



# SEMESTER 9

## PROFESSIONAL ENGINEERING MODULES

PROGRAMME  
2020-2021



<b>MSM - PROFESSIONS 2020-2021</b>	<b>5</b>
<b>Ingénieur Éco-Conception et Innovation</b>	<b>6</b>
Advanced design processes	7
Design and technology choices	9
First Design of Innovative Products	10
Modern design tools	8
<b>Ingénieur Consultant</b>	<b>12</b>
Become a Consultant.	15
Consulting Project Management	14
The fundamentals	13
<b>Ingénieur en Excellence Organisationnelle (Lean Supply Chain)</b>	<b>16</b>
Base du Management des Opérations	17
Basiques de la SC : Prévisions, MRP, Achats, SI	19
Lean Management	18
Logistique physique	20
Participation	22
Projet Intégratif	21
<b>Ingénieur Management des risques industriels et environnementaux</b>	<b>23</b>
<b>Ingénieur Recherche Innovation et Développement</b>	<b>28</b>
Innovative Design and Creativity	30
Philosophy, Sciences and Society	31
Research-Project Management	29
<b>Ingénieur Startup &amp; Business Developer</b>	<b>32</b>
Business creation project	38
Business model	34
Design Thinking	33
Finance	36
Markets and stakeholders	35
Negotiation and communication	37

**MOM - PROFESSIONAL FIELDS OF APPLICATION 2020-2021** ..... **39**

Business intelligence and industrial property ..... **43**  
Business Law ..... **44**  
Engineering Systems ..... **40**  
Environmental Hazards ..... **46**  
Industrial Enterprises management ..... **42**  
Quality Management ..... **41**

## SEMESTER 9 AT THE ECOLE CENTRALE DE LYON

In S9, students follow:

- ◇ the *UE métier* (September-November)
- ◇ the *UE secteur* (January-March)
- ◇ the *UE Module « ouvert »* (October-December)
- ◇ the *UE langue*.

### The UE métier (professions teaching unit)

#### The MSM (92h +30h project)

Student choose from one engineer profession among the 6 following:

- ◇ *ICO - Ingénieur Eco-Conception et Innovation* (Eco-Design and Innovation)
- ◇ *ICS - Ingénieur Consultant* (Consulting)
- ◇ *IEO - Ingénieur en Excellence Organisationnelle* (Organizational Excellence and Lean Supply Chain)
- ◇ *IMR - Ingénieur Management des risques industriels et environnementaux* (Technological and Environmental Risks Management)
- ◇ *IRD - Ingénieur Recherche Innovation et Développement* (Research and Development)
- ◇ *ISBD - Ingénieur Startup et Business Developer* (Startup and Business Developer)

The score of MSM is calculated from the weighted averages of the training actions followed in each module.

#### The MOM (28h)

In addition to this specialisation, students choose two training actions from seven *modules ouverts métiers* (MOM - professional fields of application):

Slot 1	
Fridays 8:00-10:00	
MOM 1.1	Engineering Systems
MOM 2.1	Industrial Enterprises management
MOM 3.1	Business Law
Slot 2	
Fridays 10:15-12:15	
MOM 1.2	Quality Management
MOM 2.2	Business intelligence and industrial property
MOM 3.2	Human resources and organisation management
MOM 4.2	Environmental Hazards

The score of the MOM is equal to the average of the two MOM scores.

#### Assessment of the *UE métier*

The UE rating is the weighted sum of the MSM (80%) and MOM (20%). The UE is validated if the UE average is higher than 10 **and** if the score of each training action within each module is higher than 10.

# **PROFESSIONS (MSM) 2020-2021**



## **Introduction**

The design of products corresponds to the synergy of three complementary scientific fields:

- the organizational sciences associated with concepts and the implementation of a systemic approach,
- engineering sciences associated with models describing the behavior of matter in a wide disciplinary field,
- the mathematical sciences associated with analysis and optimization tools.

These three fields of science are taught in engineering schools like the ECL and the educational objective of the "métier" is to present the students their articulation and their implementation in an industrial context. In line with the evolution of the design profession, the product-process link will be presented in the context of two sectors integrating the three science Engineering covering all hardware products: Civil Engineering, Mechanical Engineering and Electrical Engineering. The major societal issues are tackled, namely, ecology by introducing the notions of recyclability and gray energy, and innovation by presenting the strategies capable of ensuring the success of new products.

## **Departments/Laboratories**

MSGMGC/LTDS

## **Programme**

- ICo msm 3.1 - Advanced Design Processes
- ICo msm 3.2 - Modern design tools
- ICo msm 3.3 - Design and technological choices
- ICo msm 3.4 - ICo Project
- ICo msm 3.5 - Conferences

## **Learning Outcomes**

- ◇ Knowledge of engineering systems and consideration of modern digital mock-up and co-design
- ◇ Ability to integrate ecological constraints in the design of innovative products
- ◇ Multiphysical approach of the products
- ◇ Initiation to industrial design.
- ◇ Apply creative methods in the pre-project phase

## **Employment Sectors**


The design business covers a very wide range of activities in design offices. In addition, the concepts highlighted in the lessons are essential for introducing innovation into projects, mastering product quality and end-of-life recyclability. The industrial sector involved is very large, encompassing Civil Engineering, Transportation, Energy Production and Health.

## **Assessment**

Each msm gives rise to a note.



Lecturer(s) : Olivier Dessombz

| Lectures: 20 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

### Objectives

To provide future designers with a panel of industrial methods of shape optimization for mechanical parts under dynamic criteria. Awareness of sustainable development issues and the ecodesign approach. The purpose of setting the context is to re-anchor the student engineer in a societal reality. From examples to integrate concepts and put them into practice. Through creative exercises, learn to develop the ability to project to future scenarios.

**Keywords:** Optimization, Meta-Heuristics, Meta-models, Uncertainties, Iso-geometry; Eco-design, circular economy, environmental and social impacts, multi-criteria analysis, sustainable development objective (SDG), sustainable development, SAR

#### Programme

- Robust approaches to shape optimization of mechanical parts.
- From the planet to products:
  - Approach to sustainable development, corporate social responsibility.
  - Limits of resources.
  - Eco-systemic services, biomimicry.
  - The challenge of sustainable development, the social responsibility of organizations, the environmental, social and societal dimension.
  - The stakes of eco-design in your design strategy.
  - Sustainable development, environmental impacts, eco-design, life cycle ...
  - Define the functional unit base of any Life Cycle Analysis (LCA).
  - Methodology of eco-design and implementation of an industrial project.

#### Learning Outcomes

- ◇ To know the industrial approaches of optimization of form for mechanical parts under dynamic criteria.
- ◇ Being able to integrate environmental and social criteria into the design process.
- ◇ Understanding of social, environmental, planetary and local issues.
- ◇ Create new paradigms, innovate, question the existing.

#### Autonomous Work

**Objectifs :** As a result of the course understand a recent article exposing a breakthrough in the methods presented. Implement the content.

**Méthodes :** By group read, analyze, synthesize a recent article exposing an advance in the methods presented in class. Creativity tools: methods of distance, reconciliation, projection ... Search and analysis of documents.

#### Core Texts

JAN SOKOLOWSKI. *Introduction to Shape Optimization Shape Sensitivity Analysis*. Editeur1, 1992.

FUAD LUKE. *Eco-design handbook Alastair*. Thames & Hudson, 2005.

VANESSA BATUT, FRED CAUSSE. *Design responsable*. La Martinière Styles, 2010.

#### Assessment

Evaluation of the summary of the article.




## AF ICo 3.2

*Outils modernes de conception*

### MODERN DESIGN TOOLS

Lecturer(s) : Olivier DESSOMBZ

| Lectures: 12 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 4 h | Project: 0 h | Language:  |

### Objectives

Show what digital simulation is for and why is it becoming more important. Remove the reflex: just use the tool. How to check a model and validate a result.

**Keywords:** Finite elements, virtual and augmented reality, numerical simulation.

#### Learning Outcomes

- ◇ Make engineers able to analyze the physical behavior of structures and manufacturing processes.
- ◇ transform school knowledge into useful knowledge for the industrialist.

#### Core Texts

JEAN-LOUIS BATOZ, GOURI DHATT. *Modélisation des structures par éléments finis*. HERMES, 1990.

#### Assessment


A dozen questions half of which are in the form of multiple choice questions





**DESIGN AND TECHNOLOGY CHOICES**

Lecturer(s) : Olivier Dessombz

| Lectures: 26 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 4 h | Project: 0 h | Language:  |

**Objectives**

.....  
This course deals with the implementation and expertise of numerical and experimental methods applied to the implementation and optimization of control strategies for the stabilization and isolation of dynamic systems. The sector courses (Civil Engineering or Electro-mechanics) given by specialists in the field allow to deepen knowledge in these fields.

**Keywords:** Structural dynamics, vibration control, vibratory isolation, smart structures, piezoelectric, shape memory alloy, MEMS. Civil engineering, Electro-mechanical engineering, Electronics  
.....

**Learning Outcomes**

- ◇ Modeling of coupled multiphysics systems.
- ◇ Development of an appropriate formulation for the analysis and optimization of the control problem.
- ◇ Discretized system control: LQG, DVF, IFF, Active Isolation.

**Core Texts**

ANDRÉ PREUMONT. *Vibration Control of Active Structures: An Introduction*. Springer International Publishing, 2018.

PHILIPPE DE LARMINAT. *Automatique appliquée*. HERMES SCIENCE PUBLICATIONS, 1996.

H.J. ZIMMERMANN. *Fuzzy set theory and its applications*. Springer International Publishing, 2010.



**Assessment**

MCQ



## FIRST DESIGN OF INNOVATIVE PRODUCTS

Lecturer(s) : Louis JEZEQUEL

| Lectures: 0 h | PC: 8 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:   |

### Objectives

Imagine innovative products using a process of "Design thinking" and check their feasibility in a pre-design phase. Lay the foundations of a business model with an entrepreneurial vision.

**Keywords:** Innovation, design, entrepreneurship

#### Programme


- Creative session for the definition of innovative products
- Competition analysis
- Functional analysis
- Pre-conception
- Construction of a business model

#### Assessment

Defense



**Lecturer(s) : Olivier Dessombz**

| Lectures: 0 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:   |

**Objectives**

Present by actors of the industrial world the application of the methods and concepts taught to concrete cases.

**Keywords:** eco-design

**Programme**

- Eco-design and digital simulation
- Architecture and engineering



## **Introduction**

## **Departments/Laboratories**

CLES

## **Programme**

## **Learning Outcomes**

- ◇
- ◇
- ◇
- ◇
- ◇

## **Employment Sectors**

## **Requirements**

## **Assessment**




## AF ICs 3.01

*Les Fondamentaux*

### **THE FUNDAMENTALS**

#### **Lecturer(s) :**

| Lectures: 4 h | PC: 19 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

#### **Objectives**

---

#### **Keywords:**

---




## AF ICs 3.02

*Gestion de projet, techniques financières et techniques de communication*

### **CONSULTING PROJECT MANAGEMENT**

#### **Lecturer(s) :**

| Lectures: 6 h | PC: 27 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

#### **Objectives**

---

#### **Keywords:**

---




## AF ICs 3.03

*Devenir Consultant*

### **BECOME A CONSULTANT.**

#### **Lecturer(s) :**

| Lectures: 22 h | PC: 12 h | PW: 0 h | Autonomy: 0 h | Study: 8 h | Project: 0 h | Language:  |

#### **Objectives**

---

#### **Keywords:**

---



## **Introduction**

Train engineers capable of organizing, of improving and of piloting systems of production or Supply Chain, with an objective of performance and the customer satisfaction by the control of the quality, the costs and the deadlines.

The objective of this training is to develop the capacities of the student in:

- Understand the strategic stakes in Supply Chain and in organizations
- Understand the physical flows, the flows of information, as well as the financial flows
- Analyze, understand and reorganize a process of production or of supply chain
- Acquire the techniques of management of Supply Chain and quality in production.
- Get acquainted with them Informations systems (APS, ERP, WMS, ...)
- Accompany actions of improvement and continuous progress in every types of activities of valuable production

## **Departments/Laboratories**

CLES

## **Learning Outcomes**

- ◇ organize and implement supply chain and production process
- ◇ guarantee the efficiency (customer answer) and the efficiency of a process or an organization
- ◇ Manage and motivate collaborators' team to return the successful organization
- ◇ Pilot the continuous improvement of a processus or an organization

## **Employment Sectors**

Continuous improvement manager, Supply Chain Manager, Engineer or Manager of Methods, Production Manager, Engineer or Quality controller, Engineer R/D, logistic project manager, supplying Manager, purchasing manager, planning and sequencing (order to pay) manager, project manager, Logistic consultant or Organization and Management consultant





## AF IEO msm 3.1

*Base du Management des Opérations*

### **BASE DU MANAGEMENT DES OPÉRATIONS**

**Lecturer(s) : J.P. Piacentino**

| Lectures: 20 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 10 h | Project: 0 h | Language: |

### **Objectives**

---

Keywords:

---



## AF IEO msm 3.2

*Lean Management*

### **LEAN MANAGEMENT**

**Lecturer(s) : J.P. Piacentino**

| Lectures: 12 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 12 h | Project: 0 h | Language: |

### **Objectives**

---

Keywords:

---



## AF IEO msm 3.3

*Basiques de la SC : Prévisions, MRP, Achats, SI*

### **BASQUES DE LA SC : PRÉVISIONS, MRP, ACHATS, SI**

**Lecturer(s) : J.P. Piacentino**

| Lectures: 12 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 16 h | Project: 0 h | Language: |

### **Objectives**

---

Keywords:

---



## AF IEO msm 3.4

*Logistique physique*

### **LOGISTIQUE PHYSIQUE**

**Lecturer(s) : J.P. Piacentino**

| Lectures: 5 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 5 h | Project: 0 h | Language: |

### **Objectives**

---

Keywords:

---



**AF IEO msm 3.5**

*Projet Intégratif*

## **PROJET INTÉGRATIF**

**Lecturer(s) : J.P. Piacentino**

| Lectures: 30 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language: |

### **Objectives**

---

Keywords:

---



## AF IEO msm 3.6

*Participation*

### **PARTICIPATION**

**Lecturer(s) : J.P. Piacentino**

| Lectures: 0 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language: |

### **Objectives**

---

Keywords:

---



## Profession IM

Ingénieur Management des risques industriels et environnementaux

# TECHNOLOGICAL AND ENVIRONMENTAL RISKS MANAGEMENT

Director(s): Pietro SALIZZONI

122h

## Introduction

## Departments/Laboratories

MFAE / LMFA

## Programme

## Learning Outcomes

- ◇
- ◇
- ◇
- ◇
- ◇

## Employment Sectors

## Requirements

## Assessment



## AF IMR 3.1

*Les Impact sur l'homme, l'environnement et la santé*

**Lecturer(s) : Pietro SALIZZONI, Lionel SOULHAC, Béatrice FERVERS**

| Lectures: 24 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

### **Objectives**

---

Keywords:

---





## AF IMR 3.2

*Evaluation et quantification des Risques*

**Lecturer(s) : Pietro SALIZZONI, Philippe POLOMÉ**

| Lectures: 26 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 16 h | Project: 0 h | Language:  |

### **Objectives**

---

Keywords:


---



## AF IMR 3.3

*Gestion, prévention et mitigation des risques*

**Lecturer(s) : M. MICHALLET, F. MARTINEZ**

| Lectures: 26 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

### **Objectives**

---

Keywords:

---



## AF IMR 3.4

*Projet IMR*

**Lecturer(s) : Béatrice FERVERS**

| Lectures: 0 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 50 h | Language:  |

### **Objectives**

---

Keywords:

---



### **Introduction**

The aim is to make students familiar with the specificities of the role of an engineer in Research, Innovation and Development. This is addressed in connection with present challenges such as the management of energy and water resources, big data in the general context of internationalization. Students are placed in a research-project management situation (groups of 6) and attend lectures and conferences on national and international structures that ensure research funding. They also have to simulate a project construction to answer a European-project call.

Specific lectures include Innovation, Creativity, Project management and Philosophy, organized in three specific modules. The IRD 3.1 and IRD 3.2 are the core of the course. The IRD 3.3 can be replaced by any Master-degree course (equivalence).

### **Departments/Laboratories**

MFAE

### **Programme**

IRD 3.1 Research-project management

IRD 3.2 Innovation and Creativity

IRD 3.3 Series of conferences and Philosophy (can be replaced by a master-degree course).

### **Learning Outcomes**

- ◇ Formulate a R&D problem
- ◇ Be able to prove creativity in searching a solution
- ◇ Apply the dynamics of research in the context of structures supporting research
- ◇ Be able to express a personal thought about the social consequences of innovation

### **Employment Sectors**

Any research-and-development team in large industrial groups or SME, positions in public research centers (CNRS, INRETS, INSERM...) or universities.

### **Requirements**

The only pre-requisite is the MOM 2.2 about Economic Intelligence and Data Protection

### **Assessment**

IRD 3.1 40%, IRD 3.2 30%, IRD 3.3 / master course : 30%



**RESEARCH-PROJECT MANAGEMENT**

**Lecturer(s) : Mathieu CREYSSELS**

| Lectures: 10 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 21 h | Project: 0 h | Language:  |

**Objectives**

The course is aimed at familiarizing students with specific issues in research project management such as the Go/No Go. It includes lectures and a short-term research project on a subject needing a true innovative approach. The context of the project is as far as possible multidisciplinary and a quantified solution is required.

**Keywords:** Innovation, multidisciplinary

**Programme**

Lectures on specificities of the R&D projects, Project work by groups of 5/6, for about 30 hours personal work and 12 hours with permanent staff (or external partner). The results are presented during a one-day workshop.

**Learning Outcomes**

- ◇ Be able to manage a research project
- ◇ Be able to apply an innovation/creativity strategy
- ◇ Bring quantified answers to problems (technical and financial)
- ◇ Be able to valorize a research project

**Autonomous Work**

**Objectifs :** R&D projects,  
**Méthodes :** Alternating work sessions in autonomy and in the presence of an expert.


**Assessment**

Report and oral presentation of project results (70%), individual short questionnaire (1h,30%)



## INNOVATIVE DESIGN AND CREATIVITY

Lecturer(s) : Damien CONSTANT, Michel ROGER

| Lectures: 14 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 11 h | Project: 0 h | Language:  |

### Objectives

The mechanisms of innovation in companies is exposed, in connection with the role of research and development and associated topics (business plan...).

Creativity techniques (TRIZ method) are also presented and students have to make fast applications, focused on the design of technical things.

**Keywords:** Innovation, design, TRIZ method

#### Programme

Part 1 (innovation): competitiveness of companies, methodology to establish a targeted research.  
Part 2 (creativity): concepts and tools of the TRIZ method, industrial design.

#### Learning

#### Outcomes

- ◇ Model a problem in a technical system: contradictions...
- ◇ Propose innovative solutions based on TRIZ method
- ◇ Analyze a proposed design
- ◇ Built a business plan from a short problem statement

#### Autonomous Work

**Objectifs :** Assess students' ability to give fast answers in a project environment  
**Méthodes :** Short-term project including a business plan (groups of 3 students) and oral presentation.

#### Core Texts

ALTSHULLER G. *Et soudain apparut l'inventeur : les idées de TRIZ*. Seredinski (Avraam), 2016.

#### Assessment

Presentation of short-term pproject (innovation)  
Individual test (creativity)



## AF IRD 3.3

*Structures de Recherche Nationales et Internationales – Philosophie, Sciences et Société*

### **PHILOSOPHY, SCIENCES AND SOCIETY**

**Lecturer(s) : Laure FLANDRIN, Michel ROGER**

| Lectures: 6 h | PC: 6 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

### **Objectives**

---

Keywords:

---

#### **Core Texts**

BOURG. *Du risque à la menace. Penser la catastrophe*. PUF, 2013.

CALLON, LACOUSME, BARTHE. *Agir dans un monde incertain*. Seuil, 2001.

FEENBERG. *Questioning technology*. Routledge, 1999.



## Ingénieur Startup & Business Developer **STARTUP AND BUSINESS DEVELOPER**

Director(s): Marie GOYON

122h

### **Introduction**

The program concern all students willing to create value by designing a new business, either as an entrepreneur developing her/his own startup , or as a business developer enlarging an existing company's activities portfolio.

The program relies on three main methodologies: design thinking, project management and lean startup.

The course is organized with 2 tracks: startup creation and business development, each track with specific courses.

### **Departments/Laboratories**

CLES

### **Programme**

Design Thinking : 20 h

Business model : 18 h

Markets and stakeholders : 18 h

Finance : 18 h

Negotiation and communication : 18 h

Business Creation Project (BCP) : 30 h

### **Learning Outcomes**

- ◇ Be able to design disrupting products, services or systems embedded in social and economical reality
- ◇ Be able to manage an innovative project including financial reports
- ◇ Be able to lead teams
- ◇ Be able to negotiate with customers and pitch with VC
- ◇ Be able to collect and interpret relevant data to consolodate the project

### **Employment Sectors**

Entrepreneurs, Business Developer, Innovation Manager, Manager of a Business Unit, Key Account manager, Product manager, Project manager, Consultant in Strategy, Marketing or Innovation Management

### **Requirements**

none

### **Assessment**

BCP's business plan and pitch





Lecturer(s) : Marie GOYON

| Lectures: 3 h | PC: 17 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

### Objectives

The program understands innovation and its management by a global, multidisciplinary approach linking the analytical thought and the intuitive thought. Design thinking methodology Implements a process of creativity involving user's feedbacks and usages .

Students will learn how to place a problem in a global context (economic, technical, sociological ...) and how to transform an idea into a business.

**Keywords:** Creativity, design, codesign, usages

#### Programme

What is design thinking  
The way of developing new ideas  
How to analyse ideas in a global context within economical, sociological, technological frameworks  
The way to transform new ideas into business

#### Learning Outcomes

- ◇ Be able to get an overview on a specific problem
- ◇ Be able to work with a global and transversal approach
- ◇ Develop one's creativity

#### Autonomous Work

**Objectifs :** Presentation of disruptive ideas  
**Méthodes :** Group work on specifications

#### Core Texts

TIM BROWN. *L'Esprit design: Comment le design thinking change l'entreprise et la stratégie*. Pearson Education, 2014.

MARTIN ROGER. *Design of Business: Why Design Thinking is the Next Competitive Advantage*. Harvard Business School Press, 2009.

BILL BUXTON. *Sketching User Experiences: Getting the Design Right and the Right Design..* Morgan Kaufmann Publisher, 2007.


#### Assessment

Business creation project



**BUSINESS MODEL**

Lecturer(s) : Sylvie MIRA BONNARDEL

| Lectures: 3 h | PC: 17 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

**Objectives**

- Define how to transform an idea into value creation.
- Identify which offer is going to bring to customers a value for which they will be ready to pay.
- Think how to organize the processes and the partners allowing to produce the offer
- Analyse how income can balance costs.

Keywords: business model canvas

**Programme**

Business model definition  
 How to use business model canvas to innovate  
 How to use business model canvas to manage the value creation process

**Learning Outcomes**

- ◇ Design an value proposition adapted to targeted customers
- ◇ Build the customers relationship
- ◇ Forecast revenues
- ◇ Organize the overall supply chain process

**Autonomous Work**

**Objectifs :** Design the activity's business model  
**Méthodes :** Work in group

**Core Texts**

ALEXANDER OSTERALDER. *Business Model nouvelle génération : Un guide pour visionnaires, révolutionnaires et challengers.* Pearson, 2011.

ALEXANDER OSTERALDER. *Value Proposition Design: How to Create Products and Services Customers Want.* Wiley, 2014.

PHILIPPE SILBERZAHN. *Effectuation : Les principes de l'entrepreneuriat pour tous.* Pearson, 2014.


**Assessment**

Business creation project



MARKETS AND STAKEHOLDERS

Lecturer(s) : Marie GOYON

| Lectures: 3 h | PC: 17 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

Objectives

- Identify the actors of the ecosystem and their interactions
- Understand the dynamics and the structure of relevant markets
- Understand which are the levers
- Understand stakeholders' strategies
- Identify relevant support for the project's success

Keywords: Marketing, competitive advantage, stakeholders

Programme

Stakeholders' network: how to identify the ecosystem stakeholders and their interactions; how build a useful network  
 understand the market: customers, competitors, competitive advantage and marketing strategy  
 Manage the activity creation process: strategic vision, leadership and project management

Learning Outcomes

- ◇ Market study
- ◇ Marketing strategy
- ◇ Capacity to leverage the right ecosystem's elements

Autonomous Work

Objectifs : Propose a useful map of the ecosystem  
 Méthodes : Group work

Core Texts


DALLE JM, CURIEN N, CALLON M, COHENDET P.. *Réseau et coordination*. Economica, 1999.  
 RACHEL VANIER. *Ecosystème*. Intervalles, 2017.

Assessment

Report on Business Creation project



**Lecturer(s) : Sylvie MIRA BONNARDEL**

| Lectures: 3 h | PC: 17 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

## Objectives

Understand the financial reporting of business creation or startup  
Know how to report financial forecast in the business plan  
Know how to present credible financial scenarios

**Keywords:** Profit and loss statement, cashflow statement, financial forecasts

### Programme

Financial aspects of business and startup creation  
Financial statements  
Evaluation of profit, ROCE and ROE  
Cost management

### Learning

#### Outcomes

- ◇ State financial forecasts for a business development
- ◇ Evaluate return on investment
- ◇ Evaluate financial risks

### Autonomous Work

**Objectifs :** State financial forecast for a business or startup development  
**Méthodes :** Group work

### Core Texts

CARLIER F. *Réussir son premier business plan*. Studyrama, 2015.  
VERMINEM P. *Finance d'entreprise*. Dalloz, 2016.  
BONNET C. *Finance entrepreneuriale*. Economica, 2012.


### Assessment

Report on the business / startup creation



## NEGOTIATION AND COMMUNICATION

Lecturer(s) : Sylvie MIRA BONNARDEL

| Lectures: 3 h | PC: 17 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

### Objectives

Learn negotiation methods to persuade a customer to buy.  
Learn negotiation methods to convince an investor to finance the project  
Learn how to pitch ie to present the project and convince of its potential within a very short period of time (1 to 10 minutes)

**Keywords:** Negotiation, communication, pitch

#### Programme

Communication methods  
Commercial negotiation methods  
Financial communication methods  
Pitch

#### Learning Outcomes

- ◇ Negotiation
- ◇ Communication
- ◇ Pitch

#### Autonomous Work

**Objectifs :** Work on the presentation of the business creation project  
**Méthodes :** Group work

#### Core Texts

OLIVIER FERRIER. *Les techniques de négociation efficaces*. Vuibert, 2016.  
DAN ROAM. *Convaincre en deux coups de crayon*. Broché, 2009.


#### Assessment

Business creation project presentation



**BUSINESS CREATION PROJECT**

Lecturer(s) : Marie GOYON

| Lectures: 3 h | PC: 17 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language:  |

**Objectives**

- Develop one's creativity and use it to create a new business or a startup
- Develop capacities to manage a business development project
- Learn to collect data relevant to manage the project
- Identify and organize relevant resources to manage the project
- Learn how to communicate with partners, customers or VCs

**Keywords:** Project management, business development, business plan

**Programme**

The students chose to act as business developer for a company or as an entrepreneur. They are asked to lead the project for the creation of a new and innovative activity either for a sponsoring company, or for the creation of their own start-up. The project begins with the ideation and ends in the pitch in front of investors' jury or in front of sponsoring company

**Learning Outcomes**

- ◇ Be able to transform disrupting ideas into business opportunities
- ◇ Be able to evaluate the business potentiel
- ◇ Be able to combine sociological, economical technological data
- ◇ Be able to present a sustainable business model

**Autonomous Work**

**Objectifs :** Learn how to develop an innovative business within a company or to create one's own startup  
**Méthodes :** Group work

**Core Texts**

FAYOLLE A., FILLON LJ. *Devenir entrepreneur*. PEARSON, 2006.  
COSTER M. *Entrepreneuriat*. PEARSON, 2009.

**Assessment**

Report and pitch

# **PROFESSIONAL FIELDS OF APPLICATION (MOM) 2020-2021**



## AF MOM 1.1

*Systemes d'ingenierie*

### **ENGINEERING SYSTEMS**

**Lecturer(s): Patrick SERRAFERO**

| Lectures: 14 h | PC: 0 h | PW: 0 h | Autonomy : 0 h | Study: 0 h | Project : 0 h | Language  |

### **Objectives**

---

Keywords:

---





## AF MOM 1.2

*Management de la qualité*

### QUALITY MANAGEMENT

**Lecturer(s): Pierre Bourgeoisat**

| Lectures: 14 h | PC: 0 h | PW: 0 h | Autonomy : 0 h | Study: 0 h | Project : 0 h | Language  |

### Objectives

Understand the challenges of quality in the company.

Integrate the process of quality and/or continuous progress in the professional curriculum.

Develop the basis of methods and tools used in the field of quality, to facilitate: their choice, their appropriation or the development of their use.

**Keywords:** Management, Quality, Quality management, Quality assurance, process, quality system, quality Policy, problem solving, continuous improvement, SPC, statistic process control, 5S

#### Programme

History, concepts and vocabulary. Quality in business  
Management and costs of quality and costs of non-quality  
ISO 9000 and 14000 standards-certifying bodies and accreditators  
Deploying a quality approach in a company's strategy  
Internal and external quality audit.  
Quality improvement, problem solving, introduction to lean management  
Performance indicators (KPI's)  
Standard tools (5S, 5 why, brainstorming, etc.)  
Specific tools (AMDEC, experience plan, etc.)  
Statistical tools (SPC)  
Example of specific tools: value analysis

#### Learning

#### Outcomes

- ◇ Improve all the processes
- ◇ Integrate Quality approach with the quodidy
- ◇ Understand the challenges of quality in business

#### Core Texts

M. PILLET & D. DURET,. *Qualité en production*. Editions d'Organisation, 1997.

JEAN-MARIE GOGUE,. *Management de la qualité*. Magnis nostris frequentibus, 2001.

BERNARD FROMA. *Du manuel qualité au manuel de management : l'outil stratégique*. Magnis nostris frequentibus, 2007.



## AF MOM 2.1

*Management de l'entreprise industrielle*

### **INDUSTRIAL ENTERPRISES MANAGEMENT**

**Lecturer(s): Pierre BOURGEOISAT**

| Lectures: 14 h | PC: 0 h | PW: 0 h | Autonomy : 0 h | Study: 0 h | Project : 0 h | Language  |

### **Objectives**

Discover the models of industrial companies and their evolution

Understand industrial organizations, their issues and their aspects: operational, managerial and human.

Discover production management: the value chain, the associated support functions.

**Keywords:** Industry, production, operations management, management, quality, organization, value chain, value added and non value added, support functions, ERP, planning, forecasting, MRP, supply chain, stocks, push and pull system, flows, information system

#### **Programme**

Organizations and structures

Management of the company

Supply chain:

-Purchasing (stakes and organisation)

-Forecasts (demand, market)

-Planning (MRP, articles, needs)

-Stock management (utility and limits)

-Workshop management (necessity and productivity issues)

Company documents (ranges, nomenclature, quality, procedures, etc.)

Quality and process improvement

#### **Learning Outcomes**

◇ Understand the industrial organizations in which the student will work.

◇ Identify the role of each function in a company

◇ Be in the value chain of the company

#### **Core Texts**

ALAIN COURTOIS, MAURICE PILLET, CHANTAL MARTIN BON. *Gestion de production*. Eyrolles.

GEORGES JAVEL. *Organisation et Gestion de la production*. Dunod.

RANÇOIS BLONDEL. *Gestion de la production*. Magnis nostris frequentibus.



## AF MOM 2.2

*Intelligence économique et propriété industrielle*

### **BUSINESS INTELLIGENCE AND INDUSTRIAL PROPERTY**

**Lecturer(s): Sylvie MIRA BONNARDEL**

| Lectures: 14 h | PC: 0 h | PW: 0 h | Autonomy : 0 h | Study: 0 h | Project : 0 h | Language  |

### **Objectives**

Understand how to collect, handle, spread the relevant information with business intelligence and how to protect knowledge and know how. Understand the mechanisms of the industrial property (patent, marks, models and copyright)

**Keywords:** Strategic intelligence, intellectual and industrial property

#### **Programme**

Intellectual property  
Strategic intelligence  
Information systems security  
Software law

#### **Learning Outcomes**

- ◇ Know how to protect intellectual property
- ◇ Understand what is on stake with information protection
- ◇ Understand how to identify weak signals

#### **Core Texts**

LORHO T.. *Profession caméléon - De la DGSE à l'intelligence économique*. FAYARD, 2015.  
HARBULOT C;. *Manuel d'intelligence économique*. PUF, 2015.  
POLLAUD-DULIAN F.. *La propriété industrielle - Propriété intellectuelle*. ECONOMICA, 2010.

#### **Assessment**

Case study



## AF MOM 3.1

*Droit de l'entreprise*

### **BUSINESS LAW**

**Lecturer(s): Sophie DEL PUPPO, Sylvie MIRA BONNARDEL**

| Lectures: 14 h | PC: 0 h | PW: 0 h | Autonomy : 0 h | Study: 0 h | Project : 0 h | Language  |

### **Objectives**

Understand the basics of business law

**Keywords:** Business law, social law

#### **Programme**

Business law  
Tax law  
Social law

#### **Learning Outcomes**

- ◇ Understand the company's legal context
  - ◇ Understand basic concepts of business law
  - ◇ Be able to spot the legal points in a business contrat
- Be able to understand the legal points of a business contratc and to identify relevant solutions

#### **Autonomous Work**

Group work on case study

#### **Core Texts**

BRAUD A.. *L'essentiel du droit commercial et des affaires*. GALINEAU, 2014.  
GRANDGUILLOT D.. *Droit social*. GALINEAU, 2014.  
PAPIN R.. *La création d'entreprise : Création, reprise, développement*. DUNOD, 2015.

#### **Assessment**

Case study



## AF MOM 3.2

*Management des ressources humaines et des organisations*

**Lecturer(s): Philippe THIMONIER**

| Lectures: 14 h | PC: 0 h | PW: 0 h | Autonomy : 0 h | Study: 0 h | Project : 0 h | Language  |

### Objectives

Understand the key issues of human resource management within organizations

Knowledge of key human resource management processes

Understanding the basic skills of team management

**Keywords:** Management, Motivation, Performance, Recruitment, Training, Evaluation, Mobility, GPEC, Remuneration, Social Dialogue, Change, Psychosocial Risks

#### Programme

Human resources management: principle of shared responsibility :

The strategic dimension

The management dimension: the major processes of human resources management

The hierarchical dimension: basic skills to manage a team

Two special cases:

Support for change

Psychosocial risk

#### Learning Outcomes

◇ Understand the importance of the human dimension in the success of a project

◇ Know the different human resource management processes and be able to analyze their impact on motivation and performance

◇ Implement the basic skills of a team leader: listening, communicating, delegating, reporting, evaluating ...

◇ Identify the main psycho-social risks

#### Core Texts

GRUPEMENT D'AUTEURS SOUS LA DIRECTION DE C.H. BES. *RH au quotidien*. Dunod, 2015.

ELINE NICOLAS. *Gestion des ressources humaines*. Dunod, 2014.

#### Assessment

Test (Multiple choice questions+case study) + active participation (10%)



## ENVIRONMENTAL HAZARDS

Lecturer(s): Richard PERKINS, Pietro SALIZZONI

| Lectures: 14 h | PC: 0 h | PW: 0 h | Autonomy : 0 h | Study: 0 h | Project : 0 h | Language  |

### Objectives

Between 1994 and 2013 natural disasters such as flooding, drought, hurricanes, tsunamis, earthquakes and volcanic eruptions claimed more than 600 000 lives, affected the lives of more than 3 billion people and caused economic losses exceeding \$2 billion. Extreme natural events are often at the origin of technological disasters, as, for example, in the case of the tsunami which led to the failure of the nuclear plant at Fukushima. And climate change is likely to increase both the frequency and the intensity of extreme events.

The aim of this course is to present the main classes of natural hazards, together with the appropriate methods of prevention, prediction and protection, where these exist.

**Keywords:** Natural hazards, risk, catastrophe, prevention, safety, tectonics, earthquake, volcano, tsunami, landslide, lahar, avalanche, flooding, dam, hurricane

#### Programme

Definition of risk  
Types of hazard, their geographic distribution, their consequences – notions of frequency, intensity and vulnerability  
Natural hazards  
Tectonic hazards (volcanoes, earthquakes, landslides, avalanches...)  
Meteorological and hydrological hazards (storms, hurricanes, flooding, tsunamis, dam collapse...)

Technological risks, and the different techniques used to model and evaluate risk are presented in the Modules Spécifiques of the Métier Ingénieur Management des Risques Industriels et Environnementaux.

This course is a module of the Master Risques et Environnement.

#### Learning Outcomes

- ◇ At the end of this course, the student should be able to identify the different natural hazards to which a site is exposed
- ◇ Students should be aware of the orders of magnitude associated with different events
- ◇ At the end of this course, the student should be aware of the main principles and components of French legislation concerning natural and technological risks
- ◇ At the end of this course, the student should be able to define the main components of a Plan de Prévention des Risques

#### Core Texts

SMITH, K. & PETLEY, D.N.. *Environmental Hazards: Assessing Risk and Reducing Disaster*. Routledge, 2009.

CHILES, J.R.. *Inviting Disaster: Lessons from the Edge of Technology*. Harper, 2002.

BEDFORD, T & COOKE, R.. *Probabilistic Risk Analysis: Foundations and Methods*. Cambridge Univ. Press, 2001.

#### Assessment

Knowledge (70%) Multiple choice exam on course material, Skills (30%) Literature review on some aspect of the course



**Ecole Centrale de Lyon**  
36, avenue Guy de Collongue  
69130 Ecully  
+33 (0)4 72 18 60 00

[www.ec-lyon.fr](http://www.ec-lyon.fr)

L'École Centrale de Lyon est une École du groupe des Écoles Centrale.



@CentraleLyon