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## 4<sup>th</sup> year vocational modules

### I4-8 Presentation

### Toulouse

Icam

## 1. Innovation (INNOV) Module Specification

Note: This module should focus on experimenting and the freedom to experiment.

Module section	Subjects	Total hours	Teaching			Self study (other)
			Lessons, lectures (class or group)	Tutorials/practicals Project (group)	Individual project	
<b>Introduction</b>	<ul style="list-style-type: none"> <li>Introduction to Innovation</li> <li>Introduction to robotics</li> </ul>	6 hrs	6	-	-	-
<b>Innovation management</b> <b>Consultant in innovation</b>	<ul style="list-style-type: none"> <li>Managing an innovation project</li> <li>Patents</li> <li>Promoting innovation in a company</li> </ul>	42 hrs	12	10	6	14
<b>Creativity</b> <b>Product development engineer</b>	<ul style="list-style-type: none"> <li>Creativity techniques: ASIT method</li> <li>Applying the technique</li> </ul>	44 hrs	6	16	6	16
<b>Research</b> <b>R&amp;D engineer</b>	<ul style="list-style-type: none"> <li>The researcher's journey</li> <li>Study of the thesis process</li> </ul>	42 hrs	4	16	6	16
<b>Robotics</b> <b>New technology engineer</b>	<ul style="list-style-type: none"> <li>Vision</li> <li>Industrial data processing</li> </ul>	38 hrs	4	14	6	14
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>Protection of heritage</li> <li>Innovation forum</li> </ul>	8 hrs	4	4	-	-
<b>Evaluation</b>		4 hrs	-	-	-	-
	<b>Module total</b>	<b>184 hrs</b>	<b>36 hrs</b>	<b>60 hrs</b>	<b>24 hrs</b>	<b>60 hrs</b>

## 2. Description of the Innovation module

### 4.1. Module introduction

Module	INNOV	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/ practicals Project	Individual project	
<b>Introduction</b>	<ul style="list-style-type: none"> <li>• Introduction to innovation</li> <li>• Introduction to robotics</li> </ul>	6 hrs	6	-	-	-

➤ **This section of the module's content :**

- **Presentation of the innovation policy in general**

How do public policies promote innovation in companies? Which support systems are in place?

- **Introduction to robotics**

- ⇒ Mobile and collaborative robotics
- ⇒ Robotics in aeronautics

## 4.2. Innovation management

Module	INNOV	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/practicals Project	Individual project	
<b>Innovation management</b> <b>Consultant in innovation</b>	<ul style="list-style-type: none"> <li>Managing an innovation project</li> <li>Patents</li> <li>Promoting innovation in a company</li> </ul>	42 hrs	12	10	6	14

➤ **This section of the module's content :**

- **Innovation project planning procedure**

Presentation of the procedure to follow when planning an innovation project. Supportive organisations, people to meet, important points etc.

- **Notion of patents**

Introduction to patents and the INPI (French National Intellectual Property Institute). Understanding the role of patents in the innovation cycle. How can we use existing databases?

- **Managing an innovation project in a company**

How is innovation promoted in companies? What can be done to support innovation?

### 4.3. Creativity

Module	INNOV	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/practicals Project	Individual project	
<b>Creativity</b> <b>Product development engineer</b>	<ul style="list-style-type: none"> <li>• Creativity techniques: ASIT method</li> <li>• Applying the technique</li> </ul>	44 hrs	6	16	6	16

➤ **This section of the module's content :**

- **ASIT method training**

Discussion and feedback with a presentation on how to use the ASIT method in real cases of innovation.

- **Creativity work : expressing ideas**

Small group work researching innovative ideas. Research subjects, create ideas/solutions, validate and assess feasibility.

#### 4.4. Research

Module	INNOV	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/practicals Project	Individual project	
<b>Research R&amp;D engineer</b>	<ul style="list-style-type: none"> <li>The researcher's journey</li> <li>Study of the thesis process</li> </ul>	42 hrs	4	16	6	16

➤ This section of the module's content:

##### Presentation of the research sector

- How do you become a researcher ?
  - Definition of an industry and lab researcher
  - Three steps to becoming a researcher
- Key technologies
  - Present the national strategic options in terms of research over a 10-20 year period.
  - Present ICAM laboratories guidelines and work.

##### "From idea to result"

- Experimental approach
  - How do we go from the paper stage (the idea) to something more real and quantifiable ?
  - How can we gauge the result's reliability (uncertainty, experimental design, improvement)
- Planning an applied research project
  - Define the project's research topic
  - Create a group of partners (industrial, university etc.)
  - Design and develop new products in an industrial context
  - Evaluate (methodology) hypotheses using appropriate experiments (from plan to product)
  - Implement theoretical interpretations in relation to the results of experiments and analyses.
- State of the art
  - Bibliography (use of different sources, methodology)
  - Technology scouting
  - Considering available technology that has not been used
- Reporting results
  - Writing progress reports
  - Writing a publication

##### Laboratory/Industry relations

- Cultural issues (patents, deadlines etc.)
- Technological transfer (see SATT, IRT)

### 4.5. Robotics

Module	INNOV	Total hours	Teaching			Self study (other)
			Lessons, lectures	Tutorials/practicals Project	Individual project	
<b>Robotics</b> <b>New technology engineer</b>	<ul style="list-style-type: none"> <li>Vision</li> <li>Industrial data processing</li> </ul>	38 hrs	4	14	6	14

➤ This section of the module's content :

#### Industrial data processing

- Networks
- Vision
- Sensor
- Artificial intelligence
- Real time
- Automation, automatic control

#### Robotics

- Architecture of robotic systems (material and software)
- Process automation
- Application of robotics (robots for industries, people)

#### Man/Machine communication

- Sharing a work environment
- Ergonomics of interfaces
- Safety
- Man/machine relationship

#### 4.6. Module conclusion

Module	INNOV	Total hours	Teaching			Self study (other)
			Lessons, lectures	tutorials/practicals Project	Individual project	
<b>Conclusion</b>	<ul style="list-style-type: none"> <li>Protection of heritage</li> <li>Innovation forum</li> </ul>	8 hrs	4	4	-	-

➤ **This section of the module's content :**

- **Protection of heritage**

Lecture on **economic warfare** : How can we protect ourselves? Should we be trusting? Why should we remain vigilant?

- **Meeting designers and inventors**

Presentations from people whose professions relate to innovation (BNP, business incubator etc.) or who have been involved in a project (project leaders, new companies etc.)



#### **4.1. Presentation of the type of subject for the final project in the INNOV module**

##### **Innovation management**

- Assistance in preparing a business plan for a “new company” project
- Assistance in preparing a business plan for the Icam laboratories
- Support an inventor

##### **Innovation engineering**

- Evaluation of the potential for innovation in companies (SMEs)
- Evaluation of the potential for technology transfer between laboratories
- Design project for Icam laboratories or students

##### **Research and development**

- Project with research laboratories (internal or external): technology scouting and bibliography
- Experiments

##### **Robotics**

- Feasibility for new uses (*painting by Kuka*)
- Function development (communication, senses etc.)
- Analysis of the economic benefit of investing in robots for SMEs

### 3. Final Project

The aim of this project is for students to broaden their knowledge of a profession which they are interested in. They will thus be faced with a real issue whose subject is directly linked to the professions presented in the three thematic modules.

The subjects for this final project will be provided by the companies involved in the training program.

The schedule for the final project for the 3 thematic modules is as follows:

- A 92 hour project spread over 3 weeks
- Small groups of students work on the projects
- A final presentation before a jury and audience

#### **What the project involves :**

- Subject distribution
- Small independent group work
- Occasional support (from a full time Icam employee and/or an outsider monitoring the project)
- Project submission
- Presentation
- Feedback from company