



Reacfin **Masterclass** (IA|BE CPD eligible)

Non-Life pricing: The actuarial and data science toolkit

About the **masterclass**

Non-Life insurance is facing many challenges ranging from fierce competition on the market and evolution in the distribution channels used by the consumers, to evolution of the regulatory environment.

Pricing is the central link between solvency, profitability and market shares (volume). Improving pricing practice encompasses several dimensions:

- Technical
- Competition
- Customer behaviour
- Segmentation

The aim of this masterclass is to

- present basic and more advanced actuarial/statistical techniques used in non-life pricing, competition analysis and profitability analysis,
- focus on some practical problems faced by pricing actuaries and product managers by presenting practical examples and running case studies with the participants,
- introduce machine learning techniques used in non-life pricing in order to open new perspectives for product development (competition analysis, profitability analysis...).

Each day of this masterclass is worth 7 Continuous Professional Development (CPD) points at the Institute of Actuaries in Belgium (IA|BE).



About the agenda

Day 1 – Basic statistical techniques for non-Life pricing: building a technical tariff with GLM in R (7 CPD pts)

- Introduction to risk classification
- From linear to generalized linear models
- Poisson regression for claim counts

- Case study: Developing a new technical tariff for frequency

- Gamma regression for attritional claims
- Extreme value theory for large claims modelling
- Case study: Developing a new technical tariff for cost

- Case study: Final technical tariff
- Other practical difficulties with GLM

Day 2 – Advanced statistical techniques for non-life pricing with R (7 CPD pts)

- Modelling continuous explanatory variables with Generalized additive models: methodology and examples
- Example: age and geographical effects

- Penalized regression techniques (Lasso, Ridge, interaction detection...): methodology and examples
- Example: Smurf R package

- Introduction to credibility theory
- Example: car fleet (excel)

- Introduction to Generalized Linear Mixed Models (GLMM)
- Example: Worker Compensation pricing

About the agenda

Day 3 – Machine Learning in non-life pricing with R (part 1) (7 CPD pts)

- Introduction to supervised machine learning algorithms, regression trees & random forest (RF)
- Example: Fitting a regression tree & RF on frequency

- Case Study: Bagging and random forest on cost
- Gradient Boosting Model (GBM)
- Example: Fitting GBM on frequency
- Case Study: GBM adjustment for cost

- Case Study: Continuous Variables categorization using regression trees or clustering methods
- Case Study: Application of GBM method to highlight interactions

- Data Management
- Case Study: Data analysis and features selection with random forest
- Profitability and Competition analysis:
- Case study: Profitability analysis with regression trees

Day 4 – Machine Learning in non-life pricing with R (part 2) (7 CPD pts)

- Artificial Neural Networks (ANN)
- Example: Fitting ANN on frequency
- Case Study: ANN adjustment for cost

- Introduction to unsupervised machine learning algorithms (k-means and HAC): methodology and examples

- Introduction to Explainable AI (Partial dependence plots, ICE plots, Shapley values...): methodology and examples

- Introduction to Explainable Boosting Machine (EBM) and GAMI-Net

About **Reacfin Academy**

Reacfin Academy is the business line of Reacfin dedicated to continuous professional education and training in Finance, Risk Management, Portfolio Management, Actuarial Science and Data Science.



www.reacfinacademy.com

About the **speakers**



Michael LECUIVRE

Head of Reacfin's Non-Life Center of Excellence and IA|BE qualified actuary

Expert in Non-Life (pricing, product development, reserving and risk management) and machine learning.



Xavier MARECHAL

CEO of Reacfin and IA|BE qualified actuary

Expert in Non-Life and Health insurance (pricing, product development, reserving and risk management) and machine learning.



Julie ZIANS

Senior Manager and IA|BE qualified actuary

Expert in Non-Life and Health insurance (pricing, product development, reserving and risk management) and machine learning.