Universidad de Navarra

Advanced Internal Models (MBRF)

Guía docente 2026-27

PRESENTACIÓN

Breve descripción:

This subject provides an in-depth understanding of the internal models used by banks to estimate regulatory capital requirements. It covers the key principles underlying model development, validation, risk measurement, control frameworks and governance, with particular emphasis on methodological robustness, economic soundness and regulatory expectations. The course also considers the role of internal models in supporting effective risk management and contributing to the resilience of financial institutions and the broader financial system.

- **Titulación**: Master in Banking and Financial Regulation
- **Módulo/Materia**: Advanced internal models
- **ECTS**: 4,5
- **Curso, semestre**: 2nd semester
- **Carácter**: Compulsory
- **Profesorado**: Coordinator: Iban Hidalgo (Banco Santander).
  - Giorgio Bocchi (Bank of America).
  - Juan Carlos García Céspedes (Banco BBVA).
  - Manuel Pérez de Castro (Banco Santander).
- **Idioma**: English
- **Aula, Horario**: To be defined.

RESULTADOS DE APRENDIZAJE (Competencias)

BASICAS Y GENERALES

- CG6 - To facilitate clear and effective oral and written presentation of financial topics.
- CG7 - To provide knowledge of data extraction techniques and basic research in the field of financial intermediation.
- CB6 - To possess and comprehend knowledge that provides a foundation or an opportunity to be original in the development and/or application of ideas, often in a research context.
- CB7 - To enable students to apply the acquired knowledge and their problem-solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
- CB10 - To empower students with learning skills that enable them to continue studying in a largely self-directed or autonomous manner.

ESPECIFICAS

- CE1 - To develop programming skills in common languages (SAS, Python, R, and Visual Basic for Excel) for solving issues related to financial intermediation.
- CE3 - To apply advanced statistical and econometric techniques used in the development of internal risk management models.

PROGRAMA

1. **Internal Models - context and introduction.** Regulatory landscape: supervisors, regulators and international bodies affecting financial institutions, bibliographical references (guide through the set of regulatory references for credit risk modeling), the notion of regulatory capital: expected loss vs unexpected loss, type of models and uses, context and related regulation, including: New default definition, relation between the prudential and accounting framework, NPL backstops.

2. Upcoming modeling techniques basics: **AI and machine learning**.
3. **Developing PD Models**: data collection, model structure, model design, variable selection, parameter estimation and master scale calibration (risk differentiation vs risk quantification), margins of conservatism (MOC). Practical cases: Retail and Corporate practical cases.
4. **Developing LGD Models**: data collection, model structure, model design, types of collateral, variable selection, parameter estimation, calibration, economic downturn LGD. Treatment of defaulted assets: ELBE, LGD-in-default, IRB shortfall. Practical cases: Retail and Corporate practical cases.
5. Other modeling purposes: **IFRS 9 and stress test**.
6. **Modeling exposure at default (EAD)**: estimating credit conversion factors (CCF), correlations between PD, LGD, and EAD, calculating expected loss (EL).
7. **Validation and Backtesting**: validation and model adequacy: validation of PD, LGD and EAD, quantitative validation versus qualitative validation, backtesting for PD, LGD and EAD, backtesting model stability, backtesting model discrimination, backtesting model calibration (binomial, Vasicek and chi-squared tests).
8. Internal Model Methods (IMM) for **counterparty credit risk**.
9. **Advanced Credit Valuation Adjustment** (A-CVA) for CVA risk.

ACTIVIDADES FORMATIVAS

1. Lectures: 42.5 hours

Theoretical and practical classes in themes indicated in the syllabus with the help of the blackboard, power point presentations and videos.

2. One-to-one tutorials: 5 hours

Each student may have personal interviews with the professor to help him/her with personal study and learning.

3.Practical assigment: 20 hours

Students must work in an individual essay which is part of the evaluation.

4.Exams: 3 hours

The students will have a final exam at the end of the module.

5.Personal work: 34.5

Students must understand themes covered early in the course to be able to comprehend information presented later in the course, and will have to be able to integrate material learnt throughout the course. Therefore, it is important that they do not fall behind and try to set aside regular times outside of class to work on the course material on a daily basis.

EVALUACIÓN

CONVOCATORIA ORDINARIA

Students are required to attend 80% of classes. Failing to do so without justified reason will imply a Zero grade in the participation/attendance evaluation item and may lead to suspension from the program.

The final assessment will be:

- Individual Essay: 30%.

- Exam (Test): 70%.

Topic: Internal models perspectives in the context of financial institutions credit risk management.

Ideas to consider in the essay:

- Today's role of internal regulatory models in financial institutions.
- Impact on key metrics affecting risk management.
- Interrelationships between IRB models and other expected credit loss models such as IFRS 9 and stress testing.
- Main challenges affecting regulatory models:
    - Increasing supervisory pressure.
    - Models in the context of current challenges of financial institutions: the pressure of profitability, new players in the market, etc.
    - Internal models in the context of the current COVID-19 crisis. Are they valid? How they should evolve?
- **Assessment of the individual essay**: It is expected that the alumni provide a critical view on the topic of the essay. The originality of ideas and well-reasoned judgments will prevail over mainly descriptive statements.

CONVOCATORIA EXTRAORDINARIA

- Individual Essay: 40%.
- Exam (Test): 60%.

HORARIOS DE ATENCIÓN

- By appointment with the professors.

BIBLIOGRAFÍA Y RECURSOS

- Basel Committee on Banking Supervision. MAR30. Internal models approach: general provisions.
- Basel Committee on Banking Supervision. MAR31. Internal models approach: model requirements.
- Basel Committee on Banking Supervision. MAR32. Internal models approach: backtesting and P&L attribution test requirements.
- Basel Committee on Banking Supervision. MAR33. Internal models approach: capital requirements calculation.
- ECB guide to internal models. General topics chapter.
- ECB guide to internal models. Risk-type-specific chapters.
- Inmaculada Para Martos, Antonio Ríos, Raquel Arguedas Sanz, José Casals Carro (2010): Gestión y control del riesgo de crédito con modelos avanzados. ISBN: 978-84-92477-35-7. Find the book in the library (Find book)
- Niepmann, Friederike and Viktors Stebunovs (2018): Modeling Your Stress Away. International Finance Discussion Papers Number 1232. Board of Governors of the Federal Reserve System. (Find book)

Libros para MBRF - curso 23/24 – Alumni Library

Commercial and Investment Banking & the International Credit and Capital Markets

A guide to the global finance industry and its governance

Brian Scott-Quinn

Universidad de Navarra

Palgrave macmillan

Disponible en papel y en electrónico

Safe to Fail

How Resolution will Revolutionise Banking

Thomas F. Huertas

Palgrave

Disponible en papel y electrónico

Fragile by Design

The political origins of Banking Crisis & Scarce Credit

Charles W. Calomiris / Stephen H. Harber

Princeton

Tenemos el libro impreso en Madrid (oct 22)

Effective Legal Protection in Banking Supervision.

Laura Wissink

Europa Law Publishing

Libro disponible en papel (dic 23)

European Banking Supervision: the first eighteen months

Dirk Schoenmaker / Nicolas Veron

Bruegel

Libro disponible en formato electrónico

Libro disponible en papel (nov 22)

The Bankers´New Clothes

Anat Admati & Martin Hellwig

Princeton

Tenemos el libro en formato electrónico

Libro disponible en papel

Boomerang

Travels in the new third world

Michael Lewis

Norton

Libro disponible en papel

The Undoing Project

Michael Lewis

Penguin

Libro disponible en papel

The courage to act

Ben S. Bernake

Libro disponible en papel

Principles

Ray Dalio

Libro disponible en electrónico

Español

Reinventar la Banca: de la Gran Recesión a la gran disrupción digital

Discurso de Recepción del académico de número Exmo. Sr. D. José Manuel González-Páramo

Real Academia de Ciencias Morales y Políticas

Libro disponible en papel

Banca y Contabilidad

Historia, Instituciones, Riesgos y Normas Internacionales IFRS

Jorge Pérez Ramírez

Marcial Pons

Libro en papel

La prociclicidad y la regulación prudencial del sistema bancario

Mario José Deprés Polo

Fundación de las Cajas de Ahorro

Disponible en formato electrónico

Libro en papel

Anatomía de una Crisis

Aristóbulo De Juan / Francisco Uría / Iñigo de Barrón

Deusto

Libro en papel

El Mecanismo de Resolución Bancaria ¿procedimiento singular o expropiación forzosa?

María Prendes Valle

Iustel

Libro en papel

Gestión y control del riesgo de crédito con modelos avanzados

Inmaculada Pra / Raquel Arguedas / Antonio Rios / José Casals

Ediciones Académicas

Libro en papel 2 ejemplares

Temas de investigación en economía de la empresa bancaria

Isabel Plaza Hidalgo

UNED

Tenemos el libro en formato electrónico

El Futuro del Dinero

Como la revolución digital está transformando las monedas y las finanzas

Eswar S. Prasad

Libro en papel

Manual de contabilidad bancaria

Javier Tarancón Martínez, Carlos José Rodríguez García

Editorial Pirámide

I.S.B.N.: 978-84-368-4510-5

Libro en papel 2 ejemplares