MASTER OF SCIENCE, TECHNOLOGY AND HEALTH

2024-2025

YEAR 1

INDUSTRIAL ENGINEERING

SMART AND CONNECTED ENTERPRISE

PROGRAMME SUPERVISOR(S):

Catherine DA CUNHA

YEAR 1 – Autumn Semester

CORE COURSES

Course code	Title	ECTS Credits
CSM	Basics of Computer Science and Mathematics	4
DESIMU	Discrete-Event Simulation	4
EcoGel	Economics and Management for Industrial Engineering	4
ENTMOD1	Enterprise Modelling	4
METOP	Introduction to Optimization Methods	4
PRODMANAG1	Production Management	4
STAD	Statistics and Data Analysis	4

LANGUAGE COURSES

Course code	Title	ECTS Credits
CCE1	Cultural and Communication English	2
ESP1	Spanish Language	2
FLE1	French Language	2

YEAR 1 – Spring Semester

CORE COURSES

Course code	Title	ECTS Credits
E40P	Entreprise 4.0 processes	4
INFOSYS1	Introduction to Information systems	4
INNOV	Innovation Engineering	4
IR2	Introduction to Research	4
OR	Operation research	4
PROJMNGT	Project Management	4
SUSTENT	Strategic management of Sustainable enterprise	4

LANGUAGE COURSES

Course code	Title	ECTS Credits
CCE2	Cultural and Communication English	2
ESP2	Spanish Language	2
FLE2	French Language	2

Basics of Computer Science and Mathematics [CSM]

LEAD PROFESSOR(S): Raphaël CHENOUARD

Requirements

Objectives

At the end of the course (30 hours + personal work) the students will be able to:
- Know basics of programming languages (VBA, Python)
- Describe and implement an algorithm
- Understand object-oriented programming
- Understand basics notions for numerical analysis (vector, matrix, derivative)

Course contents

These lectures aim at introducing the following concepts:
- Basics of algorithmic;
- Basics of object-oriented programming;
- Vectors and matrices calculus;
- Derivatives and numerical applications

Languages such as Visual Basic and Python will be emphasized.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	10 hrs	8 hrs	12 hrs	2 hrs	0 hrs

Master Programme - Industrial Engineering - Smart and Connected Enterprise
YEAR 1 - Autumn Semester

Discrete-Event Simulation [DESIMU]

LEAD PROFESSOR(S): Catherine DA CUNHA / Maroua NOUIRI

Requirements

Basics of Computer Science and Mathematics

Objectives

At the end of the course (30 hours + personal work) the students will be able to:

- Understand a discrete-event simulation-based analysis
- Model simple industrial processes using a discrete-event simulation software
- Configure the simulation model
- Define the key performance indicators
- Gather key performance indicators from the simulation runs
- Analyse the results of the simulation

This course contributes to the Sustainable Development Goal 12 "Responsible consumption and production". Using the knowledge acquired in this class, the students will be able to schedule the activities of a machine or a plant to optimize indicators including human well-being from resource use and environmental impact.

Course contents

These lectures constitute an introduction to the simulation of discrete event systems applied to manufacturing production systems. The main elements covered are:

- Principles of simulation
- Modelling for simulation
- Configuration and tuning of a simulation model
- Analysis of key performance indicators values from simulation tool
- Optimization via simulation

After an introduction lecture, practical sessions will lead to a mini-project in full autonomy. Industrial software such as FlexSim will be used.

Course material

- Introduction to Simulation Using SIMAN, Pegden, C.D., Sadowski, R.P., Shannon, R.E., 2nd ed. McGraw-Hill, Inc., New York, NY, USA (1995)
- Simulation modeling and analysis, Law, A. M., Kelton, W. D., & Kelton, W. D. (Vol. 3). New York: McGraw-Hill (2007).

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	8 hrs	0 hrs	20 hrs	4 hrs	0 hrs

Economics and Management for Industrial Engineering [EcoGeI]

LEAD PROFESSOR(S): Simon ROUSSEAU / Yasamin ESLAMI

Requirements

Objectives

Management Systems (MS) use accounting data to manage and analyze operations. This part of the programme focuses on the financial and economic operations generally applied in industrial engineering.

This course introduces current measurement and analysis standards, budget management, and economic indicators to run the business and explain operational results as well as performance outcomes.

Financial and economic aspects help and influence decision making. They play an important role in coordinating operational activities regarding performance goals and resource optimization.

Course contents

At the end of the course (30 hours + personal work) the students will be able to:

- Understand the data provided by financial statements and how the information can be used to assess the economic health of a company
- Calculate financial ratios based on financial statements and how to interpret them to analyse a company
- Understand the difference between cash flow and profit
- Understand how to measure the performance of a company, its economic sustainability and its competitiveness
- Calculate and analyze the profitability threshold
- Understand how companies choose strategic investments based on financial considerations in order to gain or retain competitive advantage
- Understand how a company can finance its investments and its activities
- Understand how to measure and analyze costs by using financial accounting data
- Focus on Activity-Based Costing (ABC): the method of allocating overhead expenses based on actual activities and processes, not arbitrarily.
- Understand what a budget is, how it is designed and constructed and how it fits into the long term planning of the company
- Understand how to set up financial KPIs and how to use them

Exercises will be completed during and between classes.

Course material

- Tukker, A., 2015. Product services for a resource-efficient and circular economy - A review. Journal of Cleaner Production, 97, pp.76–91.
- Berliner C. and Brimson J. (1988). Cost management for today's advanced manufacturing, the CAM-I conceptual design, Harvard Business School Press.
- Johnson H.T. (1992) Relevance regained, from Top-down control to Bottom-up empowerment, Free Press
- Johnson H.T. and Kaplan R.S. (1987) Relevance lost: the rise and fall of management accounting, Boston, Harvard Business School Press
- Malmi T. and Brown D. (2008). Management Control systems as a package – Opportunities, challenges and research directions, Management Accounting Research, vol. 19, n°4, p. 287-300.
- Vargo S. and Lusch R. (2008). Service-dominant logic: continuing the evolution, Journal of the Academy of marketing Science, vol. 36, n° 1, p. 1-10.

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	14 hrs	14 hrs	0 hrs	4 hrs	0 hrs

Enterprise Modelling [ENTMOD1]

LEAD PROFESSOR(S): Catherine DA CUNHA

Requirements

Objectives

At the end of the course (32 hours + personal homework) the students will be able to:

- Understand the main concepts behind hierarchical organisations and industrial enterprises
- Conduct an operational management method
- Construct enterprise business models including various points of view and using several tools

This course contributes to the Sustainable Development Goal 12 "Responsible consumption and production" by teaching the students how to design and diagnosis business models with sustainability perspectives. As well, Process based approach is generally used as a main step in Product Lifecycle Analysis studies.

Course contents

These introductory lectures aim to present the main elements that define the architecture of an enterprise. After this introduction, the following items will be presented in detail:

- Introduction to Enterprise organization
   o What is an organization as a system?
   o Different points of view for the analysis of an organization (structure, operation, collaboration, decision levels, etc.)
- Enterprise Modelling concepts
   o Definition of the concepts of process, tasks and activities
   o Definition of actors and roles
   o The concept of performance

- Business process modelling with IDEF0-SADT
   o Introduction to process modelling
   o IDEF diagram structure

- Business Process Modelling Notation (BPMN)
   o Introduction to BPMN principles and notations
   o BPMN diagram creation and validation
   o Examples of process model applications
   o Performance simulation with Bizagi tool

- Decision-based modelling with GRAI method
   o Main concepts: decision centers, functional view, temporal view, hierarchy, etc.)
   o Modelling tools (decision centers description, GRAI grid and Network)

- Introduction to UML for the description of enterprise structure
   o UML class diagram for the description of the structure
   o UML use cases and sequence diagrams for the description of the functional view

Practical exercises and homework will help students to apply the learned modelling languages in various case studies. A mini

project will be conducted by the students to apply all learned methods and tools in the design of their chosen company.

Course material

- Livre blanc - Introduction au BPM. Stéphane PLANQUART
- Business Process Model and Notation (BPMN) OMG official Standard document: http://www.omg.org/spec/BPMN/2.0
- BPMN 2.0 by Example. OMG official Standard document http://www.omg.org/spec/BPMN/2.0/examples/PDF/10-06-02.pdf
- The GRAI method http://chen33.free.fr/M2/Courses/GRAI%20INTEROP%20part%201.BV.pdf
- Integrating value modeling into ArchiMate. University of Twente
- Business Process Modeling Introduction to ARIS Methodology http://www.trainning.com.br/download/Business%20Process%20Modelling%20-%20Introduction%20to%20ARIS%20Methodolgy.pdf

Assessment

Individual assessment: EVI 1   (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	12 hrs	16 hrs	0 hrs	4 hrs	0 hrs

Introduction to Optimization Methods [METOP]

LEAD PROFESSOR(S): Raphaël CHENOUARD

Requirements

Python programming language

Objectives

At the end of the course the students will be able to:

- Understand an optimization problem
- Model a problem as a mathematical problem
- Choose a classical optimization method
- Analyze the result of the optimization

Course contents

These lectures constitute an introduction to classical optimization methods. The main elements covered are:

- Mathematical modelling
- Linear Programming
- Optimization without constraint
- Optimization with constraint

These lectures are applied to practical examples and implemented using SciPy Python library. SciPy generic optimization functions are used, but some classical algorithms are also implemented like steepest descent or Newton algorithm.

Course material

- Numerical Optimization, Pegden, Jorge Nocedal, Stephen Wright. 2nd ed. Springer (2006).
- Introduction to Numerical Analysis, Arnold Neumaier. Cambridge University Press (2001).

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	8 hrs	18 hrs	4 hrs	2 hrs	0 hrs

Production Management [PRODMANAG1]

LEAD PROFESSOR(S): Catherine DA CUNHA / Rosa ABBOU

Requirements

Objectives

At the end of the course, the students will be able:
- to understand how a production system works
- to take decisions on planing

Course contents

This course constitutes an introduction to production management. The main elements covered in the course are:

Overview of Production Systems: Explore types of production systems
Production Planning & Control: Learn techniques for demand forecasting, scheduling, and resource allocation.
Inventory Management: Study inventory models, stock control methods, and just-in-time (JIT) systems.
Lean Manufacturing & Process Optimization: Understand principles of lean production, waste reduction, and efficiency maximization.

Course material

▪ Gideon HALEVI, Handbook of Production Management Methods. Edition Butterworth-Heinemann, 2001.

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	8 hrs	10 hrs	12 hrs	2 hrs	0 hrs

Statistics and Data Analysis [STAD]

LEAD PROFESSOR(S): Catherine DA CUNHA

Requirements

Objectives

The aim of this course is to provide the students with the necessary mathematical tools to address the fields of reliability under the framework of survival analysis. At the end of the lecture, students will fully understand the main statistical approaches for modelling "time to event" data with right censoring and will be apply to conduct a whole statistical analysis of their data.

In addition depending on time, the course will cover classical machine learning strategies (not related to time to event data).

Course contents

- Remainder on statistics
- Specificities : skewness, censoring
- Non parametric estimation
- Cox-proportional hazards model
- Conclusion with a whole statistical analysis

Course material

[1] D. Collett. Modelling Survival Data in Medical Research. Chapman and Hall/CR, 3rd edition, 2014.
[2] J. P. Klein and M. L. Moeschberger. Survival analysis. Springer–Verlag, 2nd edition, 2003.
[3] D. G. Kleinbaum and M. Klein. Survival analysis: A self learning text. Springer–Verlag, New–York, 3rd edition, 2012.

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	12 hrs	18 hrs	0 hrs	2 hrs	0 hrs

Cultural and Communication English [CCE1]

LEAD PROFESSOR(S): David TROYA

Requirements

Objectives

This course aims at improving your critical thinking and persuasion skills in English. Using documentaries, we will explore, discuss and debate a range of cultural, political, social, and environmental issues relevant to current world events.

Speaking and understanding English as a second or third language is a great achievement, but does it mean you are an effective communicator? The next step involves, among other things, critical thinking and persuasive skills, both of crucial importance in the modern professional environment. We will address these issues by analyzing documentaries that will lead to formal debates.

Several competencies will be developed through class exercises. Oral presentations will be an opportunity put your verbal as well as your non-verbal communication skills into practice. During debate, you will be able to sharpen your analytical skills, provide constructive feedback, defend an argument, and prove a point.

Course objectives

- Improving your communication skills

- Becoming an active listener

- Enhancing your non-verbal communication skills

- Developing critical thinking toward media

- Boosting leadership skills through moderating

- Organizing evidence and arguments

Course contents

Each session will be dedicated to a particular cultural, political, social or environmental topic of relevance in the wider anglophone world. Each topic will include multimedia material in the form of a short documentary or documentary excerpt. During class, students will lead a primer presentation, a moderated discussion and a formal debate.

Primer Presentation:

In pairs, you will hold a short talk to prime us on the topic of that week's documentary: you will introduce us to the topic by setting it in a wider context and establishing what's at stake.

Moderated Discussion :

In pairs, you will moderate a discussion related to the themes explored by the documentary. Moderators will come prepared with open-ended questions pertaining to the strengths and weakness of the documentary. They will distinguish between content and form and encourage critical, constructive opinions.

Formal Debate:

What's the difference between an opinion and an argument? You will soon find out. After the moderated discussion, we will brainstorm potential topics for debate, and follow the British Parliamentary model to sharpen your research, critical thinking, and persuasive skills.

During the debate, each speaker will be assigned an audience member who evaluates their individual performance and provides a short debrief. A panel of two judges will determine which side wins.

Course material

Written and televised press, information and digital tools, general documents, business environment and company strategies. Internet conferences (Ted Talks, etc.), our own educational materials on Hippocampus (Moodle).

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

Spanish Language [ESP1]

LEAD PROFESSOR(S): Marta HERRERA

Requirements

Objectives

For beginners:
Practice and reinforcement of the five skills (oral and written expression and comprehension as well as interaction)
Acquisition of vocabulary and linguistic structures
Be able to talk about yourself and those around you
Be able to express oneself during daily activities
Know how to give your opinion

For advanced students:
Practice and reinforcement of the five skills (oral and written expression and comprehension as well as interaction)
Acquisition of specialised vocabulary
Be able to understand the essential content of concrete or abstract subjects including a technical discussion
Be able to communicate spontaneously and fluently
Be able to express oneself in a clear and detailed manner, to express an opinion on a topical subject

Course contents

For beginners:
Personal environment (introduce yourself, express yourself, your tastes, your character, your hobbies, etc.), your surroundings (friends, family, location, climate), your interests (sports, leisure)
Present tense (regular and irregular)
Language patterns to express habit, obligation, "gustar" and its equivalents,
Possessive adjectives
Differences between "es", "está", "hay"
Use of "por" and "para"
Adverbs and frequency patterns
Numeral adjectives

For advanced students:
Knowledge of the Hispanic world (economic, technical, cultural and social environment)
Present tense (regular and irregular)
Imperative
Past tenses
Direct / indirect style
Future tense
Conditional tense
Present and past subjunctive moods

Course material

Preparation manuals, our own tailor-made documents, written and internet press, general civilization documents, digital tools

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
Spanish	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

French Language [FLE1]

LEAD PROFESSOR(S): Silvia ERTL

Requirements

N/A

Objectives

The objective is to familiarize the learner with the French language and French culture through an entertaining task-based communicative language teaching, focused on speaking combined with:

- Phonetics
- Self-correcting exercises on our learning platform
- Learning Lab activities
- Project work
- Tutoring

Course objectives include the acquisition and reinforcement of vocabulary, syntax, and pronunciation by both traditional means and through the use of digital resources.
Students will learn general French, develop language skills of oral and written comprehension and expression.

After completing this course (32 hours + personal work), the students will be able to communicate in spoken and written French, in a simple, but clear manner, on familiar topics in the context of study, hobbies etc. Another important goal of this course is to introduce the student to French culture. At the end of the course (2 semesters), complete beginners can achieve an A1 level and some aspects of the A2 of The Common European Framework of Reference for Languages. More advanced students may aim for B1/B2 levels.

Course contents

Full range of practical communication language exercises: reading comprehension, listening comprehension, written expression, oral expression.

Learners will be able to use the foreign language in a simple way for the following purposes:

1. Gving and obtaining factual information:
- personal information (e.g. name, address, place of origin, date of birth, education, occupation)
- non-personal information (e.g. about places and how to get there, time of day, various facilities and services, rules and regulations, opening hours, where and what to eat, etc.)

2. Establishing and maintaining social and professional contacts, particularly:
- meeting people and making acquaintances
- extending invitations and reacting to being invited
- proposing/arranging a course of action
- exchanging information, views, feelings, wishes, concerning matters of common interest, particularly those relating to personal life and circumstances, living conditions and environment, educational/occupational activities and interests, leisure activities and social life

3. Carrying out certain transactions:
- making arrangements (planning, tickets, reservations, etc.) for travel, accommodation, appointments, leisure activities
- making purchases
- ordering food and drink

Course material

Preparation manuals, our own tailor-made documents, written and televised press, internet, general civilization documents, digital tools, our own educational materials on Hippocampus (Moodle).

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	2	0 hrs	48 hrs	0 hrs	0 hrs	0 hrs

Entreprise 4.0 processes [E4OP]

LEAD PROFESSOR(S): Catherine DA CUNHA

Requirements

Objectives

At the end of the course the students will be able to understand the main processes in an industrial company and how Computer Aided tools are able to help the experts in their daily tasks.
Concretely, the courses will be divided into five sections. Every section presents one topic with an introduction course and practical classes for training.

Course contents

This introductory course will address the following items:
- Introduction to Design and Computer Aided Design
  o What is the main functions of a CAD tool
  o Design of a simple product
- Introduction to Machining and Computer Aided Manufacturing for Machining
  o Presentation of the main process of machining
  o Explanation of CNC machines functioning
  o Preparation of a job on a CAM tool
  o Realization of a simple part with machining
- Introduction of Additve Manuacturing and Computer Aided Manufacturing for Additive Manufacturing
  o Presentation of the main processes of Additive Manufacturing
  o Explanation of the AM machines functioning
  o Preparation of a job with CAM tool for AM
  o Realization of a simple part with AM
- Introduction to the control of sequential production systems
  o Recall of the basics of automation
  o Introduction to grafcet
  o Simulation: Control of a simple production process with automgen tool.
- Introduction to Computer Aided Maintenance
  o Explanation of main processes in preventive and reactive maintenance
  o Explanation of reliability models
  o Case studies

Course material

1. Cad/Cam Theory and Practice, McGraw-Hill Series in Mechanical Engineering
2. Introduction to Manufacturing Processes, Schey, John A

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	10 hrs	4 hrs	16 hrs	2 hrs	0 hrs

Introduction to Information systems [INFOSYS1]

LEAD PROFESSOR(S): Catherine DA CUNHA / Wassim BOUAZZA

Requirements

Objectives

At the end of the course (32 hours + personal work) the students will be able to:
- Understand the role of information systems (EIS) in the enterprise and their main functions
- Understand the main categories of Enterprise Information Systems
- Manipulate the main functions of an ERP system
- Design of data base and information system

This course contributes to the Sustainable Development Goal 9 "Industry, Innovation, and infrastructure" by explaining to the students how digitalization can contribute to the optimization of industrial processes and resources.

Course contents

- Introduction to enterprise information systems
  o Concepts related to enterprise information systems
  o Types of enterprise information system
- Design of data base
  o Creation of data base with Access
  o Introduction to SQL
- Design of information systems with UML
  o Static view: use case, class and object diagram
  o Interaction view: sequence diagram, state machine diagram and collaboration diagram
  o Introduction to the conception of human machine interfaces
- Main Functions of ERP (Enterprise Resources Planning)
  o Marketing and sales
  o Supply chain management
  o Production Management
  o Manipulation of Sage ERP tool

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	10 hrs	16 hrs	6 hrs	0 hrs	0 hrs

Innovation Engineering [INNOV]

LEAD PROFESSOR(S): Catherine DA CUNHA / Guy CAVEROT

Requirements

Objectives

At the end of the course (32 hours + personal work) the students will be able to:

- Understand and practice a customer-oriented and a value-driven process to assess a business opportunity
- Conduct activities associated with business planning and business modelling
- Assess the underlying dimensions of a business plan
- Leverage the tools and methodologies of strategic communication.

This course contributes to the Sustainable Development Goal 9 "Industry, Innovation, and infrastructure" by increasing the innovative capacities of the students and considering sustainability constraints at both technical and managerial levels.

Course contents

These introductory lectures aim to present a set of methods and tools used in the development of a business opportunity and how such development projects are managed and drive innovation. Based on active learning techniques, students will be tasked with conducting an entrepreneurial project. The concepts will be introduced as part of the process of business modelling of the innovation.
At the end of the course, students will tackle the strategic communication of their entrepreneurial project by putting together a pitch and a business plan.

The following items will be presented in detail:

- Introduction to innovation engineering
- Value creation behind a business opportunity: from a problem to a value creation process
- Prototyping a solution
- Business model
  o Monetizing a value proposition
  o The business system behind the value proposition
- R&D roadmapping
- Financial plans and need for funds
- Strategic communication
  o Pitch Communication
  o Business Plan Structure

Course material

- "Guide to Business Plan Writing," Gate2Growth supported by European Commission
- Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers
- Value Proposition Design: How to Create Products and Services Customers Want
- Other resources will be available on Moodle

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	12 hrs	16 hrs	0 hrs	4 hrs	0 hrs

Introduction to Research [IR2]

LEAD PROFESSOR(S): Catherine DA CUNHA

Requirements

Objectives

Ddiscovery of research via literature survey and dissimination methods.

This course contributes to the Sustainable Development Goal 9 "Industry, innovation and infrastructure" by learning how the students can realize scientific and industrial surveys for their innovative projects.

Course contents

4 hours lecture classes will introduce the main basics to know about the mission and the work of researcher (What is research, its activities and missions).
Based on a proved experience of the teacher, students will learn how to do literature survey on scientific domain and how to disseminate the research results on various types of supports.

They will learn principles of writing of scientific papers and project deliverables.

Students will realize a literature survey and present a poster/presentation on one predefined topic of enterprise of the future.

Students will attend, where it is possible, locally held research conferences.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	4 hrs	4 hrs	0 hrs	16 hrs	0 hrs

Operation research [OR]

LEAD PROFESSOR(S): Arnaud LAURENT / Raphaël CHENOUARD

Requirements

Objectives

Provide students with the major principles of value network optimization.

Course contents

- Introduction to operations research
- Graph algorithms and linear programming - Constraint programming
- Meta-heuristics

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	8 hrs	10 hrs	12 hrs	2 hrs	0 hrs

Project Management [PROJMNGT]

LEAD PROFESSOR(S): Catherine DA CUNHA

Requirements

Objectives

The teaching in this course will be based mainly on serious games reflecting industrial situations. At the end of the course (32 hours + personal homework) the students will be able to:
- Understand the main principles of operational enterprise management
- Conduct full project management approach including risk analysis and cost evaluation
- Understand agile project management principles

This course contributes to the Sustainable Development Goal 9 "Industry, Innovation, and infrastructure" by explaining to the students how to optimize project resources through efficient management practices and agile methodology.

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	8 hrs	14 hrs	8 hrs	2 hrs	0 hrs

Strategic management of Sustainable enterprise [SUSTENT]

LEAD PROFESSOR(S): Yasamin ESLAMI

Requirements

Objectives

The course will focus on Strategy management and how to integrate sustainability into the strategy of an enterprise.

Course contents

The course will follow the objectives below:
1) study the concepts of Strategy and strategy management including internal and external analysis and SWOT analysis
2)Introduce the concept of sustainable development and sustainability as a general concept
3)Discover the sustainable development goals and learn their definitions, objectives, targets etc
4)Investigate the role of sustainability in an enterprise and how to integrate it into the enterprise's strategy
5)Define sustainable enterprise and enterprise sustainability

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	4	16 hrs	12 hrs	0 hrs	4 hrs	0 hrs

Cultural and Communication English [CCE2]

LEAD PROFESSOR(S): David TROYA

Requirements

Objectives

Interview techniques and communicational English:

- Understand the general concepts of interactive communication
- Build a media project
- Acquire interview techniques
- Understand the process of sourcing and checking facts and figures
- Understand issues related to plagiarism
- Create a bibliography
- Behavioral skills in an inter-cultural environment:
- Strengthen self-confidence and capacity for interaction
- Develop active listening and reformulation skills
- Develop networking skills

Course contents

Cultural and Communicational English: exercises to explore in practice the areas of culture and communication.
Media project (for example: prepare, conduct and promote interviews for a radio programme: L'Heure Centralienne (http://www.euradionantes.eu/emission/l-heure-centralienne), with the contribution of professors, PhD students, industrial partners, industry players at fairs, etc.

Course material

Written and televised press, information and digital tools, general documents business environment and company strategies. Internet conferences (Ted Talks, etc.), our own educational materials on Hippocampus (Moodle).

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

Spanish Language [ESP2]

LEAD PROFESSOR(S): Marta HERRERA

Requirements

Objectives

For beginners:
Practice and reinforcement of the five skills (oral and written expression and comprehension as well as interaction)
Acquisition of vocabulary and linguistic structures
Be able to talk about yourself and those around you
Be able to express oneself during daily activities
Know how to give your opinion

For advanced students:
Practice and reinforcement of the five skills (oral and written expression and comprehension as well as interaction)
Acquisition of specialised vocabulary
Be able to understand the essential content of concrete or abstract subjects including a technical discussion
Be able to communicate spontaneously and fluently
Be able to express oneself in a clear and detailed manner, to express an opinion on a topical subject

Course contents

For beginners:
Personal environment (introduce yourself, express yourself, your tastes, your character, your hobbies, etc.), your surroundings (friends, family, location, climate), your interests (sports, leisure)
Present tense (regular and irregular)
Language patterns to express habit, obligation, "gustar" and its equivalents,
Possessive adjectives
Differences between "es", "está", "hay"
Use of "por" and "para"
Adverbs and frequency patterns
Numeral adjectives

For advanced students:
Knowledge of the Hispanic world (economic, technical, cultural and social environment)
Present tense (regular and irregular)
Imperative
Past tenses
Direct / indirect style
Future tense
Conditional tense
Present and past subjunctive moods

Course material

Preparation manuals, our own tailor-made documents, written and internet press, general civilization documents, digital tools

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
Spanish	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

Master Programme - Industrial Engineering - Smart and Connected Enterprise
YEAR 1 - Spring Semester

French Language [FLE2]

LEAD PROFESSOR(S): Silvia ERTL

Requirements

N/A

Objectives

The objective is to familiarize the learner with the French language and French culture through an entertaining task-based communicative language teaching, focused on speaking combined with:

- Phonetics
- Self-correcting exercises on our learning platform
- Learning Lab activities
- Project work
- Tutoring

Course objectives include the acquisition and reinforcement of vocabulary, syntax, and pronunciation by both traditional means and through the use of digital resources.
Students will learn general French, develop language skills of oral and written comprehension and expression.

After completing this course (32 hours + personal work), the students will be able to communicate in spoken and written French, in a simple, but clear manner, on familiar topics in the context of study, hobbies etc. Another important goal of this course is to introduce the student to French culture. At the end of the course (2 semesters), complete beginners can achieve an A1 level and some aspects of the A2 of The Common European Framework of Reference for Languages. More advanced students may aim for B1/B2 levels.

Course contents

Full range of practical communication language exercises: reading comprehension, listening comprehension, written expression, oral expression.

Learners will be able to use the foreign language in a simple way for the following purposes:

1. Giving and obtaining factual information:
- personal information (e.g. name, address, place of origin, date of birth, education, occupation)
- non-personal information (e.g. about places and how to get there, time of day, various facilities and services, rules and regulations, opening hours, where and what to eat, etc.)

2. Establishing and maintaining social and professional contacts, particularly:
- meeting people and making acquaintances
- extending invitations and reacting to being invited
- proposing/arranging a course of action
- exchanging information, views, feelings, wishes, concerning matters of common interest, particularly those relating to personal life and circumstances, living conditions and environment, educational/occupational activities and interests, leisure activities and social life

3. Carrying out certain transactions:
- making arrangements (planning, tickets, reservations, etc.) for travel, accommodation, appointments, leisure activities
- making purchases

- ordering food and drink

Course material

Preparation manuals, our own tailor-made documents, written and televised press, internet, general civilization documents, digital tools, our own educational materials on Hippocampus (Moodle).

Assessment

Individual assessment: EVI 1 (coefficient 1.0)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	2	0 hrs	48 hrs	0 hrs	0 hrs	0 hrs