

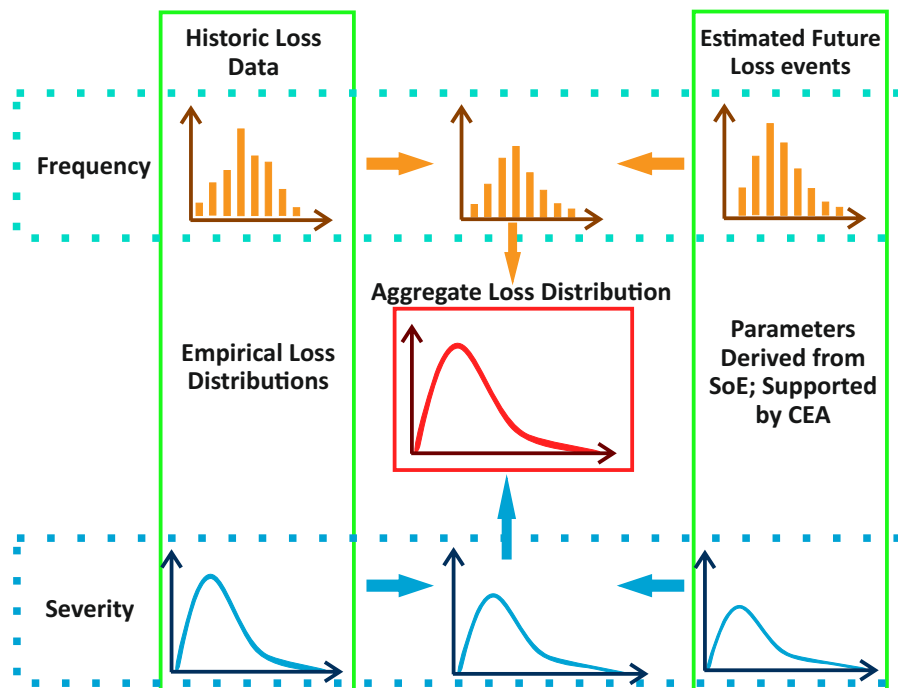
# INSURANCE LOSS MODELLING using Excel

100+ hours

Case Study and Project- driven Methodology

Blended Learning Methodology

## INSURANCE LOSS MODELLING



PEAKS<sup>2</sup>TAILS



## DETAILED CURRICULUM

### MODULE 1 - Introduction to Insurance Products & Modelling Techniques

#### INSURANCE PRODUCTS

- Life Insurance
- Health Insurance
- Non Life Insurance products

#### PREDICTIVE MODELLING TECHNIQUES

- Survival Analytics
- Markov Chain - Time Homogenous & Time Inhomogenous
- Estimating the life time distribution function
- Proportional hazards models
- The Binomial and Poisson models
- Exposed to risk
- Graduation
- Empirical Bayes Credibility theory
- Loss Distribution
- Risk Models
- Generalised Linear Modelling
- Time Series Modelling
- Simulation

### MODULE 2 - Pricing reserving & Capital Calculations

#### General Insurance

#### DETERMINISTIC RESERVING

- Triangular Method in use -
- Chain Ladder Method
- Bornhuetter - Ferguson Method
- Average Cost per Claim Method



## DETAILED CURRICULUM

### STOCHASTIC RESERVING

- Analytics methods
- Simulation - based methods

### CAPITAL MODELLING

- Deterministic Models
- Stochastic Models

### PRICING

- Burning cost approach
- Frequently/Severity approach
- Generalised Linear Modelling
- Generalised Additive Models
- Generalised Linear Mixture Modelling

### Health Insurance

### PRICING

- Equation of value / formula approach
- Cashflow techniques
- Group risk assessments
- Options and guarantees

### RESERVES & CAPITAL

- Market consistent valuation
- Value at Risk (VaR) capital assessment



## DETAILED CURRICULUM

### Life Insurance Pricing and Reserving

#### PRICING

- Equation of value / formula approach

#### RESERVING

- Gross Premium Prospective Reserve
- Gross Premium Retrospective Reserve

#### CAPITAL MODELLING

- Market consistent valuation
- Value at Risk (VaR) capital assessment

## BACKGROUND

## OBJECTIVE

## ATTENDEES

## PEDADOGY

### BACKGROUND

Actuaries face many challenges today , ranging from Pricing & valuation of a vast range of insurance products to reserving & Capital Calculations . These challenges are highly relevent for today's insurance industry, bringing imperatives and incentives for researchers to develop new tools for risk modelling and risk management.This course teaches all the tools and techniques available domain to handle these complex calculations .



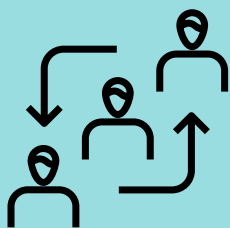
### OBJECTIVE

Understanding of different types of insurance products - Life insurance , Health insurance & Non Life insurance products . Understanding the concept of Pricing , Reserving and Capital calculations . Understanding actuarial tools and techniques available to model insurance risks.



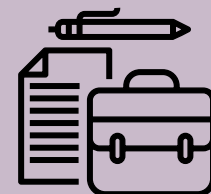
### WHO CAN ATTEND

An MBA in Finance or any Finance Professional pursuing FRM/Actuaries who is aspiring to take up opportunities in insurance companies



### PEDADOGY

An intuitive non-quantitative approach will be employed throughout so that participants develop a feel for risk/reward tradeoffs without relying on complex mathematical formulas. Having said that , participants are encouraged to have laptops with Excel for a chance to manipulate simple but illustrative calculations.



# DEMO MODELS

DURING THE PROGRAM YOU WILL LEARN TO  
CREATE EXCEL MODELS LIKE SHOWN BELOW

**Insurance Calculation**

Dist. for which all moments exist:

- Gamma
- Exponential
- Weibull
- Normal

**Skewness and Kurtosis**

Kurtosis = Square skewness + 1

Normal Distribution (3): Skewness, kurtosis dependant on 2 parameters

Exponential Distribution (2): Generalized beta distribution

Logistic Distribution: Log normal - dependant on log SD

Uniform Distribution: MOST FLEXIBLE DISTRIBUTION

Weibull and gamma - dependant on shape

Log normal - dependant on log SD

For any level of skewness log normal kurtosis is greater than gamma and weibull

**Distribution Fitting**

MME (Matches moments of the empirical data with fitted distribution. Minimizes difference between moments of data and the distribution)

Capture past data

Find out Moments of distribution

Based on moments find out the parameters of distribution

MLE (MLE ensures that likelihood of observing all data points get maximized)

Take MME estimates

Find PDF of all the data points, take log of PDF

Maximize the sum of PDF or minimize the sum of PDF

In case of GPD applicable when shape parameter > -0.5 which would always be in real life. In real life log loss has fat tails, and shape from -0.5 to 0 is thin tailed, so in real life log loss has shape > 0

For normal distribution, log normal and poisson, MME and MLE estimates of parameters are same.

Quantile Matching (Matches specific quantiles of the empirical data)

eg. 50% quantile, 99% quantile

Take say 50% and 99% quantile loss from the experts

Then assume any distribution and assume its parameters

**Weibull Insurance (Scale = 1, Shape = 2)**

MLE estimate:  $\alpha = 1.1$ ,  $\beta = 0.0001$

Chart Title: Theoretical CDF vs Empirical CDF

Distribution	Mean	Variance	Skewness	Kurtosis
Normal	0	1	0	3
Lognormal	1	0.35	1.03	3.09
Gamma	1	1	2	6
Weibull	1	1	1.5	3.5

**Correlation captures dependance of variables + Distribution of variables.**

Copula captures dependance of variables irrespective of the underlying distribution.

## FREQUENTLY ASKED QUESTIONS

### PREREQUISITE



Knowledge of Basic Excel ,  
Basic Statistics , insurances  
Products is must

### CERTIFICATE



Silver Certificate on successful  
completion of projects .  
Gold Certification on passing a  
2 hours MCQ based exam.

### FEES



Rs.8000

### DURATION



100+ hours

## ABOUT THE TRAINER



Karan Aggarwal is one of India's leading trainers in Financial Modelling, Risk Modelling, Data Analytics and academic programs like Financial Risk Manager (FRM) & Actuarial Science. He has spearheaded several solution accelerators and spreadsheet-based prototypes in Risk and Analytics space. Karan has also authored a number of books on Advanced Excel, Statistical Modelling, Risk Modelling & Machine Learning. He is widely regarded for his problem-solving, thought leadership and intrapreneurship skills. His analytical mindset, solid fundamentals & the thirst to keep learning set him apart as a true authority in this field. Karan has also been awarded the Young Indian Entrepreneur Award by the Confederation Of Indian Industries in the year 2017.



# OUR TRAINEES WORK IN





# OUR SERVICES

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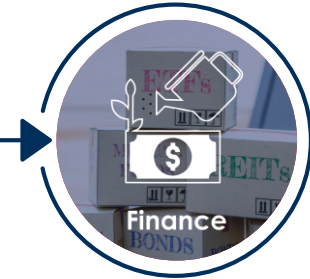
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