ACTUARIAL MODELING FOR INSURANCE



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Introduction

Actuarial Modeling for Insurance Training Course builds the quantitative skill that pricing, reserving, and capital decisions depend on. An insurer earns profit only when its models reflect real claim behaviour, and it survives only when those models hold under stress. This course develops that capability from first principles. It covers probability, loss distributions, and frequency-severity modelling. Furthermore, it applies life tables, survival models, reserving techniques, and risk-based capital frameworks. In addition, it covers model validation, governance, and regulatory expectations such as Solvency II and IFRS 17. As a result, participants build and challenge models that support sound insurance decisions.

Actuarial Modeling for Insurance Course Objectives

- Explain the role of actuarial modelling in insurance pricing, reserving, and capital.
- Apply probability distributions and statistical fitting to claims data.
- Build frequency-severity models for non-life insurance portfolios.
- Apply life tables, survival models, and mortality improvement.
- Calculate reserves using chain-ladder and Bornhuetter-Ferguson methods.
- Estimate incurred but not reported claims and development patterns.
- Apply risk-based capital models and solvency margin calculations.
- Interpret IFRS 17 measurement models and their modelling inputs.
- Validate models through backtesting, sensitivity, and scenario analysis.
- Document model assumptions and apply actuarial governance standards.

Course Methodology

- Interactive lectures with real insurance claims and mortality datasets.
- Distribution fitting and frequency-severity modelling workshops.
- Reserving triangle exercises using chain-ladder and BF methods.

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- Capital modelling and stress testing on sample portfolios.
- Structured peer review with facilitator feedback on model assumptions.

Who Should Take This Course

- Actuarial analysts and actuarial students.
- Insurance risk and capital modelling professionals.
- Underwriting and pricing analysts.
- Finance and reserving teams in insurance companies.
- Risk managers and internal auditors in insurance.
- Regulators and supervisors reviewing insurer models.

Actuarial Modeling for Insurance Course Outlines

Day 1: Probability Foundations for Insurance Modelling

- Role of actuarial modelling in insurance decisions.
- Probability distributions used in insurance.
- Random variables, expectation, and variance.
- Data preparation and cleaning for claims analysis.
- Distribution fitting and goodness-of-fit testing.
- Frequency-severity decomposition of claims.
- Case study: fitting a distribution to a claims dataset.

Day 2: Non-Life Pricing and Loss Modelling

- Frequency models using Poisson and negative binomial.
- Severity models using gamma, lognormal, and Pareto.

- Aggregate loss modelling and compound distributions.
- Credibility theory and experience rating.
- Risk classification, rating factors, and GLM basics.
- Reinsurance structures and their modelling effect.
- Workshop: building a frequency-severity pricing model.

Day 3: Life and Health Modelling

- Life tables and survival functions.
- Mortality and morbidity modelling approaches.
- Mortality improvement and longevity risk.
- Life insurance and annuity present value calculations.
- Health insurance claim modelling basics.
- Multiple decrement and select mortality concepts.
- Workshop: calculating reserves for a life product.

Day 4: Reserving and Capital Modelling

- Loss reserving principles and the claims triangle.
- Chain-ladder and Bornhuetter-Ferguson methods.
- Incurred but not reported estimation and tail factors.
- Discounting and inflation in reserve estimates.
- Risk-based capital and solvency margin modelling.
- Correlation, dependency, and aggregation of risks.
- Workshop: completing a reserving analysis and capital estimate.

Day 5: Validation, Governance, and Reporting

- Model validation: backtesting and out-of-sample testing.
- Sensitivity and scenario analysis under stress.
- IFRS 17 measurement models and modelling inputs.
- Solvency II internal model requirements overview.
- Assumption documentation and change control.
- Model risk governance and review processes.
- Course review, assessment, and action planning.

Conclusion

By successfully completing Actuarial Modeling for Insurance, participants will gain a thorough understanding of probability foundations, frequency-severity loss modelling, life and health modelling, loss reserving techniques, risk-based capital modelling, and actuarial governance. They will also acquire practical skills in distribution fitting and claims modelling, pricing and loss model construction, reserve estimation and capital calculation, and model validation and assumption documentation. In addition, the course prepares them to build models whose outputs can be defended in pricing, reserving, and regulatory review. Gentex Training Center delivers this programme with a strong focus on applied quantitative technique and sound actuarial judgement.

FAQs for Actuarial Modeling for Insurance course

Q1 What is the "Actuarial Modeling for Insurance" course about?

It is a five-day programme on constructing and validating insurance models. It covers probability distributions, frequency-severity loss modelling, life tables and survival models, loss reserving with chain-ladder and Bornhuetter-Ferguson methods, risk-based capital modelling, and actuarial governance and reporting.

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Q2 What are the key benefits of the "Actuarial Modeling for Insurance" course?

Participants produce models that pricing, reserving, and capital decisions can rely on. The course improves distribution selection and claims fitting, strengthens reserve estimates and development patterns, sharpens capital and solvency calculations, improves sensitivity and stress testing, reduces model risk through validation, and raises documentation quality for regulatory and audit review.

Q3 What skills will I gain from the "Actuarial Modeling for Insurance" course?

Participants gain distribution fitting and claims modelling, frequency-severity pricing and loss model construction, reserve estimation and risk-based capital calculation, and model validation, sensitivity testing and assumption documentation. These four skills cover the practical core of actuarial modelling in insurance.

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Q4 What tools, methods, or standards are covered in the "Actuarial Modeling for Insurance" course?

The course covers probability distributions and statistical fitting, goodness-of-fit testing, frequency-severity decomposition, Poisson and negative binomial frequency models, gamma, lognormal and Pareto severity models, aggregate and compound loss distributions, credibility theory and experience rating, generalised linear models for risk classification, reinsurance structure modelling, life tables and survival functions, mortality and morbidity modelling, longevity risk and mortality improvement, annuity and life insurance present value calculation, health claim modelling, multiple decrement and select mortality, the claims development triangle, chain-ladder and Bornhuetter-Ferguson reserving methods, incurred but not reported estimation, tail factors, discounting and inflation adjustment, risk-based capital models, solvency margin calculation, dependency and risk aggregation, backtesting and out-of-sample validation, sensitivity and scenario analysis, IFRS 17 measurement models, Solvency II internal model requirements, and assumption documentation and change control.

Q5 How is the "Actuarial Modeling for Insurance" course applied in real-world practice?

Participants apply the methods to real portfolios. They clean and prepare claims data, fit distributions, build frequency-severity pricing models, select rating factors, calculate life and annuity reserves, complete reserving triangles, estimate tail factors, run capital and solvency calculations, backtest model outputs, and document assumptions for review. Many leave with a reserving workbook, a pricing model template, and a model validation checklist ready to use.

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