DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

a.y. 25/26

Data Science for Insurance:
Introduction to the course

February 23, 2026

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Lecturers

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Check the personal page for office hours

Lessons timetable

II semester: Lectures from February 23rd, 2026 to May 26th, 2026

    Monday 2 pm - 4 pm, room 4_B (Building H2bis)

    Tuesday 9 pm - 11 pm, room 4_D (Building H2bis)

Easter Holidays from April 3rd to April 7th, 2026 (lessons suspended)

Any change that occur in the timetable will be communicated via Moodle or via the team of the course.

Course material

- Slides and additional material presented in class or useful for the study will be made available through the Moodle page of the course
  $\rightarrow$ register using the key `DSFI25`
- Lecture recordings will be available via Teams
- Details on the R packages used can be found at web CRAN page https://cran.r-project.org/
- Further readings
  - Charpentier, A. (Ed.). (2014). *Computational Actuarial Science with R*, Chapman and Hall/CRC
  - J. McNeil, R. Frey, and P. Embrechts (2015) *Quantitative Risk Management: Concepts, Techniques and Tools*, Revised Edition, Princeton Series in Finance
  - M. V. Wüthrich and M. Merz (2022). *Statistical Foundations of Actuarial Learning and its Applications*, Springer Cham.

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Course Structure

The course is structured in two parts:

Module A (24 h, R. Pappadà) will focus on

- Statistical issues in risk management and risk measures
- Multivariate risk modelling in finance and insurance
- Copulas and related applications

Overview (cont.)

Module B (24 h, M. Marino) will focus on

- Actuarial principles for assessing both life and non-life insurance contingencies

- General Insurance pricing: from the Generalized Linear Model to the Combined Actuarial Neural Network model

- Survival Analysis and the construction of life tables: statistical and learning methods for modeling and forecasting mortality

Overview (cont.)

The course consists of frontal lectures and R practical sessions

- Home assignments will be scheduled during the course and evaluated
- Labs will focus on the use of the R statistical software
- R source files and lecture notes will be available via Moodle

Overview (cont.)

Practical sessions with R include

Module A

- *Time series modelling*: models for risk-factor changes and volatility estimation methods
- *Modelling dependent risks*: estimation of risk measures for dependent risk processes and estimation of copula models

Module B

- *General Insurance pricing*: Ratemaking and experience rating via Generalized Linear Models, Neural Networks and Combined Actuarial Neural Network models
- *Survival Analysis and the construction of life tables*: survival distribution estimation, life tables and portfolio experience, prospective life tables and forecasting models

Main objectives of the course

By the end of this course, you will be able to

- Discuss main statistical issues in the financial and insurance context related to risk management

- Exploit copula models for addressing various statistical problems related to stochastic dependence

- Employ actuarial principles for assessing life and non-life contingencies

- Implement suitable statistical and data-driven methods for setting technical assumptions in evaluating the fundamental insurance risks

Final exam

The final exam consists of two steps:

I A written test with problems and general questions pertaining to the topics covered in class

II a project to be developed with R presenting the statistical analysis of a dataset and the implementation of some of the techniques discussed in class

The final grade will be the average of the evaluation resulting from Part I and Part II.

Q&A

Questions?