PROGRAMME

SEMESTER 9
Professional Engineering Modules
Professions 2019-2020
Professional Fields of Application 2019-2020

ÉCOLE CENTRALE LYON
## Summary

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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):

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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.
Courses Semester 9

MSM - Professions 2019-2020
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
MSGMG/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 - Design Offices
ICo msm 3.6 - 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.

Requirements

Assessment
Each msm gives rise to a note.
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


Assessment

Evaluation of the summary of the article.
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. We deal with all the physical problems that can arise: they are described by 5 essential equations which we need (for some) to revive the memory.

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

Programme

1. INTRODUCTION
Study desk context, Problems to be solved, What is a model. Academic point of view, Industrial point of view. Some methods of resolution. Importance of finite elements. The need for multiphysics simulation
2. HISTORY
Numerical simulation through the ages. Numerical simulation and real tests
3. CODES
4. TRAINING
5. THE ACTORS
6. NOTIONS & PROBLEMS
Study of some pathological problems. Examples: refinement, calculation of constraints in mechanics ...
7. APPLICATIONS
Some multiphysical simulation videos asking each question: why, how?
8. THE CHALLENGES
What should we expect (to do better) in the future?
9. CONCLUSIONS

Learning Outcomes

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

Autonomous Work

Objectifs : Bibliographic studies
Méthodes : During the presentation, there are a number of questions, to know what they know and to convey key messages.

Core Texts


Assessment

A dozen questions half of which are in the form of multiple choice questions
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 and the realization of micro-robots. A series of applications to micro-robotics allows to introduce the peculiarities of control in the micro world where it is necessary to change the paradigm in taking into account the efforts and constraints applied. Learning the basic concepts is facilitated by the provision of a written document, complete to enter the technical details of the strategies discussed.

Keywords: Structural dynamics, vibration control, vibratory isolation, smart structures, piezoelectric, shape memory alloy, MEMS.

Programme

Introduction
Classical Automation Tools
Some Actuators and Sensors used for Structural Control
Classical Collocated Control
Isolation strategies
Microrobotique's applications

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.
◊ Taking into account the constraints related to the micro world and design of MEMS.

Autonomous Work

Objectifs : Allow the student to understand the modeling, optimization and expertise of the dynamics of a mechatronic system.

Méthodes : General course: element of automatic, transducers, active stabilization, active insulation ... Exercises of applications and design. Reading of course documents and assessment via a multiple choice quiz.

Core Texts


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


Assessment

MCQ
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
Lecturer(s) : Olivier DESSOMBZ

| Lectures: 0 h | PC: 0 h | PW: 0 h | Autonomy: 0 h | Study: 28 h | Project: 0 h | Language:  |

### Objectives

DYNAMIC CONTROL OF BUILDINGS: optimization of an anti-vibratory system for buildings

**Keywords:** Generalized coordinates, state representation, modeling, simulation; uncertainties - design - specifications - optimizations - random - stochastic - intervals

### Learning Outcomes

- Know the major methods of taking into account uncertainties in mechanical systems
- Optimize a TMD system (tuned mass damper)

### Assessment

Rating of the report of BE
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, architecture, electric cars

Programme

- Eco-design and digital simulation
- Design of electric cars
- Architecture and engineering
Introduction

Departments/Laboratories
CLEs
Les Fondamentaux
The fundamentals

Lecturer(s) : Laure Flandrin

| Lectures: 4 h | PC: 19 h | PW: 0 h | Autonomy: 0 h | Study: 0 h | Project: 0 h | Language: |
AF ICs 3.02

Gestion de projet, techniques financières et techniques de communication
Consulting Project Management

Lecturer(s) : Laure Flandrin

| 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) : Laure Flandrin**

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

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## Objectives

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## Keywords:

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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 Information systems (APS, ERP, WMS, ...)
- Accompany actions of improvement and continuous progress in every types of activities of valuable production

Departments/Laboratories
CLES

Programme

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
Objectives:

Keywords:
Lean Management

Objectives

Keywords:
Basiques 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:
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

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:
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:
Introduction

Departments/Laboratories

MFAE / LMFA
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:
## Objectives

**Keywords:**

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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: 🇫🇷
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:

Learning Outcomes

◊ Se familiariser avec les différents pièges de la décision
◊ Améliorer la prise de décision et Comprendre l'architecture de choix
◊ Initiation aux théories de la décision dans les environnements incertains et risqués
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) are 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%
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, multidisciplinarity

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%)
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
◊ Build 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


Assessment

Presentation of short-term project (innovation)
Individual test (creativity)
Lecturer(s): Laure FLANDRIN, Michel ROGER

Objectives

Keywords:

Core Texts

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 consolidate 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
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


Assessment

- Business creation project
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

Assessment
Business creation project
Marchés et Réseau d’acteurs
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


Assessment

Report on Business Creation project
**AF ISBD 3.4**

*Reporting financier*

*Finance*

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

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

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**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

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**Programme**

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

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**Learning Outcomes**

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

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**Autonomous Work**

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

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**Core Texts**

- **Carlier F.** *Réussir son premier business plan.* Studyrama, 2015.

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**Assessment**

Report on the business / startup creation
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


Assessment

Business creation project presentation
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 potential
◊ 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

COSTER M. Entrepreneuriat. PEARSON, 2009.

Assessment

Report and pitch
MOM - Professional Fields of Application 2019-2020
AF MOM 1.1

Systèmes d'ingénierie
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: fr |

Objectives

Keywords:
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 quotidie
◊ Understand the challenges of quality in business

Core Texts

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.)

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 PILLE, CHANTAL MARTIN BON. Gestion de production. Eyrolles.
RANÇOIS BLONDEL. Gestion de la production.
**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

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**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

**Autonomous Work**

- Case studies  
- Group work

**Core Texts**


**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 contrat and to identify relevant solutions

Autonomous Work

Group work on case study

Core Texts

Grandguillot D. Droit social. GALINEAU, 2014.

Assessment

Case study
AF MOM 3.2

Management des ressources humaines et des organisations
Human resources and organization management

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


Assessment

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

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