FUNDAMENTALS OF ACTUARIAL SCIENCE



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GENTEX Training Center LLC | Orlando - FL, USA
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Introduction

Fundamentals of Actuarial Science Training Course builds a working foundation in the mathematics and judgement behind insurance and pension pricing. Participants work through probability and financial mathematics, life contingencies, survival models, life and general insurance applications, reserving and solvency, and actuarial modelling and professionalism as one connected discipline. The programme links the uncertainty an insurer or pension fund carries with the models and assumptions that quantify it. As a result, learners gain a practical, exam-ready grounding in actuarial method. Furthermore, the course strengthens quantitative reasoning, assumption discipline, and technical communication.

Fundamentals of Actuarial Science Course Objectives

- Explain the actuarial role, its professional standards, and its scope.
- Apply probability concepts: distributions, expectation, and variance.
- Apply financial mathematics: present value, annuities, and discounting.
- Apply survival models and life table construction.
- Apply life contingency functions and assurance and annuity valuation.
- Apply life insurance premium calculation and policy valuation.
- Apply general insurance pricing and claims reserving concepts.
- Apply risk theory, ruin probability, and aggregate loss models.
- Apply solvency, capital requirements, and regulatory frameworks.
- Apply actuarial model documentation and professional communication.

Course Methodology

- Interactive sessions built on actuarial calculation and case examples.
- Workshops on probability, life tables, and premium calculation.

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- Group exercises on reserving, solvency, and risk theory problems.
- Hands-on practice with life tables, annuity factors, and model worksheets.
- Simulation of a pricing review and an actuarial assumption discussion.
- Facilitator coaching and structured exam preparation guidance.

Who Should Take This Course

- Aspiring actuaries and actuarial trainees.
- Insurance analysts, underwriters, and product staff.
- Pension fund administrators and benefits consultants.
- Risk managers in insurance and financial institutions.
- Finance and quantitative analysts working with insurance data.
- Consultants advising on insurance pricing and reserving.

Fundamentals of Actuarial Science Course Outlines

Day 1: The Actuarial Profession and Probability Foundations

- The actuarial role, professional standards, and ethical duties.
- Areas of practice: life, general, health, and pensions.
- Probability: random variables, distributions, and moments.
- Expectation, variance, and covariance in actuarial work.
- Common distributions used in actuarial modelling.
- Risk pooling and the law of large numbers.
- Case discussion: a product priced on an unrealistic assumption.

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Day 2: Financial Mathematics for Actuaries

- Simple and compound interest and accumulation.
- Present value and discount factors.
- Annuity certain: present and accumulated value.
- Cash flow valuation and net present value.
- Nominal and effective rates and payment frequencies.
- Inflation, real versus nominal rates.
- Workshop: valuing a multi-payment cash flow.

Day 3: Survival Models and Life Tables

- Survival function, hazard rate, and force of mortality.
- Curtate and complete lifetime random variables.
- Life table construction and interpretation.
- Select and ultimate mortality and mortality improvement.
- Applying life tables to survival probabilities.
- Comparing mortality across populations and products.
- Exercise: calculating survival probabilities from a life table.

Day 4: Life Contingencies, Premiums, and Reserves

- Life contingency functions and commutation functions.
- Whole life, term, and endowment assurance valuation.
- Life annuities and their present values.
- Net premiums and premium loadings.
- Policy values, prospective and retrospective reserves.

- Unit-linked and with-profit contract basics.
- Simulation: calculating a net premium and its reserve.

Day 5: General Insurance, Risk Theory, and Solvency

- General insurance pricing, frequency, and severity models.
- Claims reserving: chain ladder and run-off triangle methods.
- Aggregate loss models and reinsurance basics.
- Risk theory, surplus process, and ruin probability concepts.
- Solvency, capital requirements, and regulatory frameworks.
- Model documentation, governance, and actuarial communication.
- Capstone: presenting an actuarial valuation and assumptions review.

Conclusion

By successfully completing Fundamentals of Actuarial Science, participants will gain a practical command of probability and financial mathematics, survival models and life tables, life contingency valuation, premium and reserve calculation, general insurance pricing and reserving, and solvency and risk theory. They will acquire skills in actuarial calculation, assumption setting, model documentation, and technical reporting that support sound insurance and pension decisions. Gentex Training Center designs the programme to help professionals build actuarial skills with confidence.

FAQs

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Q1 What is the "Fundamentals of Actuarial Science" course about?

It builds a working foundation in the mathematics and judgement behind insurance and pension pricing. The course spans the actuarial profession and probability foundations, financial mathematics, survival models and life tables, life contingencies, premiums and reserves, and general insurance, risk theory and solvency.

Q2 What are the key benefits of the "Fundamentals of Actuarial Science" course?

You gain a practical, exam-ready grounding in actuarial method that links the uncertainty an insurer carries with the models and assumptions that quantify it. The course improves probability and financial mathematics fluency, strengthens survival and contingency modelling, sharpens reserving and solvency reasoning, and gives you assumption and documentation discipline that supports defensible pricing.

Q3 What skills will I gain from the "Fundamentals of Actuarial Science" course?

You will develop four core skills: probability and financial mathematics application, survival modelling with life table construction and interpretation, life contingency valuation with premium and reserve calculation, and general insurance reserving with solvency and risk theory analysis.

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Q4 What tools, methods, or standards are covered in the "Fundamentals of Actuarial Science" course?

The course covers the actuarial role and professional standards and ethical duties, areas of practice in life, general, health and pensions, random variables, distributions and moments, expectation, variance and covariance, common actuarial distributions, risk pooling and the law of large numbers, simple and compound interest and accumulation, present value and discount factors, annuity certain present and accumulated values, cash flow valuation and net present value, nominal and effective rates and payment frequencies, inflation and real versus nominal rates, the survival function, hazard rate and force of mortality, curtate and complete lifetime random variables, life table construction and interpretation, select and ultimate mortality and mortality improvement, survival probability calculation, mortality comparison across populations and products, life contingency functions and commutation functions, whole life, term and endowment assurance valuation, life annuities and present values, net premiums and premium loadings, policy values and prospective and retrospective reserves, unit-linked and with-profit contract basics, general insurance pricing with frequency and severity models, claims reserving including chain ladder and run-off triangle methods, aggregate loss models and reinsurance basics, risk theory, the surplus process and ruin probability, solvency capital requirements and regulatory frameworks, and model documentation, governance and actuarial communication.

Q5 How is the "Fundamentals of Actuarial Science" course applied in real-world practice?

Participants apply it to real work such as valuing a multi-payment cash flow, calculating survival probabilities from a life table, computing a net premium and its reserve, pricing a general insurance product by frequency and severity, running a chain ladder reserving estimate, and documenting assumptions for a valuation review. The same methods support solvency assessment and product approval.

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