INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

ONLINE SPRING SCHOOL

1st Edition
From 1st to 12th March 2021

20hrs – 2 ECTS

To Apply to this online program:

Make sure your time zone allows you to attend the classes from 8am to 11am (France)

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 2nd most important city, it is located in the heart of the thriving Auvergne-Rhône-Alpes region. The city was classified as World Heritage Site by UNESCO in 1998. Ancient capital of the Gauls, it testifies of 2000 years of history. Lyon has been recognized as France's 1st city for culture outside of Paris and is indeed characterized above all by the balance between its cultural institutions of excellence offering quality programming, its large-scale festivals, and its cultural venues open to all.

With its many fields of excellence, Lyon is 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, Mérial, 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 amongst the greatest French universities for science and technology. Our five-year program, 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 that lead INSA Lyon students to become responsible engineers. After almost 60 years of existence INSA Lyon 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. Its purpose is also to become a centre for research and innovation recognized throughout the world, a partner of choice for business and industry.

INSA ONLINE SPRING SCHOOL

For this 2 weeks Online Spring School, students will be able to choose between two courses both addressing the future and its challenges. While connected devices are all around us and lead the way towards smarter cities, students will discover in this 1st track, how they work and what is at stake, through practical exercices. The 2nd track calls for creativity and a problem solving approach. Through Design Thinking Methods, students will work in teams and reconsider a more sustainable future based on circular economy.

Students will experience hands-on innovative and interactive teaching online. Even though they are not travelling, they will acquire valuable international experience and e-meet INSA students, get to know French culture and participate in intercultural activities online.

We are proud of this new program, a safe and quality teaching in challenging times. We hope you will enjoy this pioneer experience !

COURSE DESCRIPTIONS

Disclaimer

If you have any questions about the Online Spring School program, please do not hesitate to contact Tara PIGNAL – Coordinator for the program – online-spring-school@insa-lyon.fr

TRACK : CONNECTED DEVICES AND SMART DEVICES

Hours and Credits: 20 total contact hours; 2 ECTS

Prerequisites: This is an entry-level course. The only prerequisites are some knowledge and practical experience of computer programming, language and algorithms.

Academic coordinator: Arthur Gatouillat – arthur.gatouillat@piwio.fr

Instructors:

Dr. Arthur Gatouillat arthur.gatouillat@piwio.fr

Dr. Loïc Sevrin, loic.sevrin@piwio.fr

PART I: INTRODUCTION TO THE INTERNET OF THINGS AND HOW IT RELATES TO SMART CITIES

OBJECTIVES AND METHODS

This lecture series provides an overview of the concepts and challenges of the Internet of Things applied to smart cities, and its ever-evolving ability to interconnect people, processes, and data. 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 through various labs and tutorials. Classes will typically consist of lectures, speakers from both industrial and academic backgrounds, rapid prototyping tools, in-lab exercises, and discussions of case studies.

SYLLABUS

- Introduction to the Internet of Things:
  - What is the IoT?
  - What are some of the basic applications?
  - What are the broad technical concepts powering the IoT?
  - How can the IoT be applied to smart cities?
  - *Student work*: Case study of an application of the IoT to the smart cities.

- Introduction to data collection and processing:
  - How is data stored in IoT systems?
  - Which tools can be used to process data and gain valuable insights on the physical world?
  - What are the main challenges to store and process this data efficiently?

- Introduction to geographical data storage and processing:
  - How is geographical data stored?
  - How can geographical data be processed?
  - What are the traditional tools and standard to deal with geographical data?
  - Technical introduction: Node.js, Javascript, HTTP, HTML and databases.

PART II: GEOGRAPHICAL DATA MANIPULATION LABORATORY

OBJECTIVES

Students will collaborate with classmates on smart cities practical laboratories, in which they will use theoretical and practical knowledge acquired in the Phase I lectures.

SYLLABUS

The laboratory will be structured as follows:

- ❖ Modelization on an intelligent building:
  - ⇨ Simulation of sensors in an intelligent building.
  - ⇨ Remote control of connected sensors and actuators.
  - ⇨ Technologies: Node.js, HTTP, REST, SQL.

- ❖ Processing of geographical data:
  - ⇨ Processing of real-life geographical data.
  - ⇨ Querying and displaying geographical data.
  - ⇨ Technologies: Node.js, REST, GeoJSON, PostGIS.

EVALUATION:

Multiple choice quiz (30% of the grade) related to Part I.

Oral evaluation of the IoT case study (30% of the grade).

Laboratory report evaluation (40% of the grade).

REFERENCES:

Kleppmann, M. (2017). Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems. "O'Reilly Media, Inc.".

TRACK / SHORT CIRCULAR DESIGN SPRINT

Hours and Credits: 20 total contact hours; 2 ECTS

There are no prerequisites for this track

Academic coordinator and Instructor: Shani RIPERT, shani@la-cime-design.fr, CEO of LA CIME and industrial designer, design thinking facilitation

The agency supports SMEs and groups in the complete chain of creating new products and new services.

For the past 10 years, Shani Ripert has acquired an insight and intuition on the promising markets of tomorrow. She is an expert in building new customer experiences for international markets. Shani Ripert leads creativity sessions, notably through design thinking methods, applied to concrete cases. She works with various design and engineering schools during workshops and teaching.

SHORT CIRCULAR DESIGN SPRINT : MULTI-CULTURAL COLLABORATION TO ANSWER A SUSTAINABLE CHALLENGE

(through Design Thinking Methods)

OBJECTIVES AND METHODS

Design thinking methods 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 of the impact of circular design and sustainability in product design and service context. This short Design Sprint will also present various methods and tools to apprehend a topic with efficiency and rewarded team effort to find a solution to any problem.

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 which covers the learning expectations.

An opportunity for students to start their circular economy consciousness. As much a learning experience as a "solution engineer", this module has been built to challenge students to rethink everyday products, services and systems for a circular economy and for a better future.

The remote format will also provide the opportunity to apprehend and learn new skills on software and digital tools at different stage of the Design Sprint.

LEARNING SKILLS

- Multidisciplinary teamwork, co-creation
- Sustainable development, renewable energies: asking the right questions
- Cross vision between France and Japan regarding the future
- Remote collaboration: learn about a digital brainstorming software
- Learn digital tools to make a virtual mock-up (app…)
- Getting a better understanding of European markets
- Creativity, generation of ideas, reassessment of one's own judgements
- ethnology principles and tools (human science)
- Learning Customer centric vision, empathy
- understanding and analysing existing problems on a specific market

- Market analysis, choice of positioning

SYLLABUS

- ❖ Design thinking lessons
  - ⇨ Design thinking principles
  - ⇨ Creativity methods
  - ⇨ Eco-conception
  - ⇨ From linear thinking to systems thinking
  - ⇨ Circular economy Concepts
  - ⇨ Circular brainstorming: structure your thinking

- ❖ Circular design tools and exercises
  - ⇨ User-centred research (key principles, interview structure and guide creation)
  - ⇨ Persona study and their context
  - ⇨ Product journey Mapping
  - ⇨ Brand Promise (customer added value, circular opportunity, message)
  - ⇨ Product to Service flip (how to create a services solution instead of a product)

EVALUATION :

At the end of the course each team will have to "pitch" their value creation in front of "potential clients" with the support of a visual presentation.

The students will have to explain the decisions they have made and the difficulties they have overcome. And compare their short experience with the French / European people and expectations.

JUDGING CRITERIA FOR THE PRESENTATION

- System mapping / The important stakeholders of the system are mapped out & the relationships between them are clear
- Circular opportunities / They fulfil the principles of the circular economy & give insights on the relevant stakeholders that need to be involved
- One question for systems change / It is specific and action-oriented
- Visual clarity / Information is easy to grasp and visually appealing
- Feedback / Students have been provided constructive feedback from potential French users
- Final effect / Students solution shows a high degree of creativity and realism

COURSE GRADE :

Collective assessment

Project written presentation – 30%

Oral presentation – 40%

Individual assessment

Related to design thinking (quiz) – 30%

RESSOURCES:

DESIGN SPRINT PRINCIPLE

The design sprint is a creative process used by start-ups or large companies and based on a time constraint (in principle five days), during which the five stages of design thinking are implemented. Its aim is to reduce the risk when bringing new services or innovative products to market, by exploring as many ideas as possible and only prototyping the best, which will be tested on real users on the last day.

This process allows the team, by clearly defining objectives, to validate or invalidate assumptions and to decide on a roadmap before the first line of code is written. The fundamental principles of this process are: unity of time and place, multidisciplinary teams, rapid prototyping and user tests.

The method was developed and popularized by Google Ventures and is now used in almost every industry.

Explaining the Circular Economy and How Society Can Re-think Progress

https://www.youtube.com/watch?v=zCRKvDyyHmI