

## First Year – Semester 1

<b>Risks, Safety, Dangers and Hazard Management. (cyndinics)</b>	<b>6 cr</b>
Risk news, risk culture, methods and tools to manage, evaluate and control the different manifestations of risk. The stages of risk management, risk classification, the role of predictive analysis, methods and tools of risk management, project risks, economic risks, technological risks and the risks inherent to an innovation project in design or implementation, quantification of risks, Preliminary Risk Analysis (APR), Quantitative Risk Analysis (QRA). Methodological Approaches, Qualitative and Quantitative Methods, Deductive and Inductive Methods, Static and Dynamic Methods, Specificities of Technological Risk, Natural Hazards and Technological Risks, Disaster Theory, Risk Areas, Classification of Zones, Regulations and Legal Follow-up, Major Technological Risk, and minor criminal risk, culture of technological risks, autopsy of disasters, partner organizations in the prevention of technological risks.	
<b>Basic science lessons</b>	<b>6 cr.</b>
Mathematics for the Engineer, Modeling of the Uncertain, Foundations of Stochastic Modeling, Probabilistic Methods and Statistical Methods, Classical Stochastic Processes and Fields, Markov Processes, Second Order Processes, Diffusion Processes, Stability of Linear Dynamical Systems , Brownian motion, concept of statistical control, process under control, deregulated process, types of control, experimental designs, robust solutions, numerical simulation.	
<b>Project and quality Management (2+2+2) cr.</b>	
<b>Project Management</b>	<b>2 cr.</b>
Received Ideas, definitions, standard course, management and management, parameters, modeling, classes of projects, actors. Organization by project, functional organization, matrix organization, project manager, project team, life of a project, management of men, deadlines, costs, contracts, information, risks and quality. The specifications (CdC, CdCF). The project structuring methodology, The project management art, complexity management, the systemic approach, project plan, strategic plan, tactical plan, the OTP (Organization chart of the Project tasks), the management plan and planning, project risk, capitalization of experience, cost control structuring of budget lines, project information system.	
<b>Functional Analysis (FA) and Value Analysis (VA)</b>	<b>2 cr.</b>
Definitions of FA and VA, Definitions (Need, System, Product, Function, User), External Functional Analysis, Internal Functional Analysis, FA&VA Objectives, Characterization of Functions, Service Function, Technical Function, Constraint, Evaluation Criteria of a function, level of a criterion of appreciation, flexibility of a level, class of flexibility, limit of acceptance, exchange rate, life cycle, complexity, the evolution of a system, Functional Loads, Design for an objective cost, methods (APTE, SADT, ...), cost and price, total cost, parametric cost, value analysis (AV), definition of the notion of "value", work plan of the value analysis, VA phases (action orientation, information retrieval, function and cost analysis, validation of needs and objectives, search for ideas and possible solutions, study and evaluation of solutions, expected results ionnel, presentation of solutions, decision, implementation, monitoring, assessment), methods and tools of value analysis, value analysis in the industrial context, control of value	
<b>Quality management</b>	<b>2 cr.</b>
Implantation of a quality culture in a professional environment (large and small companies or industries, the field of the service and others), implementation of quality approaches, methods and tools of the quality, management of the quality of a process, a entity, product, quality and quality assurance approaches, harmonization of total quality management with or without standards, steps in the process of implementing a quality strategy, the need and the detailed requirements of a standard and self-diagnosis, the construction of the different components of a quality system, industrial experiences of quality management, audit and quality certification, Approach and tools of internal and external audit, organizations and steps to obtain a certification, the objectives of a certification, the follow-up of a certification, the audit and the certification to replace the quality approach in the objectives of the company, the national and international standards, the standards of leading companies in their fields, quality industrial practices.	

<b>Numerical and Statistical methods in HSE (2+2+2)cr.</b>	
<b>Data and knowledge Management</b>	<b>2 cr.</b>
Data analysis, Statistics, data simulation, Overview of data types for an HSE system, Statistical modeling and probabilistic, Use of databases for security and reliability, Multidimensional Data Analysis.	
<b>Advanced numerical optimization methods</b>	<b>2 cr.</b>
Sub-Constrained Optimization Methods, Operational Research in Multi-criteria Optimization, Graph Theory or Linear Programming, Optimal Value Path Problems, Simplex Method, Heuristic and Meta-Heuristic Methods, Distributed Optimization, Stochastic Process Optimization, Modern Methods finite element optimization, mathematical optimization methods and algorithms in discrete space, Structural optimization, sensitivity analysis, optimization methods using optimal control theory, optimization by: fuzzy logic, neural networks and genetic algorithms.	
<b>Applied Computing and Multimedia</b>	<b>2 cr.</b>
Practice scientific programming in several languages. Practice different tools for the realization of multimedia products. Methods for designing groupware applications. Messaging and computer-mediated communication. Realization of multimedia products integrating the following dimensions: scientific, calculation, exploitation and remote follow-up.	
<b>Environmental Management, Wastewater Prevention and Treatment (2+2+2) cr.</b>	
<b>Environmental Risk Management</b>	<b>2 cr.</b>
Apply the environmental risk management approach. Risk analysis methods. Identification of risks. Assessment of consequences. Inventory of risk reduction scenarios and identification of the most appropriate, taking into account existing constraints and available sources of information. Action plan and emergency plan. Risk communication, applicable laws and regulations.	
<b>Integrated Management Systems, Standardization, Certification, QHSE Audits</b>	<b>2 cr.</b>
Apply a process of setting up an environmental management system. Basic Principles of an Environmental Management System (EMS). Management cycles. The implementation process of an EMS. Integrated systems management. Product standards of the ISO 14000 family (eco-labeling, environmental performance, life cycle).	
<b>Residual materials management</b>	<b>2 cr.</b>
Develop a management plan for residual materials and hazardous materials. Nature and flow of residual materials (hazardous and non-hazardous), regulatory requirements and good practices, current and optimal methods for the management of hazardous and non-hazardous residual materials of domestic, industrial, commercial and institutional origin, including collection, handling, storage, labeling, transport, treatment and disposal, industrial ecology.	
<b>Research Methodology and Academic Writing</b>	<b>2 cr.</b>
Develop students' skills to conduct quality bibliographic research in the various scientific fields of training. Conduct a bibliographic synthesis on a specific subject.	

## First Year – Semester 2

### **Dependability of products, systems and processes**

**6 cr.**

The dependability components (Reliability, Maintainability, Security, Availability, Integrated Logistics Support, ...), Reliability of the systems and process of analysis of dependability, evaluation of the performance of the operational safety, evaluation methods qualitative, quantitative and mixed evaluation methods, Boolean methods, success or reliability diagrams, failure trees, probabilistic evaluation methods, failure tree construction methods, state space methods, approaches Markovian, renewal process, event trees, event graphs and Petri nets, flow diagrams, optimization of system reliability, importance factors, reliability performance allocation methods, factor human, human reliability, codes, regulations, industrial practice.

### **Labor Law, Environmental Law, Security and Business**

**6 cr.**

Public law, international law, jurisdictional systems of major influential countries, the corporate world, corporate law, corporate management, capital evolutions, industrial property, patents, contract law, contract litigation, the specificity of international contracts, economic concepts and reasoning, economic analysis, major currents of economic thought, economic circuit, markets, meeting places of economic agents, consumption, savings, capital, investment, work, employment, unemployment, growth, fluctuations, economic crises, money in all its forms, financial market and financing of the economy, management of human resources.

### **Environmental impact assessment**

**6 cr.**

Conduct impact studies: know and apply the different steps as well as the methods for impact assessment. Evaluate impact studies: verify that the studies are relevant and comply with the requirements. Relevant legislation around the world. Local and international assessment procedures. Steps of a typical file, from the point of view of both the editor and the reviewer. The usual stakeholders in environmental assessment and their various motivations. Rules of ethics of the evaluation professional. Role of the public and social aspects.

### **Environmental Impact & Sustainable Development (2+2+2) cr.**

#### **Sustainable development**

**2 cr.**

Analyze the contribution of economic tools to the management of environmental issues. Elements of economy, economic instruments of environmental management, monetary valuation of the environment, tool of decision support, economic optimum and ecological sustainability, sustainable development and environmental indicators.

#### **Ecotoxicological risk analysis**

**2 cr.**

Evaluate the eco-toxicological risk of substances in various situations. Plan an eco-toxicological evaluation, evaluate results in water, soil and air. Sources of toxic. Environmental pathways. Ecotoxicity, short-term and long-term eco-toxicological hazard, exposure to hazard and subsequent risks. The steps and the application of an eco-toxicological risk analysis, their requirements and their limits. Case Analysis

#### **Physical chemistry in environmental management**

**2 cr.**

Acquisition of the notions necessary for the implementation of the sampling-analysis-diagnosis chain in the natural, urban or industrial environment. - Acquisition of the bases of the treatment of urban and industrial effluents. - Acquisition of a mode of transversal reflection where natural processes and industrial processes of depollution overlap widely -Acquisition of the basic notions on the phenomena of dispersion of the contaminants and for the dimensioning of the works of depollution.

## **HSE Entrepreneurship**

### **Financial Management, Investment and Economic Intelligence**

**2 cr.**

Performance, stock market indicators, study of events, value creation, lobbying, corporate political strategy, economic intelligence, the BABA of economic intelligence (the day before, meeting the information needs of companies, the 5 stages of the process of watch, the different types of watch, watch device, traps to avoid, influence, defend its special interests, in the respect of the general interest, set up influence actions, international standardization and strategy of influence, economic security, secure the economic heritage, the guide of economic intelligence

### **Management of an international Project**

**2 cr.**

International economics and industrial strategies, international business law, European and international projects, financial management of international investment, diagnosis, economic intelligence, interculturality and management of trust in complex projects, studies by geographical area.

### **Business creation in the HSE domain**

**2 cr.**

Being able to create a company in HSE, undertaking and economic realities, legal, social and financial planning, financial products and insurance, financial arrangements, globalized tax management, business transfer, franchising, e-business, corporate structures in Europe and their regulations, VAT, depreciation, wages, disposals, provisions, profit and loss account, analysis of competition, definition of a general policy and strategic activities, financial market awareness, Innovation for the creation of a business : from the idea to the project Traditional business models and new models, the stages of business creation: process, constitution, accounting and management Writing business plan, development plan and cash flow plan, research of funds and control of risks related to the activity

### **Economics and finance in HSE**

**2 cr.**

Economic model for the HSE activity, cost and financing of an HSE policy, taxation, the quantification of an HSE policy, the economic and financial impact of an HSE policy, insurance in HSE.

## Second Year

<b>Industrial ergonomics</b>	
<b>ergonomics</b>	<b>6 cr.</b>
Ergonomics: definition, objectives, different currents in ergonomics: physical ergonomics (anthropometry, biomechanics, noise ...), cognitive (perception, memory,) and organizational (collaborative work, new forms of work ...), methods applied by these currents: methods, protocols, techniques and data interpretation, Articulation between these currents and the design of solutions, concrete case studies in the context of group projects.	
<b>Governance of occupational health</b>	<b>2 cr.</b>
The institutionalization of occupational risk prevention systems through an assembly of regulations, negotiations and contractualisations, territorialization and, more broadly, the determination of the relevant levels of action from the top management to the beneficiary, introduction to Public health, Impact of community building on health, health at work and sustainable management, sociology of collective action, public policies according to the specificities of the health and social sector, the environment of the institutions and the legal rules in force in the social and health field.	
<b>Prevention and treatment of pollution</b>	<b>2 cr.</b>
Analyze a problem of contamination and develop solutions for prevention, treatment or restoration. Pollution prevention, treatment and restoration. Definition of a contamination problem and technological choice appropriate to the economic, social, technical and legal contexts. Treatment of drinking water. Municipal and industrial sanitation. Sludge treatment and management. Treatment of contaminated soil. Treatment of atmospheric emissions.	
<b>Educational Projects (6+6+4) cr.</b>	
<b>Educational project in tutoring</b>	<b>6 cr. + 6 cr.</b>
Each student will work on a subject that allows him to practice several concepts of environmental management and its tools that have been the subject of courses and seminars. This work can be realized by computer, technical or documentary achievements. This pedagogical work can be defined in consultation with the student. In this case this work must be the initiation to the master project. The projects are proposed by the teaching team and validated by the coordinators of the master. There is 2 Educational Project in tutoring. One about human and sustainable development and one for other subjects in this master.	
<b>Group test project</b>	<b>4 cr.</b>
This project must be proposed by student (by team). Each team must demonstrate their skills to manage and carry out a project in HSE. Work in a multidisciplinary team. Within a multidisciplinary team, developing a service offer in response to an estimate (context, objectives, tasks, schedule, budget, deliverables) received from an organization. Management of an HSE project using indicators (budget, time spent, calendar). Management of conflict situations. Managing a relationship with a customer. Analysis of various scenarios and justification of recommendations. Presentation of the results.	
<b>Professional pre-insertion</b>	<b>24 cr.</b>
Each student will have a topic of work in business that will allow them to manage and practice the implementation of HSE approaches. The internship can be searched by the student himself. It is recommended that the subject of the internship be in the continuity of the two preprofessional projects already carried out (the Pedagogical Project in Tutoring and the Group Test Project). The projects are proposed by the companies and / or the teaching team and validated by the coordinators of the master. The internship is evaluated by a report and a defenses	
<b>Academic Writing</b>	<b>6 cr.</b>
Guide the students to write the various summary reports they must produce and in particular the end-of-studies report.	