

## PARTNERS

INSAT-INPT-ICSI leading center for education in technological risk management. The ICSI (Institute for an Industrial Safety Culture), a leading organization in industrial safety, in collaboration with the INSA of Toulouse and the INP of Toulouse coordinates this **International Master in Risk Engineering**, a 1 year post-master professional certificate accredited by the French "Conférence des Grandes Ecoles". The objective of this collaboration is to constitute a European leading cluster in the field of industrial risk management and to contribute to sustainable development of industry.

## ADMISSION POLICY

- Master 2 or equivalent degree, Master 1 with at least 3 years' professional experience
- Under certain conditions:
  - Master 1 without professional experience or lower degree with professional experience recognized by VAE (*Validation des Acquis par l'Expérience*)

## FINANCIAL SUPPORT for French candidates

- Enrollment fees may be partially covered by scholarships funded by ICSI's industrial partners
- Employed persons may benefit from a CIF (Congé Individuel de Formation) or an education plan with their company
- Unemployed persons who graduated at least 2 years ago may be supported by the Conseil Régional de Midi-Pyrénées

## SELECTION

Candidates will be selected after examination of their application form and an interview: applications can be submitted from February to September 15<sup>th</sup>

- 2 recruitment sessions starting March 15<sup>th</sup>
- Third session in September if places are still available

## ENROLLMENT FEES - 2011

- Graduates without professional experience : 8 100 €
- Unemployed persons: 8 100 €
- Employed persons : 10 500 €

Industrial partners offering scholarships.



<http://www.insa-toulouse.fr/>  
<http://www.insa-imasters.com/>



<http://www.inp-toulouse.fr/>

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Lectures  
in English

MASTERE SPECIALISE (accredited by the Conference des Grandes Ecoles)

# RISK ENGINEERING

PRINCIPLES AND INDUSTRIAL APPLICATIONS

Professional degree

- Risk identification and estimation
- Risk treatment
- Specification, design and technological implementation of safe systems
- Multidisciplinary approaches

medicine  
energy transportation  
construction agriculture  
pharmacy manufacturing

INDUSTRIES AND «GRANDES ECOLES»



TOGETHER TO MANAGE RISKS

## CONTEXT

Society is faced with two goals that seem to be contradictory:

- to take risks, for instance, to innovate to create new jobs (development of new technologies, new products, new processes, etc.), and
- to reduce potential risks to take into account societal requirements at the origin of recent regulations such as REACH.

To reconcile these objectives, risks must be controlled using sound engineering approaches that can provide justification to decision-makers and other interested parties.

Risk management tools are useful in multiple industrial sectors: transportation (aircrafts, trains, cars, etc.), health (medicines, medical devices, etc.), foods (agriculture, transformation, etc.), chemistry, energy production, manufacturing, construction and environment (natural and technological risks).

## CAREER OPPORTUNITIES

The profile of graduates will be attractive

- to top management of international firms, as they may be accountable for controlling risks ,
- to business units taking safety regulations into account (aerospace and transportation, construction, manufacturing, etc.),
- to specialized consulting and auditing firms operating for large corporations to control their risks,
- to public administrations or firms which assess the effectiveness of risk control (certification authorities, etc.).

## ORGANIZATION

### 6 months of training

- 450 h of lectures and case-studies, team work on general principles and sector-specific approaches of risk engineering

- Conferences will be given by experts from industry and consultancies in technical fields in order to establish a link between fundamental knowledge and technological applications

- 200 h industrial project

### 6 months internship in a company

The International Master can be either a specialization or a second Master degree. It may be followed either full time or part-time during two years, in order to continue a professional activity in parallel with the course.

## CURRICULUM

The curriculum aims at providing

- An overview of generic aspects of risk management. Indeed, engineers who control hazards must have a global approach as issues combine numerous aspects. This first part deals with the concept of risk, risk analysis (identification and estimation), treatment, communication and consultation as well as risk management systems. It includes models, techniques and tools used for any source of risk.

- Domain-specific means to handle actual risks. Indeed, engineers must offer concrete and realistic solutions to reach objectives. This second part deals with means (hazard identification, assessment techniques, controls and standards) that can be applied in specific domains: process safety, toxicological risks for human health, environmental risks associated with toxic products, natural and technological risks for construction, dependability of computing systems, risks associated with electromagnetic radiation, safety of electrical systems. Although it involves various scientific domains, this second part does not require deep knowledge of each domain as an introduction to useful skills will be supplied.

A large part of the lectures will be provided by professionals. Case studies will be developed by students.

## SCHEDULE

Part A -	<b>Generic knowledge</b>	
	• Risk Management (4 ECTS)	60 h
	Notion of risk and importance of its control, objectives of the tasks of a risk management process. Identification of the risks and their origins. Risk evaluation. Risk treatment Risk Management System.	
	• Risk Analysis (4 ECTS)	60 h
	Goals of risk analysis. Inductive and deductive deterministic methods for analyzing risks. Probabilistic approaches for assessing risks. Management of uncertainty. Estimation of the severity of consequences.	
	• Legal and human factors in Risk Management (4 ECTS)	60 h
	Laws and regulations. Human and organizational factors. Communication and consultation. Integrated approach.	
	• Designing for Safety (4 ECTS)	70 h
Introduction to hazards associated with the system lifecycle. Intrinsic safety. Design conformance. Ergonomics.		
Part B -	<b>Application fields</b>	
	• Risks for Humans and the Environment (4 ECTS)	50 h
	Chemical risk on environment. Chemical risks on humans. Radiation risk. Risks associated with biotechnologies.	
	• Structural and process safety (6 ECTS)	80 h
	Structural safety: introduction to risks in structural engineering. Structural reliability methods. Decision-making in structural safety and maintenance. Structural and multidisciplinary optimization under uncertainty.	
Process safety: Identification of types of risk. Estimation of effects. Prevention and protection methods. Standards and regulations.		
	• Nuclear safety (2 ECTS)	20 h
	• Project risks (2 ECTS)	20 h
Part C -	<b>Professional skills</b>	
	Professional development and skills / French language for foreigners	20 h
	Industrial project (15 ECTS)	200 h
	Internship (30 ECTS)	6 months

## TESTIMONY

### Arnaud de CHEZELLES,



**Major Projects Assistance and Control General Manager**

#### Total Refining & Marketing

The design and implementation of safe new plants and products require a multidisciplinary overview of the control of the risks. Risk Engineering curriculum provides the knowledge and skills and will broaden your horizons. Given the increasingly international nature of large projects, knowledge of the English terminology associated with risk analysis is an obvious need in risk engineering. ICSI and its partners (academic and industrial) have come together to develop this innovative high-level curriculum to fulfil the world's growing demand for proficiency in engineering and technical expertise to analyse and control risks associated with industrial activities.

We will be pleased to receive students from Risk Engineering degree in our design teams.

## TESTIMONY

### Pr. Gilles

**MOTET,**  
Scientific Director of the Foundation for an Industrial Safety Culture



"Sectorial risk treatments are sometimes

taught whereas firms need practitioners having transverse scientific proficiencies. These skills are required to control risks raised by complex systems such as plants or products (aircrafts, medical devices, etc.) as well as new technologies. These transverse skills are also useful for the communication and the consultation with stakeholders, executive managers and technical engineers. They are also necessary to implement the regulations on transparency such as the European REACH regulation (December 2005). The professional Master "Risk Engineering" accredited by INSAT and INPT takes benefits of the competent faculties of these 2 French "Grandes Ecoles". It is also supported by the industrial partners of ICSI which provide practical experiences of current issues and their effective solutions. The curriculum presents the generic concepts, methods and tools useful to identify, estimate and treat the risks, as well as the specific means involved in the control of various hazards. The lectures are delivered in English as professionals work in connection with managers and engineers of international firms, in accordance with international regulations, and in relation with international consulting and auditing offices."