

**Programa de máster**  
**“Matemáticas y aplicaciones”**  
Departamento de Matemáticas (UAM)  
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**Introduction to risk management**

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SCOPE OF THE COURSE

In the last months, risk management has been one of the hot topics both for newspapers and from a regulatory point of view. In part this is due to the fact that the crisis which began in the summer 2007 has revealed important weaknesses in the way financial institutions were measuring and managing financial risks and, for some countries, serious regulatory deficiencies. Financial risk measurement, which doesn't interests only financial institutions, has two inseparable components: the financial or business side and the mathematical one related to the use of adequate tools for the risk measurement in terms of economic/regulatory capital in terms of a determinate (high) percentile of the loss distribution.

The course is designed to serve as an introduction to the measurement of market, credit and operational risks as they are defined in the Basel II framework. The focuss is on the mathematical tools needed for this purpose with a special attention put on the problems related to aggregation/diversification.

PROGRAMA

**1. Market risk**

- 1.1 Prudential Regulation.
- 1.2 The concept of Value-at-Risk (VaR). The different methodologies and approaches. Stress testing programs
- 1.3 Extreme Value Theory and its applications to market risk measurement.
- 1.4 The July 2009 revisions.

**2. Credit risk.**

- 2.1 From Basel I to Basel II.
- 2.2 The IRB approach. Granularity of the credit portfolio.
- 2.3 Counterparty risk in market activities.

**3. Operational risk.**

- 3.1 The different approaches for operational risk. Basic indicator, standard and advanced approaches.

3.2 The Loss Distribution Approach (LDA). Severity and frequency calibrations.

3.3 Economic capital calculation.

#### **4. Multivariate aspects of risk measurement.**

4.1 Aggregation and diversification.

4.2 Copulas. The Sklar theorem. Parametric families of copula. Measures of dependence.

4.3 Risk aggregation. Market. Operational risk.

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Hull, J.: Risk management and financial institutions. Pearson Education(Pearson Prentice Hall) 2007.

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