

Human'INSA

3-week Short Program
65-86 Contact Hours - 2 Tracks
6-8 ECTS / 3-4 US Credits

From June 19th to July 11th 2025

Track 1

Humanitarian Engineering

OR

Artificial Intelligence

Track 2

French Language and Cross-Cultural
Communication

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 Gaul, 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, 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 or regional offices: 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 France's leading universities for science and technology. Our five-year program trains multi-skilled, humanist, innovative engineers 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. Founded in 1957, 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 1st in France among engineering institutions with a 5-year integrated master's program. Its purpose is also to become a centre for research and innovation recognized throughout the world, a partner of choice for industries, but also for NGOs such as 'Humanity and Inclusion' in the framework of the Alliance Innovation for Humanity.

Human'INSA Short Program on New Technologies

During this 3-week short program, students will learn about new technologies in the field of humanitarian engineering or artificial intelligence through innovative and interactive teaching. Students will enjoy hands-on experiments and acquire valuable international experience for their professional futures.

Students will get to know French culture and the beautiful city of Lyon, and learn some French. This short program is also a perfect opportunity for students to discover INSA Lyon, a place they may want to come back to in their course of studies!

COURSE DESCRIPTIONS

Disclaimer

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If you have any questions about the Human'INSA program, please do not hesitate to contact the Short Programs Team

humaninsa@insa-lyon.fr

STUDENTS MUST CHOOSE BETWEEN TRACKS 1A AND 1B.

TRACK 2 IS COMPULSORY.

Track 1a: Humanitarian Engineering

Hours and Credits: 56 total contact hours (including 4 hours of online courses) ; 6 ECTS or 3 US credits

Prerequisites: This track offers cross-disciplinary training in the humanitarian field and does not require any specific engineering background.

Academic Coordinator: Jérôme CHEVALIER

Jérôme Chevalier is full Professor at INSA Lyon. He is mainly recognized for his work on ceramics for healthcare applications, especially on zirconia as a biomaterial for orthopedic and dental applications and on the development of innovative glass-ceramics and calcium phosphate ceramics for bone substitute applications. He is responsible, with two other colleagues, of the Chair 'Innovation for Humanity' between INSA-Lyon and the NGO Humanity and Inclusion. In this framework, he is also interested on the process of orthoses and prostheses by additive manufacturing, from recycled polymers. Jérôme Chevalier has been member of the 'Institut Universitaire de France' (2010-2015), awarded by the French CNRS with the prestigious 'Innovation Medal' (2015) and he recently received the Stuijts Award of the European Ceramic Society (2022).

OBJECTIVES AND METHODS

- To provide participants with thorough knowledge of the humanitarian sector and issues at stake: stakeholders, systems, coordination mechanisms, legal and ethical framework, Quality & Accountability initiatives and applications relating to humanitarian programme management
- To understand and apply appropriate approaches and tools to manage all stages of the project cycle in humanitarian contexts.
- To apply engineering competencies to the aid's sector and mobilized them towards innovation.

SYLLABUS

- Humanitarian Framework:
 - Explain humanitarian action, actual trends and challenges;
 - Describe the sectors of intervention in humanitarian aid.

In this introductory module, learners will discover the context and actors of humanitarian action. They will discover the history and evolution of humanitarian action and come to understand the main issues at stake today. Learners will be able to identify the main sectors of humanitarian action. This module will be performed in the frame-work of a self-study course, complemented by a synchronous remote class with a humanitarian action professional.

- Innovation in Humanitarian Projects:
 - Describe the project management cycle approach;
 - Explain quality and accountability approaches in humanitarian sector;
 - Describe specificities and innovation management.

Learners will work on the project approach in the humanitarian context. They will be able to understand the issues of quality and accountability in the humanitarian sector and integrate them into their project management methodology. Learners will become familiar with the main methodological tools used in the

sector. They will discover how to use these tools in the deployment of technical innovations. This course will include theoretical contributions and practical exercises based on situations in the humanitarian sector.

- **Digital Challenges in the Humanitarian Sector:**
 - Describe the main digital challenges in humanitarian sector;
 - List and exemplify digital innovations in humanitarian sector;
 - List the principles for digital development.

Humanitarian aid is facing profound changes, many of which are linked to the evolution and development of technologies.

On the one hand, the needs are constantly growing, impacting more and more people in new forms of crises and disasters (pandemic risk, bankruptcy situation, changes in climatic hazards, migration, etc.). Improving skills and increasing the capacity of humanitarian actors to better anticipate, assess and respond to needs while considering all the resources available locally remain crucial issues.

The digital revolution and technological advances offer new opportunities to improve the efficiency of humanitarian response, and profoundly transform the working methods of humanitarian organizations.

The use of drones or satellites to quickly provide aerial images of damage after a disaster, new production methods of orthoses and prostheses such as additive technologies, data analysis to anticipate crises, the use of connected objects, the use of money transfer via SMS, the use of generative artificial intelligence are all examples where technology can bring radical changes in crisis management. However, the same technologies also raise challenges such as the protection of beneficiaries' personal data, the cyber security of humanitarian operations, and equitable access to technological benefits in vulnerable regions. It is essential to strike a balance between harnessing technology to strengthen humanitarian aid and ensuring that these innovations leave no one behind, while respecting the basic ethical principles of humanitarian.

This module will therefore describe the main digital innovations in the humanitarian sector, as well as the main challenges we may face, on both technological and ethical points of view.

- **Environmental impact of H actions:**
 - Explain the interactions between the environment, humanitarian crises and humanitarian action;
 - Recognize the different impacts of humanitarian actions on the environment;
 - Identify good practices and innovations to reduce environmental impact of programs and offices (Water sector, Energy, Construction, Waste management).

In this module, students will explore the interactions among humanitarian crises, the environment and humanitarian actions. Best practices in sustainability and resilience will be introduced in the context of land and natural resource use, infrastructure, and provision of infrastructure services, with a focus on water and energy. As the relationship between the environment and humanitarian response is two-fold, students will consider both how the environment impacts humanitarian action and how humanitarian actions affect the environment. Topics will include climate change and conflict as drivers of human migration and humanitarian action; deforestation and land degradation linked to humanitarian operations; and opportunities for building sustainable and resilient practices into the humanitarian response. Students will adopt a systems approach for understanding the materials flows and connections between natural resources and humanitarian action. Students will learn to:

- Quantify the environmental footprint of humanitarian work (with a focus on water and energy demands) and recognize the impacts of humanitarian actions on the environment,
- Evaluate best practices for the treatment of waste streams in the context of humanitarian action, including off-grid wastewater treatment and solid waste management,
- Identify environmental drivers of natural disasters, human migration and humanitarian action.

- Cases Study – Innovative Projects:

Potential projects/case studies:

1. Given energy sources and demands in a settlement camp at the Ukraine/Poland border, determine if the energy is sufficient to support the population; how does this change in the winter when heating demands go up? Will have access to a stock and flow model written in VENSIM to model energy reliability over time as population changes.
2. Given data on infrastructure, water use and materials flows, determine how to maintain WASH infrastructure for a settlement camp at the Texas/Mexico border. Will have access to a stock and flow model written in VENSIM to predict infrastructure failure and prioritize maintenance of WASH infrastructure.

FINAL EVALUATION:

→ Project Defense: Cases Study – Innovative Projects:

- In student groups and under supervision of tutors from the four institutions (INSA Lyon, Drexel University, Bioforce, Humanity & Inclusion)
- Apply tools and methodology to develop on innovation responding to a fictive or real humanitarian situation

Track 1b: Artificial Intelligence

Hours and Credits: 35 total contact hours; 4 ECTS or 2 US credits

Prerequisites: Science and Engineering students (Computer Sciences)

Academic Coordinator: Linda Elmhadhbi

Associate Professor at INSA Lyon since 2021, Linda ELMHADHBI received a Ph.D. degree in applied informatics from the National Polytechnic Institute of Toulouse, Toulouse, France, in 2020. Her research is focused on ontologies and semantic interoperability for decision support systems.

OBJECTIVES AND METHODS

The objective of the course is to give an overview of AI basic concepts and put them into practice during a mini-project.

CONTENTS

- Introduction to AI ~ 2h

This course is an introduction to artificial intelligence to help students understand what AI means and what are the historical development, fundamental concepts, and modern applications of AI.

- Machine Learning and AI ~ 8h

This course investigates machine learning algorithms capable of performing complex tasks by focusing on how to train algorithms using training data.

- Data Mining ~ 4h

This course introduces the basics of descriptive data analysis. We will cover the basic algorithms of clustering (e.g. k-means, hierarchical clustering, DBSCAN, HDBSCAN) and frequent pattern mining (e.g. Apriori algorithm).

- Natural Language Processing (NLP) ~ 8h

This course focuses on the fundamental concepts of NLP and its role in current and emerging technologies.

We will study the concepts of text cleaning and simplification (preprocessing), text transformation into numerical vectors, grammatical and semantic analysis of texts. We will also cover concepts related to text comparison, information retrieval, and artificial intelligence.

We will delve into text analysis using neural networks and language models.

Additionally, we will explore generative models like GPT.

- Ethics of AI ~ 2h

In this course, various issues and concerns surrounding artificial intelligence such as ethics, bias, and future uses will be discussed.

- Semantic-based Explainable AI ~ 2h

The course investigates how explainable IA can make AI applications trustful and transparent in order to increase the confidence of industrialists in AI.

- Industrial visit

FINAL EVALUATION

The students will work on a mini-project of 8 hours which will be the basis of the evaluation (1h of defense).

Track 2: French Language and Cross Cultural Communication

Hours and Credits: 30 total contact hours; 2 ECTS / 1 US credits

Prerequisites: none

Academic Coordinator: Elisabeth AUMEUNIER, elisabeth.aumeunier@insa-lyon.fr

PART I.A: 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 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 I.B: FRENCH LANGUAGE AND CULTURE FOR INTERMEDIATE AND ADVANCED STUDENTS

Intermediate and advanced students of French, depending on the number, will either be taught in a class or tutored by a teacher to accomplish a couple of tasks independently. Whether you have a class or work independently, the main objective of the course is to discover the city of Lyon: social life, cultural activities, points of interest, history and more. At the end of the course, you will give a presentation on one aspect of the city of Lyon. Of course, all of it in French!

PART II: DEVELOPING INTERCULTURAL COMPETENCE

COURSE INTRODUCTION

Why the need for this course?

If we consider today's globalization, internet, and the general shrinking of time and space, intercultural/cross-cultural interactions have become a certain necessity in people's daily lives. The course is designed to help tackle the challenges of living in a world in which we are increasingly asked to interact with people who may not be like us in fundamental ways. Its overarching goals are to help one become more sensitive to differences in cross-cultural communication and to provide students with the knowledge and skills that will help them interact successfully with people from cultures other than their own, while connecting it to the language learning.

COURSE CONTENT

This course is designed to interrogate different aspects of cross-cultural communication and cultural differences: language, family life, social relationships, work, government, education, love, and religion. Throughout the exploration of these topics, we will strive to engage in self-reflection, practical experience, and understanding of connections to larger social structures.

OBJECTIVES

Specifically, the goals of this course are to describe, learn about, and see social and cultural differences conformed to a model, to provide a space for students to reflect on their own personal experiences. Students will be encouraged to engage with different cultures in practical ways and to experience cross-cultural communication in meaningful ways.

- Understand the role of communication in culture
- Recognize cultural variables
- Become familiar with communication norms, rituals, and taboos of other cultures
- Discover barriers to cross-cultural communication, adaptation to other cultures and culture shock
- Practice communication activities as they would occur in other cultures
- Learn how differences in intercultural communication manifest themselves in different professional contexts
- Increase sensitivity to one's own cultural context and its impact on how one communicates, increase knowledge of ethical issues in cross-cultural communication, and increase sensitivity to communicating with people from different cultures

GRADE DISTRIBUTION

Participation – 10%

(Inter)cultural self-analysis – 30%

Cultural presentation – 30%

Final test – 30%

The Human'INSA Team is looking forward to welcoming you next summer!

CONTACT

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