

Master of Science Civil Engineering for environmental risks mitigation CERM

POLITECNICO DI MILANO



Structure of the Programme

English is the official language of the courses.

The CERM Master Programme comprises a total from 60 up to 120 ECTS credits over one or two-year course. Two distinct didactic projects distinguish the offer of Politecnico di Milano in Risk Management: a Master of Science (Laurea Magistrale in Ingegneria Civile, duration two years) and a Specializing Master (duration one year).

For the Master of Science programme, a section of general formation provides basic and advanced tools of a civil engineering curriculum, which are, however, polarised by a conceptual framework of risk assessment and management. A 10-credits course is devoted to the fundamental of Risk Management (RM) approaches, including some basic legal issues and civil protection organizations. In the second year students choose two among a group of thematic modules which are designed with a problem solving approach, where different competences (within a number of different disciplines) are organised comprehensively to tackle a given RM problem; the final project is typically devoted to the solution of a field case. Thematic modules are the necessary complement to the general formation in civil engineering in order to achieve a correct approach to the complexity and transversal nature of RM. On the other hand, students already having specific competences from previous (technical) degrees can complete their formation towards a RM approach by following the Specializing Master programme that integrates an introduction section on Risk Management with some proper selection of Thematic Modules.

The international network

The high number of possible processes defining risk scenarios, their complexity and the variety of disciplines necessary to their management require the cooperation and integration of several cultural approaches, which are typically not available in a single School or University. In addition to this, experimental research is typically done at a field scale, therefore requiring good links between research groups and institutions / agencies responsible for RM on the territory.

The educational programme offered by the Politecnico di Milano is therefore embedded in an international network of partners where universities share and exchange didactic units, while agencies and institutions provide teaching expertise and field cases for the development of final projects. We believe students and teachers exchange to be a fundamental tool for cultural development in RM: experts from several countries are hired as teachers for the courses at Politecnico di Milano, while students (especially for the Master of Science programme) are recommended to attend at least one semester in a different Institution within the network (see Programme website).

Eligible students

The **Master of Science (2 years)** is typically intended for students holding a Bachelor Degree in Engineering, Architecture or Land Use Planning.

The **Specializing Master (1 year)** is open to a relatively wide variety of scientific and technical curricula, as well as to graduates with a few years of working experience in the field of RM, who wish to enhance their portfolio of professional skills within an international educational environment.

Tuition fees – Master of Science (2 years)

Regular fees are based on students' family income and range from about € 800 to € 3,300 per year. For Non-EU students regular fees are equal to € 3,300 per year.

Students obtaining a scholarship will have to pay only a nominal tuition fee of about € 150.

Tuition fees – Specializing Master (1 year)

Specializing Masters have a fixed fee of € 3,300.

Contacts

For a full description of the Programme, including details on the current offer of thematic modules at Politecnico di Milano and further network institutions, as well as information for scholarships, see the web site: www.master-riskmanagement.lecco.polimi.it or contact cerm.lecco@polimi.it

For further information, please contact the International Projects Service, Internationalization Office at infostudents@polimi.it or visit the web site www.polimi.it/english

rif. num. 01.09



The CERM Master Programme is aimed at providing knowledge and expertise in the field of structural and non structural measures for the mitigation of natural and technological hazards.

Why studying Risk Management?

The complexity of modern societies has produced relevant effects with respect to risks. On the one hand societies are experiencing new and emerging threats that are also the result of modernization, on the other they are more exposed and vulnerable to hazards as a result of urbanization and larger dependence from infrastructures. Furthermore, societies are increasingly calling for safety and protection, not only as a consequence of growing fears but also because safety is considered a public good to be guaranteed to citizens. Such demand for risk mitigation can be recognised across both developing and developed countries, though in different forms. Fallacies of present means to face crises and to prevent them are rather clear and contribute to the perception of increased risks.

The approach of Politecnico di Milano to Risk Management

Modern crises, new threats and “old” hazards that hit built environments require new abilities and competences. The rule of thumb is clearly not enough to accompany the whole process from impact to recovery and reconstruction and to open the floor for renovated ways to prevent risks in a sustainable way, both economically and ecologically. Engineering solutions have always been seen as fundamental pillars of both structural and non structural mitigation. Following the traditional engineering expertise, this M.Sc. proposes innovative paths to deal with the complexities of today’s risks. First, civil engineering will be coupled with a systemic approach to risk assessment and management. The traditional focus on buildings and structural safety will be complemented by the analysis of the many uncertainties faced in hazardous environments. Second, information and communication technologies are proposed as fundamental tools to support Risk Management, in particular for handling emergencies. Third, social, juridical, economical aspects will be integrated into the more technical perspective, to enable future professionals to understand the wider context in which they will have to operate. The focus on integration has been embodied in an innovative didactical method that will address problems in comprehensive modular courses.

Such an approach is not just “interdisciplinary”, as it requires the ability to work and interchange ideas with other experts to achieve an agreed solution for the problem at stake. The Politecnico di Milano has significant experience to offer. It has promoted a large integrated research on Risk Management involving several departments with researchers and professors from various fields who will teach in the M.Sc. It can count on an extended network of national and international universities and research centres with which projects financed by institutions as well as by private organizations have been developed or are currently under way.

Scope of the Programme and teaching approach

A comprehensive approach to the management of natural and technological risks requires a wide variety of competences, many of which are well grounded in engineering disciplines (civil, environmental, chemical, electronic and information technology). The programme offers a synthesis of fundamental and advanced engineering tools for Risk Management, integrated by competences in different areas (land use planning, economics and finance, communication, law, psychology, medicine, ...). Teaching is organised along three conceptual axes: (i) modelling tools are needed for sound analyses of the processes involved; (ii) the complexity of the problem requires skills characterised by a strong interdisciplinary vision; (iii) the synthesis of different disciplines is allowed by a problem solving approach. The result of such educational programme should be a professional able to share and interface specific competences within a team of experts dealing with the complexity of environmental risks assessment and mitigation, as well as emergency management.

Thematic Modules offered at Politecnico di Milano

(see Programme website for updates of the available titles and for modules in other Universities of the network)

- Engineering structures for the environment
- Structure retrofitting
- Spatial planning as a non structural risk mitigation measure
- Emergency plans for hydrogeological risk
- Hazards from industrial sites: process analysis and risk assessment
- Transport management in emergency planning
- Information Technology supporting emergency management
- Site Assessment, Monitoring and Alerting with Advanced Geo-Engineering Techniques

Master of Science in Civil Engineering for environmental risks mitigation - 2 years

1st year

Credits*	Course
50	General formation in civil engineering: advanced calculus, statistics, structures, hydraulics, soil-structure interactions, surveying and monitoring
10	Introduction to Risk Management

2nd year

Credits*	Course
20	Thematic Module
20	Thematic Module
20	Final project

Specializing Master in Civil Engineering for environmental risks mitigation – 1 year

Credits*	Course
10	Introduction to Risk Management
20	Thematic Module
20	Thematic Module
10	Final project

(*) ECTS European Credit Transfer System