



NagindasKhandwala College (Autonomous)

Name of the Programme: B. Com. (Honours) Actuarial Studies

ProgrammeCode : UHCAS

PROGRAMME OBJECTIVES:

- PO–1:** To provide intensive theoretical & practical knowledge in all aspects of risk management.
- PO–2:** To provide an integrated perspective of management functioning along with a good amount of exposure to real life cases / technical knowhow on crucial aspects of Insurance products pricing and reserving
- PO–3:** To produce bachelors with a strong background in Mathematics, Statistics, Economics, Finance and Analytics to deal with Data Analysis in the areas of Financial Sector such as Insurance, Banking, Capital Market and other Financial ApplicationsinviewofsustainedgrowthenvisagedinInsuranceIndustryandK PO industry at large in the Financialsector.
- PO–4:** To develop participants' competencies to identify the possibility of a bad event, or a catastrophe; evaluate a solution to minimize the possibility of the said bad event, or catastrophe, from occurring and also analyze the losses, that the risk might bring about, and devise solutions to reduce its consequences to theeconomy.
- PO–5:** To make program participants job-ready in the profession of actuaries and analytics.

PO-6: To provide expert's knowledge to undertake Actuarial profession and become a catalyst in the process of becoming actuary.

PROGRAMME OUTCOMES:

On successful completion of this program, a participant shall be able to

PO1: Comprehensive Knowledge: demonstrate a capability of executing comprehensive knowledge and understanding of Mathematics, Statistics, Economics, Finance and Analytics to deal with Data Analysis in the areas of Financial Sector such as Insurance, Banking, Capital Market and other Financial and undertake professional examinations in the subjects of CS1A, CS1B, CS2A, CS2B, CM1A, CM1B, CM2A, CM2B, CB1, CB2, CB3, CP2, CP3, SP1, SP2, SP4, SP5, SP7 of Institute and Faculty of Actuaries, UK and equivalent subjects of Institute of Actuaries of India.

PO2: Communication Skill: communicate problems in business and work towards their solutions

PO3: Critical Thinking and Problem Solving: demonstrate ability to think critically and analyse and synthesize data and derive inferences for valid conclusion by developing an integrated perspective of management functioning along with a good amount of exposure to real life cases / technical knowhow

PO4: Research and Projects: ability to search for, locate, extract, organise, evaluate, and use or present information that is relevant to a particular topic and work independently as well as in team on diverse projects and ensure detailed study of various facets of Finance and Business

PO5: ICT Skills: illustrate capability to use various softwares such spreadsheet, R programming, Python programming for exploring, analysing and using the information or business purposes as a part of application of ICT

PO6: Risk Assessment and Risk Management: calculate the probability of a loss event, or a catastrophe; evaluate a solution to minimize the probability of said the loss event, or catastrophe, from occurring and also assess the losses, that the risk might bring about, and create solutions to reduce its consequences to the economy (i.e. risk management).

PO7: Moral and Ethical Awareness: ascertain unethical behaviour, falsification, and manipulation of information

Semester 1

2011UCHAFC: Foundation Course

Course Objective:

To make a student aware of

1. Composition of Indian society from many facets and impact of globalization
2. Impact of Politics and power changes on social and economic growth
3. Actuarial profession and role of actuary, Constitution and Role of Institute of Actuaries of India
4. Impact of Several Influential People (Indian and International)

Course Outcome:

On successful completion of this course, student should be able to

CO1: describe composition of Indian society (Level: Remember)

CO2: describe impact of globalization (Level: Understand)

CO3: explain impact of Politics and power changes on social and economic growth (Level: Understand)

CO4: state constitution and role of Institute of Actuaries of India (Level: Remember)

CO5: describe role of actuary (Level: Understand)

CO6: describe achievements of some famous people, analyse their strengths and describe the impact of their deeds on our lives (Level: Remember, Analyse)

2012UCHAAS: Actuarial Statistics 1A (Theory and Practical)

Course Objective:

The aim of this course is to provide a grounding in mathematical and statistical techniques that are of particular relevance to actuarial work.

Course Outcome:

On successful completion of this course, student should be able to

CO1: Calculate various statistical measures and interpret them (Level: Apply)

CO2: Summarise data using appropriate statistical and graphical presentation (Level: Analyse, Apply)

CO3: Calculate probabilities of simple and compound events (Level: Evaluate)

CO4: Define random variables and determine their distributions in various actuarial applications (Level: Analyse)

CO5: Describe the essential features of statistical distributions (Level: Understand)

CO6: Determine generating functions (Level: Apply)

CO7: Calculate probabilities and other measures from standard discrete and standard continuous distributions (Level: Evaluate)

2013UCHAAS: Actuarial Statistics 1B (Theory and Practical)

Course Objective:

The aim of this course is to provide a grounding in mathematical and statistical techniques leading to inferences that are of particular relevance to actuarial work.

Course Outcome:

On successful completion of this subject, a student will be able to:

CO1: describe and apply the principles of statistical inference (Level: Understand, Apply)

CO2: calculate point estimates and interval estimates of parameters under different distribution environments (Level: Evaluate)

CO3: calculate test statistic and perform a test of significance for various parameters under appropriate distributional environments (Level: Evaluate, Analyse)

CO4: describe, apply and interpret the results of the linear regression model and generalised linear models. (Level: Understand, Apply, Analyse)

CO5: explain the fundamental concepts of Bayesian statistics and use them to compute Bayesian estimators. (Level: Understand, Apply)

2014UCHAAC: Actuarial Accounting 1

Course Objective:

The aim of this course is to

1. provide a basic understanding of corporate finance
2. provide knowledge of the instruments used by companies to raise finance

Course Outcome:

On successful completion of this course, student should be able to

CO1: understand how companies are governed and structured (Level: Understand)

CO2: suggest appropriate ways to finance a company (Level: Analyse)

CO3: understand how to calculate company's taxable income (Level: Understand)

CO4: evaluate projects (Level: Evaluate)

2014UCHAMA: Mathematics for Actuaries 1

Course Objective:

The aim of this course is to provide a basic understanding of mathematical concepts needed for studying actuarial science

Course Outcome:

On successful completion of this course, student should be able to

- CO1: use numerical methods to understand accuracies of calculations (Level: Understand, Apply)
- CO2: apply matrix and determinants for solving equations (Level: Apply)
- CO3: understand the basics of calculus to build on further (Level: Understand)
- CO4: use basic algebraic concepts in actuarial modeling (Level: Apply)
- CO5: apply finite differences and difference equations in actuarial applications (Level: Apply)

2015UCHARP: R Programming (Practical)

Course Objective:

1. Gain a foundational understanding of business analytics using R programming
2. Master the R programming and understand how various statements are executed in R

Course Outcome:

On successful completion of this course, a student shall be able to

- CO1: Gain an in-depth understanding of data structure used in R and learn to import/export data in R (Level: Understand)
- CO2: Define, understand and use the various apply functions and DPLYR functions (Level: Apply)
- CO3: Understand and use the various graphics in R for data visualization (Level: Apply)
- CO4: Gain understanding of use of R for calculating statistical measures and interpret them (Level: Understand)
- CO5: Apply hypothesis testing methods and regression models using R (Level: Apply)
- CO6: Learn and use clustering methods including K-means, DBSCAN, and hierarchical clustering – all using R (Level: Apply)

Semester 2

2021UCHAES: Environmental Studies

Course Objective:

To provide a basic understanding of environment around us in terms of natural resources, institutions and people around us, changes appearing in the environment, measuring their impact, assessment of risk and some methods of managing such risks.

Course Outcome:

On successful completion of this course, a student shall be able to

- CO1: Describe what is importance of environmental study (Level: Knowledge)
- CO2: State the natural resources around us (Level: Understand)
- CO3: Describe ecosystems and their characteristics (Level: Understand)
- CO4: Describe biodiversity and its significance (Level: Understand)
- CO5: Describe different types of pollution and their impact (Level: Knowledge)
- CO6: Discuss social issues and environment (Level: Knowledge)
- CO7: Describe how human population is affected by environmental issues (Level: Understand)
- CO8: Describe actuarial and statistical models useful in assessing certain environmental risks and methods to deal with those risks (Level: Apply)

2022UCHAAS: Actuarial Statistics 2A (Theory and Practical)

Course Objective:

The aim of this subject is to provide a strong background of mathematical and statistical modeling techniques that are of particular relevance to actuarial work, including time series analysis and its applications

Course Outcome:

On successful completion of this subject, a student will be able to:

- CO1: describe and use statistical distributions for risk modeling (Knowledge, Apply)
- CO2: describe the main concepts underlying the analysis of time series models (Understand)
- CO3: describe and apply basic principles of machine learning (Knowledge, Apply)

2023UCHAAS: Actuarial Statistics 2B (Theory and Practical)

Course Objective:

The aim of this subject is to provide a strong background of mathematical and statistical modeling techniques that are of particular relevance to actuarial work, including stochastic processes and survival models and their application.

Course Outcome:

On successful completion of this subject, a student will be able to:

CO1: describe and apply Markov chains and Markov processes (Level: Knowledge, Apply)

CO2: describe and apply techniques of survival analysis (Level: Knowledge, Apply)

CO3: describe and apply methods of Graduation (Level: Knowledge, Apply)

CO4: test statistically the graduated rates for appropriateness (Level: Analyse)

2024UCHAAC: Actuarial Accounting 2

Course Objective:

The aim of this course is to

1. provide a basic understanding of accounting principles
2. provide the ability to interpret the accounts and financial statements of companies and financial institutions
3. provide an understanding of how to manage financial risk

Course Outcome:

On successful completion of this course, student should be able to

CO1: construct statement of income, balance sheet and cashflow statement (Level: Create)

CO2: analyse published accounts (Level: Analyse)

CO3: produce management information (Level: Create)

2024UCHAMA: Mathematics for Actuaries 2

Course Objective:

The aim of this course is to

1. provide a basic understanding of certain mathematical concepts needed for studying actuarial science
2. provide basics of machine learning

Course Outcome:

On successful completion of this course, student should be able to

CO1: understand apply differential calculus in actuarial analysis (Level: Apply)

CO2: understand apply integral calculus in actuarial analysis (Level: Apply)

CO3: understand certain more theories of calculus (Level: Knowledge)

CO4: understand basics of machine learning (Level: Knowledge)

2025UCHAEX: Advanced Excel with Macros [Practical]

Course Objective:

This course is aiming at providing grounding in Excel and its advanced features including various **Excel** functions useful in actuarial analytics and enable building Excel macros using visual basic.

Course Outcome:

On successful completion of this course, student should be able to

CO1: Demonstrate knowledge of Utility, Specifications (Knowledge)

CO2: Creating and Operating on worksheets: Entering data, editing data, Window view controls, working with cells and ranges, Introducing Tables, formatting worksheets, using and creating Templates, printing from worksheets (Create, Apply)

CO3: Demonstrate Working with formats and functions: Introducing formulas and functions (Knowledge)

CO4: Creating formulas using functions useful for text manipulation, date and time related applications, counting and summing, formulas to LookUp values, useful for financial and statistical applications and formulas with array functions (Create)

CO5: Creating charts and graphics: create and edit charts of the following types: Column, Bar, Line, Pie, XY charts (Create)

CO6: Use Advanced Features: Creating and using outlines, linking and consolidating worksheets, sharing data with other applications, analyzing data using MS Query with external database files, performing what-if analysis, analyzing data using Goal Seek and Solver (Apply)

CO7: Demonstrate Programming Ability in EXCEL with VBA using VBA sub-procedures and VBA functions, Create VBAMacros, record actions to create them, write VBA Code. (Apply)

Semester 3

2031UCHAM: Actuarial Mathematics 1A

Course Objective:

The aim of this course is to provide a grounding in the principles of modeling as applied to actuarial work – focusing particularly on deterministic models which can be used to model and value known cashflows

Course Outcome:

On successful completion of this course, student should be able to

CO1: describe the basic principles of data analysis in actuarial modeling (Level: Knowledge)

CO2: calculate present value, real value of money (Level: Evaluate)

CO3: modify financial values at different times by inflating/deflating them to compare (Level: Analyse)

CO4: describe, interpret and discuss the theories on interest rates (Level: Knowledge, Analyse)

CO5: use interest rate models for decision making in various actuarial applications (Level: Apply)

2032UCHAM: Actuarial Mathematics 1B

Course Objective:

The aim of this course is to provide a grounding in the principles of modeling as applied to actuarial work – focusing particularly on deterministic models which can be used to model and value known cashflows as well as those which are dependent on death, survival, or other uncertain risks.

Course Outcome:

On successful completion of this course, student should be able to

CO1: understand and apply equation of values by cashflow inflation/deflation approach (Understand, Apply)

CO2: describe, interpret and discuss mathematical techniques used to model and value cashflows which are contingent on mortality and morbidity risks [including single decrement models and multiple decrement models] (Knowledge, Apply, Analyse)

2033UCHAM: Actuarial Mathematics 1C

Course Objective:

The aim of this course is to provide a grounding in the principles of modeling as applied to actuarial work – focusing particularly on deterministic models which can be used to model and value known cashflows as well as those which are dependent on death, survival, or other uncertain risks.

Course Outcome:

On successful completion of this course, student should be able to

- CO1: determine premiums for life insurance plans with or without profit (Analyse)
- CO2: determine premiums/benefits for benefit plans for individual life coverage plans (Analyse)
- CO3: understand reserves and calculate reserves (Knowledge, Evaluate)
- CO4: develop capability to perform profit testing to finalise premiums (Analyse, Apply)

2034UCHAM: Actuarial Mathematics 1 (Practical)

Course Objective: The aim of this course is to provide a grounding in the principles of modeling as applied to actuarial work – focusing particularly on deterministic models which can be used to model and value known cash flows as well as those which are dependent on death, survival, or other uncertain risks.

Course Outcome: On successful completion of this course, student should be able to

- CO1: apply the basic principles of data analysis in actuarial modeling (Level: Apply)
- CO2: apply, interpret and discuss mathematical techniques used to model and value cashflows which are contingent on mortality and morbidity risks (Level: Apply, Analyse)
- CO3: use spreadsheet software for a variety of calculations (including use of first principle and various software functions) (Level: Apply)

2035UCHAIP: Insurance Principles and Designing of Insurance Products (Theory and Practical)

Course Objective:

The aim of this course is to provide a grounding in the principles of insurance, underwriting process, sales process, claim process and types of life and non-life insurance products (including designing of products).

Course Outcome:

After successful completion of this course, student should be able to

- CO1: Describe Purpose and Process of insurance (Understand)
- CO2: Apply their understanding in designing insurance contract needs (Apply)
- CO3: State the purpose and products of life insurance processes from acceptance of application till closure due to claim or otherwise (Understand)
- CO4: Describe products of employee benefits (Understand)
- CO5: Describe products of Non-life insurance (Understand)
- CO6: Appraise Rating practices and premium calculations (Apply)

Semester 4

2041UCHAM: Actuarial Mathematics 2A

Course Objective:

The aim of this course is to provide a grounding in the principles of modeling as applied to actuarial work – focusing particularly on investors' mind frame and behaviour that may affect investment decisions. This will enhance ability to communicate with other financial professionals and critically evaluate modern financial theories.

Course Outcome:

On successful completion of this course, student should be able to

- CO1: describe, interpret and discuss the theories on the behavior of financial markets (including models for interest rates) (Level: Knowledge, Apply)
- CO2: discuss the advantages and disadvantages of different measures of investment risk (Level: Understand, Analyse)
- CO3: use them for decision making in various actuarial applications (Level: Apply)

2042UCHAM: Actuarial Mathematics 2B

Course Objective:

The aim of this course is to provide a grounding in the principles of modeling as applied to actuarial work – focusing particularly on stochastic asset models which can be used to make investment decisions. These skills are also required to communicate with other financial professionals and to critically evaluate modern financial theories.

Course Outcome:

On successful completion of this course, student should be able to

- CO1: describe, construct, interpret and discuss the models underlying asset valuations, portfolio design, security prices, interest rates and credit risk. (Level: Create, Apply, Analyse)
- CO2: describe properties of Standard Brownian motion (Level: Knowledge)
- CO3: understand development of stochastic calculus and its applications (Level: Understand, Apply)

2043UCHAM: Actuarial Mathematics 2C

Course Objective:

The aim of this course is to provide a grounding in the principles of modeling as applied to actuarial work – focusing particularly on deterministic and stochastic liability models and the valuation of financial derivatives. This will enhance ability to communicate with other financial professionals and critically evaluate modern financial theories.

Course Outcome:

On successful completion of this course, student should be able to

- CO1: describe ruin situation, calculate ruin probability and determine capital needed to restrict ruin chances (Level: Knowledge, Evaluate, Apply)
- CO2: describe, construct, interpret and discuss the models underlying liabilityvaluations (Level: Knowledge, Evaluate, Apply)
- CO3: describe, construct, interpret and discuss the models underlying optionpricing. (Level: Knowledge, Evaluate, Apply)

2044UCHAM: Actuarial Mathematics 2 (Practical)

Course Objective:

The aim of this course is to provide a grounding in the principles of modeling as applied to actuarial work – focusing particularly on stochastic asset liability models and the valuation of financial derivatives. These skills are also required to communicate with other financial professionals and to critically evaluate modern financial theories

Course Outcome:

On successful completion of this course, student should be able to :

- CO1: apply the theories on the behavior of financial markets (Level: Apply)
- CO2: calculate different measures of investmentrisk (Level: Evaluate)
- CO3: apply the models underlying assetvaluations (Level: Apply)
- CO4: apply the models underlying liabilityvaluations (Level: Apply)
- CO5: apply the models underlying optionpricing (Level: Apply)

2045UCHADA: Data Analytics (Theory and Practical)

Course Objective:

The aim of this course is to provide a grounding in the applications of R- programming, Excel and other softwares in business analytics

Course Outcome:

After successful completion of this course, student should be able to

CO1: Demonstrate skills to analyse business problems and solve them with the help of various technological tools including R-Programming,Excel (Knowledge, Apply, Analyse)

CO2: Appraise Big Data needs and techniques to tacklethem (Knowledge)

CO-PO Mapping Table 2020-21

Semester	Course Name	Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Semester 1	Foundation Course	2011UCHAFC	*	*					*
	Actuarial Statistics 1A	2012UCHAAS	*	*	*		*	*	
	Actuarial Statistics 1B	2013UCHAAS	*	*	*		*	*	
	Actuarial Accounting 1	2014UCHAAC	*	*	*			*	
	R Programming (Practical)	2015UCHARP	*	*	*		*		
Semester 2	Environmental Studies	2021UCHAFC	*	*		*			
	Actuarial Statistics 2A	2022UCHAAS	*	*	*		*	*	
	Actuarial Statistics 2B	2023UCHAAS	*	*	*		*	*	
	Actuarial Accounting 2	2024UCHAAC	*	*	*				
	Advanced Excel with Macros	2025UCHAEX	*	*	*		*		

	(Practical)								
Semester 3	Actuarial Mathematics 1A	2031UCHAM	*	*	*				
	Actuarial Mathematics 1B	2032UCHAM	*	*	*				
	Actuarial Mathematics 1C	2033UCHAM	*	*	*			*	
	Actuarial Mathematics 1 (Practical)	2034UCHAM	*	*	*		*	*	
	Insurance Principles and Designing of Insurance Products	2035UCHAIP	*	*	*	*		*	
Semester 4	Actuarial Mathematics 2A	2041UCHAM	*	*	*				
	Actuarial Mathematics 2B	2042UCHAM	*	*	*				
	Actuarial Mathematics 2C	2043UCHAM	*	*	*			*	
	Actuarial Mathematics 2 (Practical)	2044UCHAM	*	*	*		*	*	
	Data Analytics	2045UCHADA	*	*	*	*	*		
Semester 5	Actuarial Economics 1	2051UCHAE	*	*	*				
	Actuarial Business Management	2052UCHABM	*	*	*	*		*	
	Actuarial Project - 1	2053UCHAP	*	*	*	*	*	*	
	Securities Laws	2054/5UCHASL	*	*	*	*		*	*
	Life Insurance	2054/5UCHALI	*	*	*	*		*	
	Employee Benefits and Laws	2054/5UCHAEB	*	*	*	*		*	
	Financial Reporting Standards	2054/5UCHAFR	*	*	*	*			
	Actuarial Business Communication 1	2056UCHABC	*	*	*	*			

Semester 6	Actuarial Economics 2	2061UCHAE	*	*	*				
	Insurance Laws	2062UCHAIL	*	*	*	*		*	*
	Actuarial Project - 2	2063UCHAP	*	*	*	*	*	*	
	Social Insurance	2064/5UCHASI	*	*	*	*		*	
	Non-life Insurance	2064/5UCHANL	*	*	*	*		*	
	Health Insurance	2064/5UCHAHI	*	*	*	*		*	
	Finance and Investment	2064/5UCHAFI	*	*	*	*		*	
	Actuarial Business Communication 2	2066UCHABC	*	*	*	*			