



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

# Non-Life pricing and profitability analysis: The actuarial and data science toolkit

*Fully Online*

*March-April-May 2021*

## 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 behavior
- Segmentation

The aim of this workshop 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,...).

**Subscription is flexible for 1 to 4 modules. The total duration, that includes attending the webinars and the personal assignments, is estimated to 27 hours.**

**The whole training is worth 27 Continuous Professional Development (CPD) points at the Institute of Actuaries in Belgium (IA|BE) for the whole program, i.e. the 4 modules.**



## Practical **content**



### **E-learning**

Several e-learning modules to build the foundations



- **Pedagogical** presentation of the concepts with examples
- To be followed by the participants **whenever they want** between the webinars as pre-requisites



### **Webinars and case studies**

Up to 8 webinars to consolidate and expand practical knowledge



- **Complementary** knowledge topics covered during the webinars
- Opportunity to **ask questions** through specific Q&A sessions
- Presentation of **practical examples**
- Performance of **case studies allowing to put learning into practice**
- Webinars will be recorded so that you can attend later if you were not available or want to review the material. Recording available for 2 months after the training

## About the agenda

### Module 1– Introduction to R programming language (Optional for R users - Total estimated duration: 5h – 5 CPD pts)

#### Tuesday 23<sup>rd</sup> March 2021

Webinar #1 – at 10.00 CET, length: 2h30

- Fundamentals of R
  - Data management
  - Basics of R objects
- Examples and exercises

Pre-requisites:

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#### Tuesday 30<sup>th</sup> March 2021

Webinar #2 – at 10.00 CET, length: 2h30

- Conditions, loops and lists
  - Functions
  - Statistics
- Examples and exercises

Pre-requisites:

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### Module 2 – Basics of non-Life pricing: building a technical tariff with GLM in R (Total estimated duration: 6h – 6 CPD pts)

#### Tuesday 20<sup>th</sup> April 2021

Webinar #3 – at 10.00 CET, length: 2h

- Reminder of key concepts and Q&A about E-learning 1
- Example: Poisson, Gamma and logistic regression with R
- Case study: Developing a new technical tariff for frequency

Pre-requisites:

E-learning #1 – length: 2h

- Introduction to risk classification
- From linear to generalized linear models
- Overfitting
- Poisson regression for claim counts
- Gamma regression for attritional claims
- Logistic regression and extreme value theory

#### Friday 23<sup>rd</sup> April 2021

Webinar #4 – at 10.00 CET, length: 2h

- Case study: Developing a new technical tariff for cost and large claims
- Other practical difficulties with GLM

Pre-requisites:

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## Module 3 – Advanced Method of non-life pricing with R (Total estimated duration: 8h – 8 CPD pts)

### Wednesday 28<sup>th</sup> April 2021

#### Webinar #5 – at 10.00 CET, length: 2h

- Reminder of key concepts and Q&A about E-learning 2 and 3
- Cross-validation and parameters tuning
- How to calibrate a ML model in practice
- Example: Applying regression tree on the claim frequency
- Case study: Random forest on average claim amount

#### Pre-requisites:

#### E-learning #2 – length: 2h

- Modelling continuous explanatory variables with Generalized additive models: methodology and examples
- Penalized regression techniques (Lasso, Ridge, interaction detection,...): methodology and examples

#### E-learning #3 – length: 2h

- Introduction to machine learning
- Supervised machine learning (regression tree, bagging, random forest, boosting, neural networks)

### Monday 3<sup>rd</sup> May 2021

#### Webinar #6 – at 10.00 CET, length: 2h

- Case study: GBM on claims frequency
- Neural networks for pricing

#### Pre-requisites:

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## Module 4 – Other practical applications of Machine Learning in non-life insurance (Total estimated duration: 8h – 8 CPD pts)

### Thursday 6<sup>th</sup> May 2021

#### Webinar #7 – at 10.00 CET, length: 2h

- Reminder of key concepts and Q&A about E-learning 4
- **Example:** Binning of continuous variables with GAM and regression trees
- **Example:** Data analysis and features selection with random forest
- **Case study:** Interpreting results of ML algorithms
- **Case study:** Detection of interaction between variables based on GBM

#### Pre-requisites:

#### E-learning #4 – length: 2h

- Data Selection, Pre-Analysis and Feature Selection (data quality, pre-treatment, missing values, feature engineering and feature selection)
- Making Machine learning interpretable

### Tuesday 11<sup>th</sup> May 2021

#### Webinar #8 – at 10.00 CET, length: 2h

- Unsupervised learning: clustering and dimensionality reduction (PCA)
- **Example:** vehicle categorization
- Profitability and Competition analysis: profitability and positioning assessment, reverse engineering of competitors prices
- **Example:** Profitability analysis with regression trees
- **Example:** reverse engineering of market prices

#### Pre-requisites:

#### E-learning #5 – length: 2h

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

## About the **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](http://www.reacfinacademy.com)

## About the **speakers**



### **Samuel MAHY**

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

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



### **Xavier MARECHAL**

*CEO 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**

*Manager and IA|BE qualified actuary*

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



### **Marie HAINNEVILLE**

*Analyst actuary*

Consultant in Non-Life insurance (pricing, product development) and machine learning. Expert in R.

## Practical information



### Pricing

- Participation is flexible: you can sign up for Module 1, Module 2, Module 3, Module 4 or all modules according to your needs and availability.
- Early bird prices are open until February 28<sup>th</sup>.

	Module 1	Module 2	Module 3	Module 4	Modules 2, 3 and 4 package	4-modules package
Early price/person	300€	€550	€650	€650	<b>€1600</b>	<b>€1850</b>
Price/person	400€	€650	€750	€750	<b>€1850</b>	<b>€2150</b>

- Cancellation is possible up to 15 days before the training. After this deadline a cancellation fee of 50% will be applied. Switching participant is possible at any time.
- Reacfin has the possibility to cancel the training if the number of participants is too low.



### Required material

- Attendees need a computer:
  - with a PDF reader, R and Excel installed
  - that allows them to attend webinars on LiveStorm (<https://livestorm.co/>) and watch e-modules on Rise-Up (<https://reacfin.riseup.ai/>)
- Attendees are encouraged to install R as well as some useful packages (all the information will be provided after subscription) to perform the case studies. A basic knowledge of the R software is useful.



### Language

- Presentation will be animated in English, but questions could also be discussed in Dutch or French to facilitate the understanding of principles.



### Contact

- To subscribe, go to:  
<https://reacfinacademy.typeform.com/to/B5cZU1Qn>
- For any questions, feel free to contact us :  
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