lyon.fr](mailto:Beatrice.frezal@insa-lyon.fr)

Instructor, Essential Skills for Entrepreneurs in Innovation-driven Start-ups

**Nicolas Duvernay** CEO Impetus, [nicolas@impetus-ag.fr](mailto:nicolas@impetus-ag.fr)

**Beatrice.frezal** , [beatrice.frezal@insa-lyon.fr](mailto:beatrice.frezal@insa-lyon.fr)

Instructor, Design thinking

**Shani Rippert**, CEO La Cime [shani@la-cime-design.fr](mailto:shani@la-cime-design.fr)

Instructor, Project Management,

**Hervé Routon**, Senior Consultant – ImproValue , [herve.routon@gmail.com](mailto:herve.routon@gmail.com)

Instructor, Economics & Management of Innovation in Europe

**Chantal Dagnaud**, CEO Institutions & Strategies SAS , [cdagnaud@institutions-strategies.com](mailto:cdagnaud@institutions-strategies.com)

**Pr. Hugues Benoit Cattin**, Vice President INSA in charge of innovation [hugues.benoit-cattin@insa-lyon.fr](mailto:hugues.benoit-cattin@insa-lyon.fr)

The whole of track 2 is driven by an innovation project called the CIBUM challenge (Creativity to innovation to Business Model) which is conducted by students organized in project team.

Each team will have to offer, customer centric and including new technological solutions, for solving a problem observed by them in a given universe and prepare the launching strategy. The jury will evaluate abilities to pitch a business project, to be a creative team staying focused on users / customers needs, to build a proof of concept mockup, to draft a first business model, to build an action plan to mitigate relevant major risks of their project, to set up a process of project management, to overcome difficulties mainly due to cross cultural variances and to perceive different features between the french market and their own country. The oral presentation will be part of the assessment. The assessment will also include done during certain lectures.

### Part I: Introduction to Project Management of Innovative Products & Services

#### OBJECTIVES AND METHODS

Project management has been proven to be the most effective method of delivering products and services. This series of courses gives the student a foundation in the concepts and solutions required for successful completion of a project when faced with the inevitable cost, schedule, and resource constraints. Emphasis will also be put on understanding the profile and duties of a key project manager in an innovative technological product and service context. Team management will also be covered by presenting various methods and leadership styles a team manager can undertake to increase personal productivity and build an effective team

The course is designed as a combination of traditional lectures, exercises, case studies, quizzes, and group discussions. Students are expected to practice some of these tools and methods on a global team challenge (CIBUM challenge) which covers the learning expectations of the three parts of track 2

#### Syllabus

- Challenges in cross-cultural design
- Mind mapping
- Defining the project
- Developing a project plan
- Reducing project duration
- Team decision making
- Risk management
- Leadership styles

## FINAL EVALUATION

The evaluation is based on class exercises on project management. Moreover, Students will expose the organization of their team, tools and project management method implemented in the CIBUM challenge and the decisions they have made and the difficulties they have overcome.

## Part II: Economics & Management of Innovation in Europe

### OBJECTIVES AND METHODS

Gain an excellent understanding of classic and recent trends on the economics of innovation in European countries. This course should constitute a good introduction to the economics of entrepreneurship and innovation more broadly. The course describes the French academic and economic entrepreneurship ecosystem and specifically the French IT entrepreneurial community called "La French Tech". It is designed as a combination of traditional lectures, exercises, real-world case studies, and group discussions.

### Syllabus

Overview of the European economic history:

- European firms' R&D and innovation behavior;
- Innovation processes of services and products in a European context.
- European economics of entrepreneurship and innovation
- Legislation for innovation in Europe vs US
- French economic entrepreneurship ecosystem
- Innovation and marketing in IT in Europe
- Innovation business finance in Europe

## FINAL EVALUATION

The evaluation is based on a quiz relative to the content of this section on an individual basis and the integration of the specificities of innovation in Europe into the final team presentation of the CIBUM challenge.

## Part III: Essential Skills for Entrepreneurs in Innovation-driven Start-ups

### OBJECTIVES AND METHODS

An innovation-driven startup designs new services with models enabled by new technologies. Nevertheless, for the idea based on technology to reach the market, the entrepreneurial approach requires adopting the vision of the users, co-designing the offer of products and services with them and keeping a step ahead in creativity and differentiation.

The course focuses on entrepreneurial behavior, the ability to create maintain and enhance a network of European contacts facilitating the development of innovative projects. Targeted communication skills will also be addressed. The course is designed around:

- Short workshops on the main tools used in entrepreneurship in small teams; the students will have to conduct an innovative project.
- A serious game: CIBUM challenge: From Creativity to Innovation and to Business Model.

### Syllabus

- Main tools of innovation and entrepreneurship;
  - Design thinking,
  - Creativity methods,
  - Eco-conception,
  - Blue ocean strategy,
  - Competitive positioning mapping
- Stakeholder analysis: how to identify the major actors for the success of an entrepreneurial project, analyze and anticipate their behavior

- Embedded service innovation in IT products
- Overview of various efficient and creative business models in Innovation-driven Start-ups in order to build relevant communication strategies to launch Innovation-driven Start-ups.

## **FINAL EVALUATION**

At the end of the course each team will have to pitch their value creation in front of "potential investors».

Course grade:

### **Collective assesement**

Project	written presentation	30%
	oral presentation	40%

### **Individual assesement**

related to part 2 Economics & Management of Innovation in Europe :  
30%



## TRACK 3: FRENCH LANGUAGE, CROSS-CULTURAL COMMUNICATION, INDUSTRY AND SOCIETY

Hours and Credits: 45 total contact hours; 3 credits

Prerequisites: none

Academic coordinator : Jeannie Jouffroy – [Jeannie.jouffroy@insa-lyon.fr](mailto:Jeannie.jouffroy@insa-lyon.fr)

### Part Ia: Introduction to French Language and Culture

#### OBJECTIVES AND METHODS

The focus of this unit will be on the oral French used in daily life. Using action-based language teaching methods, this class will require the students to use the French they learn in various situations both during in-class activities and in real-life situations on-site in Lyon. The overall goal is to introduce the students to various cultural aspects of life in Lyon.

#### FINAL PROJECT

During the final class, the students will go on a shopping trip to [Les Halles de Lyon](#) with their teachers where they will be expected to use the language skills they have acquired to find their way from the INSA campus to [Les Halles](#) and once there, to interact appropriately with the vendors in order to greet, explain their needs, taste local products and make their purchases.

Examples of on-site activities:

- A neighborhood treasure hunt: finding your way around and learning about the neighborhood
- Discovering French lifestyle, shopping at a street market, going to a café...

Some of the linguistic tools necessary:

- Greeting and taking leave
- Introducing yourself
- Describing where you are and how to get where you are going
- Express your preferences and personal tastes
- Sample, order, purchase, pay

### Part Ib: French Language and the French education for intermediate and advanced students; INDEPENDANT STUDY with advisor

For high intermediate and advanced students of French, we will arrange for you to sit in on classes of interest to your field and to meet INSA students in the corresponding department. We will ask you to take notes and participate to the extent possible in classes and interview students and teachers in order to write a report after consultation with your advisor. You may be asked to present your findings orally to the group.

### Part II: Developing Intercultural Competence

#### OBJECTIVES AND METHODS

Using interactive teaching tools such as student-led discussions, debates and interviews this section of the course aims to build the knowledge base and the cultural empathy necessary to increase the students' ability to perceive, analyze and understand cross-cultural differences. We will begin to develop the skills necessary to allow students to act and react appropriately in an intercultural business environment. This unit will focus on Franco-American understanding but may also include a study of the wider Francophone world.

#### FINAL EVALUATION

**MEDIA PROJECT** Students submit entries to a collective blog in which they record both the facts of their experience and their personal reflections on its significance. Each student would be required to record 9 different events: 3 conversations with French people from different socio-professional categories, 3 anecdotes about events, lived or witnessed, that were amusing or surprising and 3 situations that were puzzling, awkward, infuriating, frustrating,

and totally unknown/unexpected.

Topics will include but not be limited to the following :

### **Stereotypes and Mindsets**

Using the idea of 'the Danger of a Single Story,' an idea taken from Nigerian novelist Chimamanda Adichie, American and French students will begin to answer questions such as: What 'single story' do we have about the other? Where does it come from? What is true/false about these single stories? What are the other possible stories? By studying words and phrases that 'do not translate' e.g. '*problématique*' or '*culture général*' as well as examining the words and phrases that employ identical forms (in linguistics, the 'signifiers') which represent different concepts (in linguistics the 'signified') students will discuss possible cultural and historical reasons for these linguistics traces of differences to better understand our different mindsets.

### **Social Behavior and Personal vs Public Space**

What is personal vs public 'space'? How can a smile be misinterpreted? Why do we each consider the other 'rude,' even when we (especially when we) are on our best behavior? Using interviews, research, direct observation and group discussions with French students, we will explore our differences in different contexts such as greetings (handshakes, *la bise*, smiles, introductions), families, friends, dating, inviting and being invited, food, meals, and manners.

### **Education in France and the USA**

After readings, in discussion with their French counterparts, American students will compare and contrast the goals, teaching methods, outcomes, and institutions of the two (very) different education systems. Together they will take elements from each to create their ideal system. 4. The French Workplace Why do French and American business people often complain about professional meetings when the 'other' is present? Using simulation games, observation, analysis and discussion we will look at issues such as hierarchy, behavioral expectations, dress codes, understanding and managing the differences between implicit vs explicit styles, participation in professional meetings.

## **Part III: Industry and Society**

### **OBJECTIVES AND METHODS**

Using a case-study approach, we will use our location in Lyon, France's 'Second City', as a base for studying the impact of different industries on society and social institutions over time. The students will acquire a knowledge base which will significantly add to what the French refer to as their 'culture générale', a prerequisite for anyone who wants to be considered well-educated.

#### **DOWNTOWN LYON - Industrial and architectural landscapes and their social consequences Part 1**

**Preparation work:** Overview of the evolution of Lyon focused on two major historical developments: the silk industry and the urban modernization of the 19th c. In this first part, the idea is to present a. how a local development (the silk industry) has brought in major social developments with national, regional and European resonance; b. how a national development (urban modernization) has been implemented locally and c. how the two intertwine leading us to the second part.

#### **CROIX-ROUSSE District – Industrial, architectural landscapes and their social consequences Part 2**

**Preparation work:** The industrial, economic and social organization of the silk industry in the Croix-Rousse In the 19th c. the central hub of the silk industry in Lyon was the Croix-Rousse district. The specific way the silk industry was organized has had major consequences in the way buildings and neighbourhoods were designed. Designs which we can still appreciate today (both inside and outside of the buildings). The social advances for which the workers have fought also prefigure later social movements of the 20th century. In this second part, the main idea is to study the heritage of the "*Canuts*" (the Croix-Rousse silk workers) and its contemporary developments. The visit includes the *maison des Canuts* (museum) and the *Traboules des pentes de la Croix-Rousse* around which a team-based project will be designed.

### **FINAL EVALUATION**

There will be a written evaluation asking students to apply analytic tools learned to an original case study.

# - SECURITY INFORMATION -

The United States of America Embassy has an established Presence Post in Lyon, which, in case of need, provides emergency assistance to American citizens.

For American citizens or calls about American citizens in an after-hours emergency situation: call 01-43-12-22-22 and then dial 0 (zero). Connection will be established with the US Consulate telephone attendants immediately. Ask to speak with the Embassy Duty Officer.

For calls from the United States: dial 011-33-1-43-12-22-22 and then 0 (zero). Ask to speak with the Embassy Duty Officer.

For non-emergency issues: refer to the information on American Citizen Services on the Paris Embassy website.

The US Presence Post in Lyon also provides assistance in case of lost or stolen passports.

## CONTACT

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