



# **Research & development**



**INGÉNIEUR RECHERCHE INNOVATION ET DÉVELOPPEMENT**

**ENGINEER RESEARCH AND DEVELOPMENT INNOVATION**

**Lecturers:** José PENUELAS, Michel ROGER

| Lecturers : 0.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

**Objectives**

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Keywords :

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**Programme**

**Learning outcomes**

**Independent study**

Objectifs :

Méthodes :

**Core texts**

**Assessment**



## **GESTION DU PROJET DE RECHERCHE ET INTERDISCIPLINARITÉ**

### **RESEARCH-PROJECT MANAGEMENT**

**Lecturers:** José PENUELAS, Mathieu CREYSSELS

| Lecturers : 10.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 21.0 | Project : 0.0 | Language : FR

#### **Objectives**

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The objective of this course is to train students in the management of the research project and its specificities (Go / No Go). This is done by a real situation on a case study which justifies a need for innovation (evaluation of a technological modification / breakthrough, ...), in an often multidisciplinary context, both at the level of the subject but also methods. Students must provide quantified answers to the problem posed.

**Keywords :** Innovation, transversality.

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#### **Programme**

Course on project management and the specificities of R&D projects.  
Case study sessions: long case study in groups of 5/6 students.  
Mini-colloquium: presentation of case studies.

#### **Learning outcomes**

- To be able to lead a R&D project.
- Know how to implement innovation / creativity methods.
- Knowing how to quantify a response (technical gain, cost of implementation, etc.)
- To be able to defend an innovation project.

#### **Independent study**

**Objectifs :** Case study: R&D project.

**Méthodes :** Supervised case study sessions and personal work.

#### **Core texts**

#### **Assessment**

Written and oral presentation of case studies (70%), microtest on the course (30%)



## CRÉATIVITÉ, ERGONOMIE, DESIGN, INNOVATION, COMPÉTITIVITÉ

### INNOVATIVE DESIGN AND CREATIVITY

Lecturers: José PENUÉLAS, Damien CONSTANT

| Lecturers : 14.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 11.0 | Project : 0.0 | Language : FR

#### Objectives

Starting from the concept of values in the company, and the positioning of the company in the socio-economic context, the need for innovation in the company is explained; the positioning of Research and Development within the framework of an innovation strategy is underlined. The emphasis is on financing innovation. Innovation monetization and market approach strategies are built using marketing techniques, product positioning, pricing and value proposition development.

Students will be made aware of the process of creativity and put in a situation to become aware of the

**Keywords :** TRIZ, Design Thinking, C&K, innovation, marketing, strategy

#### Programme

Part 1 :

1. Strategic marketing
2. The need to innovate
3. Quantitative and financial analysis
4. R&D and innovation management
5. Build a business plan

Part 2 :

1. Different approaches to creativity. Problem solving method (TRIZ method):

#### Learning outcomes

- Modeling a problem within a technical system: Idealities, technical contradictions.
- Offer innovative solutions based on TRIZ principles.
- Analyze a design proposal.
- Establish a business plan based on a case study.

#### Independent study

**Objectifs :** Case study in innovation.

**Méthodes :** Work in groups of 3 students, oral restitution.

#### Core texts

Altshuller G., , *ET SOUDAIN APPARUT L'INVENTEUR : LES IDÉES DE TRIZ.*, Seredinski (Avraam), 2016

#### Assessment

Part 1:  
Restitution of the case study.



## STRUCTURES DE RECHERCHE NATIONALES ET INTERNATIONALES - PHILOSOPHIE, PHILOSOPHY, SCIENCES AND SOCIETY

Lecturers: José PENUÉLAS, Romain SAUZET

| Lecturers : 6.0 | TC : 6.0 | PW : 0.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

### Objectives

Research consists of confronting what is not known or what does not yet exist. We are not starting from scratch, since we already have many individual resources (pre-existing knowledge; skills; models, etc.) but also collectives (e.g. expertise, external skills).

These resources will constitute some steps of the research process, but they will not answer all the problems, especially the general problems: why do we do research? What are we trying to promote? How should we do it? On what subjects? For what objectives?

**Keywords :** Expertise, Interdisciplinarity, Innovation, Values, Progress, Big Science, Sustainable Development, Environment.

### Programme

- 4 lectures on two main themes: Interdisciplinarity & The place and role of values in science.
- 2 tutorials on case studies illustrating the two main themes: Big Science projects (Manhattan Project) and what value do we want to promote through research (transhumanism).
- A series of conferences on the means of financing research and the major challenges in terms of energy resources.

### Learning outcomes

- Develop a critic on the resources and values carried by R&D.
- Understand the characteristics of contemporary research beyond immediate projects.
- To be able to debate socio-technical controversies.
- To be able to identify the major national and European research structures.

### Independent study

**Objectifs :** This activity is not concerned with framed autonomy activities outside personal work.

**Méthodes :** This activity is not concerned with framed autonomy activities outside personal work.

### Core texts

Douglas, Heather., *SCIENCE, POLICY AND THE VALUE-FREE IDEAL*, Pittsburgh: University of Pittsburgh Press, 2009

Bedessem, Baptiste *LA LIBERTÉ DE CHERCHER. PERSPECTIVES ÉPISTÉMOLOGIQUES SUR LA GOUVERNANCE DES SCIENCES.*, Paris: Herman, 2020

Galison, Peter *MEANINGS OF SCIENTIFIC UNITY: THE LAW, THE ORCHESTRA, THE PYRAMID, QUILT, AND RING.*, *PURSUIING THE UNITY OF SCIENCE: IDEOLOGY AND SCIENTIFIC*

### Assessment

- A two-hour table assignment combining a text study and a general question about the course.
- Report on the conference cycle.



## **FORMATION MASTER**

### **MASTER'S COURSE**

#### **Lecturers:**

| Lecturers : 0.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

#### **Objectives**

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Keywords :

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#### **Programme**

#### **Learning outcomes**

#### **Independent study**

Objectifs :

Méthodes :

#### **Core texts**

#### **Assessment**