

CREDIT RISK MACHINE LEARNING & ARTIFICIAL INTELLIGENCE

**DECEMBER 8-10 2025
NAIROBI, KENYA.**

KEY TOPICS

- Machine Learning basics
- Scorecard modelling via Machine Learning
- PD assessment: discriminatory power vs. goodness of fit
- Lifetime PD modelling and survival analysis
- Introduction to EAD modelling
- Concurrent risk modelling
- LGD modelling



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PhD (Statistics)**

Course overview

The course will provide attendees a comprehensive overview of Machine Learning techniques applied to credit risk modelling. A hands-on approach is followed by providing both the theoretical and practical toolkit to use on a day-by-day basis. The open-source statistical software R paves the way for grasping all details required to create customized analysis.

- During the **first day**, the key instruments used for modelling are explored. A wide use of the software R characterizes the course from the very beginning. In day one, the emphasis is on familiarizing with Machine Learning techniques and R programming. Indeed, an extensive interaction with R paves the way for the whole program.
- On **day two**, machine learning applications will mainly focus on Probability of Default estimation based on scorecard one-year modelling and linkage between scorecard and PD calibration. Attention is mainly on classification and regression trees, bagging, boosting, and random forest. Furthermore, a time horizon expansion to encompass the entire lifetime characterizes day two. Survival analysis is introduced and a combination of machine learning techniques is explored by means of R software.
- In **day three**, both EAD and LGD are explored. Behavioural model encompassing prepayment, overpayment and a comprehensive EAD dynamic are studied through the lenses of bagging, boosting and random forest modelling. Similarly, LGD is explored by considering the techniques explored throughout the course.

Learning objectives

- Working-level knowledge of modelling and corresponding hands-on R software development.
- Advanced knowledge of classification and regression trees, bagging, boosting, random forest, and introductory knowledge of reinforcement learning.
- Working knowledge of one-year and lifetime PD modelling based on machine learning techniques.
- Working knowledge of EAD and LGD modelling via machine learning.
- Introduction to AI as model “assistant”.





Responsible of Prometeia Risk Integration and Advisory for International Markets, including Egypt since 2022. This area of expertise include:

- Stress testing and Recovery Planning.
- Advisory on planning and enterprise risk management processes.
- Models & methodologies, development of simulation tools for integrated risk management
- IFRS 9, CECL, Loss forecasting, PD, LGD, EAD modelling.

Wide risk management experience across Europe, Africa and the Middle East. Before joining Prometeia, he was Director at BlackRock in London, Barclays Investment Bank in London, EY Advisory London, and HSBC Headquarters.

Professor at the University of Bologna: Master in Quantitative Finance

Visiting professor at Imperial College in London, the London School of Economics and Political Science, , University of Passau in Germany.

A recognized expert at international level in Stress Testing and Recovery Planning, authoring multiple books on the topic:

- Stress Testing and Risk Integration in Banks, A Statistical Framework and Practical Software Guide (in Matlab and R), edited by Academic Press (2016)
- IFRS 9 and CECL Credit Risk Modelling and Validation: A Practical Guide with Examples Worked in R and SAS, edited by Academic Press (2019)
- Reverse Stress Testing in Banking, A Comprehensive, edited by De Gruyter (2021)
- Authored papers published in European Journal of Operational Research (EJOR), Computational Statistics and Data Analysis (CSDA) and other top reviewed Journals.
- Referees of Journal of Banking and Finance (Elsevier) and Journal of Applied Statistics (Taylor & Francis) and other top Journals.
- Trainer in risk management and statistics in Europe, UK, Asia, Middle East, Africa.

Who should attend

- Risk managers: model developers and independent model validators.
- Auditors with focus on quantitative methods and applications.
- Finance professionals with focus on advanced modelling.
- Credit experts leveraging advanced techniques



COURSE OUTLINE.

Day 1	
9.00	Intro to R programming
	- Introduction to R - Data wrangling in R - Linear modelling in R
10.30	Coffee Break
11.00	Machine Learning basics
	- Introduction to machine learning - Decision trees - Bagging, Boosting, Random Forest
12.30	Lunch
13.30	One-year PD Modelling
	- Introduction to scorecard modelling - The mathematics of GLM regression - How to validate one-year PD models
15.00	Coffee Break
15.30	Scorecard modelling via Machine Learning
	- Classification and decision trees (CART) - Scorecard modelling via bagging, boosting, random forest
17.00	Wrap up day 1

Day 2	
9.00	From scorecard to PDs via Machine Learning: how does AI facilitate model development
	- Point-in-time vs. through-the-cycle modelling - How to calibrate PDs - Low default portfolio modelling
10.30	Coffee Break
11.00	PD assessment: discriminatory power vs. goodness of fit
	- Model validation objectives and practice - Case study on Machine Learning modelling validation
12.30	Lunch
13.30	Lifetime PD modelling and survival analysis
	- Accelerated failure time (AFT) models - Cox Proportional hazard (PH) model - Time varying covariates: macroeconomic variables, ageing, etc. - Survival random forest modelling
15.00	Coffee Break
15.30	LGD modelling
	- Structural modelling - Tobit regression - Hints on other techniques - How to deal with data scarcity - How to model stage 3 LGDs
17.00	Wrap up day 2

Day 3	
9.00	Case study on LGD modelling in R via Machine Learning
	- How to create an LGD database - Probability of cure (probability of possession) - Severity (or loss given loss) - Relationship with macroeconomic variables - LGD for low default portfolios - LGD validation
10.30	Coffee Break
11.00	Introduction to EAD modelling
	- One-year EAD modelling - Lifetime amortizing profiles - Behavioural modelling: prepayments and overpayments - EAD modelling validation
12.30	Lunch
13.30	Case study on EAD modelling via Machine Learning
	- Behavioural modelling estimation via classification and regression trees - EAD modelling by means of random forest
15.00	Coffee Break
15.30	Concurrent risk modelling
	- Prepayment vs. Default - Case study on concurrent risk modelling
17.00	Wrap up day 3



Machine Learning

A New Era of Credit Risk Assessment

This course is available as a public and in-house and can be delivered as a
LVT- Live Virtual Training

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PERSON**

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