



UNIVERSITY OF KERALA

DEPARTMENT OF DEMOGRAPHY

M. Sc. Programme in Actuarial Science

CREDIT AND SEMESTER SYSTEM

Regulations, Schemes and Syllabus for M. Sc. Degree Course in Actuarial Science

1. Objectives of the Masters Degree Course

- a) To equip students with a high level of knowledge on the Actuarial theory and practice and their various applications in practice
- b) To enable students to become efficient decision makers when they have to occupy positions where an actuarial expertise and risk theory are an essential component
- c) To enable students to disseminate acquired knowledge by acting as resource persons for imparting such knowledge to others
- d) To enthuse students to use such acquired knowledge as a foundation for developing professional skills to promote public interest
- e) The course also aims to give solid grounding for further intensive studies and research which are now highly in demand in the field of insurance, banking, investment, financial services, risk management, regulatory needs etc.

2. Eligibility

The qualification for admission to the M. Sc. Actuarial Science is a Bachelor's Degree in Statistics/Mathematics of this University or the Degrees of any University recognized by this University as equivalent thereto, with not less than 55 percent marks subject to the rules of relaxation of minimum marks for SC/ST candidates.

3. Admission Procedure

Admission to the M. Sc. Course will be made on the basis of the marks secured in the qualifying examination and in the Common Entrance Test as follows.

The percentage of marks obtained for the Bachelor's Degree will be converted to the percentage on 50.

Bachelor's Degree	50 marks
Common Entrance Test	50 marks
Total	100 marks

4. Number of seats

A total of 10 (ten) candidates will be admitted to the M. Sc. Course

5. Syllabus

SEMESTER ONE

Course Code	Course Title	Credit
DEM 513	Techniques of Demographic Analysis – Part -I	4
DAS 511	Foundations of Financial Mathematics – Part I	4
DAS 512	Principles of Insurance	4
DAS 513	Probability and Statistics	4
	Elective -1 (One from Group A)	2

SEMESTER TWO

Course Code	Course Title	Credit
DEM 521	Techniques of Demographic Analysis – Part II	4
DEM 523	Population and Public Health	4
DAS 521	Foundations of Financial Mathematics – Part II	4
DAS 522	Group Insurance and Employee Benefits	2
DAS 523	Practical	2
	Elective -2 (One from Group A)	3
	Elective-3 (One from Group B)	4

SEMESTER THREE

Course Code	Course Title	Credit
DAS 531	Life and Other Contingencies – Part I	4
DAS 532	Multivariate Analysis and Computer Applications	4
DAS 533	Basic Rate making and related matters in General Insurance	4
DAS 534	Risk Management	2
DAS 535	Reinsurance (Basic Principles and Techniques)	2
	Elective -4 (Another from Group B)	3

SEMESTER FOUR

Course Code	Course Title	Credit
DAS 541	Life and Other Contingencies – Part II	4
DAS 542	Estimating Unpaid Claims in insurance (Basic Techniques)	4
DAS 543	Basic Principles of Investment	2
DAS 544	Project Work	6
	Micro Economics (Elective)	2

LIST OF SUBJECTS UNDER ELECTIVES

Course No.	Course Title
DAS 501A	Role of Actuaries in Insurance and other sectors
DAS 502A	Set up and Operation of a Life Insurance Office
DAS 503A	Life Insurance Products
DAS 504A	General Insurance Lines
DAS 505A	Research Methodology
DAS 506A	Catastrophe Risks
DAS 507A	Agriculture Insurance
DAS 508A	Objects of Insurance Regulation
DAS 509A	Relative merits and demerits of Defined Contribution and Defined Benefit Pension
DAS 510A	Micro Economics

DETAILED SYLLABUS

DEM 513	Techniques of Demographic Analysis – I	4 Credits	Semester I
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Aim of the course

The aim of the course is to upto date knowledge of available tools for analyzing demographic data obtained from surveys, census and vital registration systems. This course helps to understand all the mathematical procedures that measure population change and its underlying factors and help in visualizing the future prospects of population growth.

Course Description

Techniques for measuring population structure, growth and distribution are explained as spatial distribution of population and growth are the important aspects of population and indicate the areal differences in economic development. Helps to have knowledge about sources of demographic data, quality of data and adjustments. Basic measures of fertility and reproduction are explained inorder to understand the population dynamics and human reproduction process for the effectiveness of population control programmes and their evaluation. Different measures of nuptiality and techniques for analyzing the marital data in understanding the process of marriage and its dissolution. Migration which forms as an important component of population growth.

Module-wise Syllabus

- Module 1** Introduction : Concepts and Definitions of terms, fertility, mortality, Nuptiality, Migration.
- Module 2** Structure of Population: Measures of Age and Sex Composition of the Population. Age pyramid, Quality of Age data, Errors in demographic data – Whipple’s Index, Myer’s Index, UN Joint Score Index.
- Module 3** Sources of data – Census, Vital Statistics, Sample Surveys, Population registers, Quality of Data – Evaluation and Adjustment of Demographic Data Interpolation and Graduation
- Module 4** Population Growth : Measures of Population growth – Balancing Equation, Arithmetic, Geometric, Exponential, Logistic. Doubling Time.
- Module 5** Rates and Ratios – Person years lived, Crude and Specific Rates, Standardization – Direct and Indirect Methods : Components of Rates
- Module 6** Mortality Measures Introduction, Crude and Specific Rates, standardized/Rates Infant Mortality – Infant Mortality Rate, Neo-natal mortality rate, Post neonatal mortality, Peri natal mortality, Foetal Death,

Morbidity: Prevalence and Incidence Rates, Maternal Mortality

Module 7 Fertility Measures :Introduction, Concepts, Types of Analysis: Period and Cohort Measures - Crude and Specific Rates, Standardised Rates Coale's Fertility indices –Total Fertility Rate, Gross Reproduction Rates, Net Reproduction Rate, Replacement Index.

Module 8 Measures of Nuptiality – Introduction, Crude Marriage rate, General Marriage rate, Age – Specific Marriage rate , Total Marriage rate, Mean Age at Marriage, Singulate Mean Age at Marriage.

Module 9 Migration and Urbanization :Introduction and Concepts, Measures of Migration, Measures of Urbanization : Degree, Tempo and Concentration, Population and Distribution. Centrality and Hierarchy.

Module 10 Labour Force : Measures of Dependency – Age and Economic – Work Participation Rates.

Assessment Details

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment*	60
	Total	100

***attend 5 questions out of 7 questions.**

References

1. Barclay G W Techniques of Population Analysis, New York, John Wiley and Sons, Inc
2. Hinde, Andrew Demographic Methods, London,1998
3. Jaffe A J Hand Book of Statistical Methods for Demographers, Washington, US Govt. Printing Office
4. MISRA B D An Introduction to the Study of Population, Madras, Publishing

5. Athak, K.B.& F.RAM Techniques of Demographic Analysis, Mumbai, Himalaya Publishing house.
6. Pollard J H Demographic Techniques Australia, Pengamon Press.
7. Preston, Samuel H, Patrick Heuveline and Michel Guillot: Demography – Measuring and Modeling Population Processes.
8. Ramakumar R Technical Demography, New Delhi, Wiley Eastern Ltd.
9. Shryock, Henry S, Jacob S Seigel and Associates, The Methods and Materials of Demography Vol. 1 & 2, Washington DC US Bureau of the Census.
10. SPEEGELMAN M Introduction to Demography Cambridge, Harvard University Press
11. Srinivasan K Basic Demographic Techniques and Applications, New Delhi Sage Publications.

DAS 511	Foundations of Financial Mathematics Part – I	4 Credits	Semester I
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Aim Of The Course

The course aims to develop a mathematical sense of financial transactions through the applications of various mathematical techniques. The ease of calculations involving compound interest rates and annuity functions should be achieved.

Course description

On completion of the course student will be able to understand financial problems arised from various industrial situations and he/she will be equiped to apply different techniques to solve them. The arithmetic and problem solving ability will be sharpened. It also enables a student a professional way of approaching a financial problem involve different types of annuities.

Module-1 Cash Flow Models and time value of money-Introduction, cash flow process, examples of cash flow scenarios, a zero-coupon bond, a fixed interest security, an index-linked security, cash on deposit, an equity, an annuity certain, an interest-only loan, a repayment loan (or mortgage), simple interest, compound interest, present values, simple discount, investing over a period, converting between different effective rates.

Module-2 Interest rates – introduction, nominal rate of interest-definition, accumulation factors, principle of consistency, the force of interest, formules for accumulation factor, present values, the basic compound interest fuctions, interest payable pthly

- Module-3** Present Values and Accumulated values using interest rates – introduction, present values of cashflows-discrete cashflows, valuing cashflows, constant interest rates, payment streams, sudden changes in interest rates, interest income
- Module-4** Level Annuities and determination of their values- introduction, present values payment made in arrear, payments made in advance, accumulations, continuously payable annuities, annuities payable pthly- present values, accumulations, non-integer values of n,
- Module-5** Decreasing and increasing annuities including deferred annuities – varying annuities- annual payments, continuously payable annuities, decreasing payments, special cases- irregular payments, sudden changes in interest rates, compound increasing annuities, deferred annuities-annual payments, continuously payable annuities, annuities payable pthly
- Module-6** Equations of Value and its applications – introduction, the equation of value and the yield on a transaction, solving for an unknown quantity, solving for the amount of a payment, solving for the timing of a payment, solving for the interest rate, uncertain payment or receipt-probability of a cashflow, higher discount rate.

Assessment Details

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References

1. Mark S. Joshi "The Concepts and Practice of Mathematical Finance", Cambridge University Press, 2nd Edition (2008)
2. Mc Cutcheon and Scott "Introduction to the Mathematics of Finance", Heinemann Professional Publishing, 1989
3. Paul Wilmott, Sam Howison and Jeff Dewynne "The Mathematics of Financial Derivatives" Cambridge University Press, 1995
4. S. M Ross "An introduction to Mathematical Finance", Cambridge University Press

DAS 512	Principles of Insurance	4 Credits	Semester I
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Aim of the course

The primary aim of this course is to gain knowledge on most basic principles of insurance and its practice. The student has to appreciate those principles which are unique to insurance business.

Course Description

The course is mostly theoretical in nature. It demand a lot of reading from different books to assimilate basic principles of insurance. Through out this this course finding apt and accurate examples plays the key role in understanding basic principles. Certain problems that are very unique with insurance theory and practice is also mentioned.

Module-1 Concept of Insurance and its origin – Insurance not a wagering contract, the concept of insurance, History of Insurance in India-Liberalization of the Indian Insurance Sector, Transfer of Insurance Policy, Importance of insurance contracts and its social benefits.

Module-2 Development of Insurance and modern classification -the different classes of insurance, the importance of the insurance industry, Scope of Insurance Business, Modern classifications of business, Modern sectors of business.

Module-3 Basic Principles - Utmost Good Faith, Principle of Indemnity and guarantee, Utmost good faith and business activity of the management, Variations in applications of indemnification in different sectors of insurance business.

Module-4 Basic Principles – Insurable Interest. Identification of insurable interest, Identification of insurance fraud, Addressing the question of how much insurance is needed for a particular risk, Over covered and under covered problems.

- Module-5** Basic Principles – Proximate cause for claims-Importance of proximate cause, How can identify it, Various ways claims decision.
- Module-6** Subrogation and Contribution - define subrogation and contribution, effect of subrogation principles, discuss contributions, Basic principles and their applications, How the basic principles integrate as a whole insurance principles.
- Module-7** Nomination and assignment - work of nomination, work of assessment, Ways of nomination and assessment.

Assessment Details

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References

1. Neelam C Gulati "Principles of Insurance Management", Excel Books, New Delhi, (2007)
2. Harriett E Jones "Principles of Insurance "FLMI Insurance Education Programme, Life Management Institute LOMA, (Dec 1995)
3. Robert I Mehr "Principles of Insurance "Richar D Irwin (Ed.), 8th Edition, 1985
4. Ben G Baldwin "The New Life Insurance Investment Advisor" 2nd Edition, Mc Graw Hill

DAS 513	Probability and Statistics	4 Credits	Semester I
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Aim of the course

To develop a clear understanding of statistical theory on data management as it is the backbone of actuarial analysis. On completion of the course a student will be able to apply basic analytical tools to a set of data.

Course Description

Course starts with elementary set theory and elementary probability theory. Fourteen different types of continuous and discrete distributions are discussed with a measure of their respective moments. ANOVA and time series analysis are discussed and practiced at the conclusion of the course.

- Module 1** Matrix theory: Rank of a matrix, elementary operations, Inverse of a matrix, Eigen values, Permutation and Combination
- Module 2** Univariate Descriptive Statistics-Variables, Types of variables, Frequency distribution and graphic representation, Measures of central tendency and dispersion.
- Module 3** Probability - Meaning basic concepts, a priori Probabilities, Addition theorem, Multiplication theorem, Conditional probability, Bayes Theorem
- Module 4** Standard Distributions - Uniform distribution-(discrete & continuous) Binomial, Poisson and Normal distribution
- Module 5** Sampling- Probability and Non-Probability Sampling, different sampling methods, Design effect. Small sample test- Student's- t distribution, chi-square test, F-test.
- Module 6** Analysis of Variance-One way classification Two way classification
- Module 7** Correlation and Regression – Relation between variables, Curve fitting and Principle of test squares, two regression lines, Angle between regression Lines, Pearson coefficient of correlation, Rank Correlation Coefficient, testing of Correlation Coefficient
- Module 8** Analysis of Time Series- Introduction, Meaning, Uses, Components of Time Series, Measurements of trend, Various methods.

Assessment Details

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References

1. S.C Gupta, V.K Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi
2. S. C Gupta, V.K Kapoor, "Fundamentals of Applied Statistics", Sultan Chand and Sons, New Delhi
3. Dekking, F.M., Kraaikamp, C., Lopuhaa, H.P., Meester, L.E., "A Modern Introduction to Probability and Statistics" Springer Text Series, 2nd Edition
4. Chin Long Chiang "Statistical Methods of Analysis" World Scientific Books, 2003
5. Patrick Brocket Arnold Levine Saunders "Statistics and Probability and their Applications", College Publishing, USA

DEM 521	Techniques of Demographic Analysis –Part II	4 Credits	Semester II
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Aim of the course

The aim of the course is to upto date knowledge of available tools for analyzing demographic data obtained from surveys, census and vital registration systems. This course helps to understand all the mathematical procedures that measure population change and its underlying factors and help in visualizing the future prospects of population growth.

Course Description

Techniques for measuring longevity – Life Tables, Population projections which deals with computations of future population size and their characteristics based on a knowledge of the past trends and realistic assumptions about the future trends in the components of its change – fertility, mortality and migration, which is required for the development planning process.

Module-wise Syllabus

- Module 1** Life Table : Concepts, Assumptions, Construction of Life tables-Complete and Abridged -.Various types – Force of Mortality, Uses of Life Tables. Single Decrement Associated Life tables.
- Module 2** Multiple Decrement Life table – Multi State Life table, Applications of Nuptiality Tables, Contraceptive Effectiveness, Working Life Tables.
- Module 3** Structure of Population – Stable, Quasi-stable, Stationary Population, Lotka’s Stable Population Theory, Applications–Population Momentums, Reproductive value.
- Module 4** Population Estimation and Projections – Methods of Population estimation and Projection – Mathematical and Cohort Component methods, Assumptions, on fertility, Mortality and Migration.
- Module 5** Sub-National Population Projections – Various Methods, URDG, Projection of

Assessment Details

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References

1. Coale A J, The Growth and Structure and Human Population – A Mathematical Investigation : Princeton Univ. Press, Princeton
2. Coale A J & Demeny P: Regional Model Life Table and Stable Population : Princeton Univ. Press, Princeton
3. Frejka James, Future of Population Growth: Alternate Paths to Equilibrium: John Wiley and Sons, Inc. N.York
4. Henry, Louis, Population Analysis and Model: London, Edward Arnold
5. Hinde Andrew, Demographic Methods: London, Arnold
6. Keyfitz N, Introduction to the Mathematics of Population London, Wesley
7. Keyfitz N, Applied Mathematical Demography John Wiley and Sons
8. Krishnan Namboodiri & Suchindran C M, Life Table Techniques and their Applications Florida, Academic Press
9. Land Ckenneth & Rogers Andri, Multidimensional Mathematical Demography New York, Academic Press
10. Pathak K B & F Ram, Techniques of demographic Analysis, New Delhi, Himalaya Publishing House

11. Pittenger B Donald , Projecting State and Local Population Cambridge Battenger Publishing Company
12. Pollard J H, Mathematical Models for the Growth of Human Population, London Cambridge Univ. Press
13. Preston Samuel H Patrick Heuveline & Michel Guillot, Demography Measuring & Modeling Population Processes Oxford, Blackwell
14. Ramakumar R, Technical Demography, New Delhi, Wikey Eastern Ltd.
15. Shryock H S et al, The Methods and Materials of Demography, New York, Academic Press
16. United Nations, Manual III Methods for Population Projection by Sex and Age: New York
17. United Nations, Methods of Analysing Census Data on Economic Activities of the Population, New York.

DEM 523	Population and Public Health	4 Credits	Semester II
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Prerequisites: There are no prerequisites

Aim of the Course

The aim of the course is to impart knowledge on health, public health, Environment, reproductive and child health

Course Description

This course contains definition of health, epidemiology, morbidity, health and environment, health economics, reproductive health and nutrition.

Course Content:

- Module 1** Concepts of health and diseases- definition of health, physical development, indices of physical development.
- Module 2** Morbidity patterns of developing and developed countries, communicable and non –communicable diseases- Trends and patterns in India and Kerala, Morbidity and mortality link- Epidemiological and demographic Transition.
- Module 3** Health and Development- social determinants of of health , inter linkages between health and Development at local and national levels, globalization and poverty, impact of development Policies on health, Health equity.

- Module 4** Health and environment- Population, Environment and ecosystem
Environmental Health Issues, Prevention and Control of Environmental
Occupational health issue-Food safety, food contamination-Waste
management, POET variables- Population, Organisation, Environment and
Technology.
- Module 5** Basic Health Economics- Demand for health, Supply of Health and Health
Care Cost, Health insurance, Markets.
- Module 6** Health Programmes and Health Care Systems in India –National Health
Programmes- health care systems functioning in different states,
organizations and institutions – Gaps and probable solutions.
- Module 7** Reproductive physiology- the male and female reproductive systems,
Menstrual cycle, fertilization, conception and gestation, fecundity and
sterility, conception control, contraceptive methods , Medical Termination of
pregnancy [MTP]
- Module 8** Reproductive Health, Definition, General concepts, Maternal and child health,
Prenatal and Antenatal care, sanitation, Hygiene, Reproductive
Rights,STD,RTI,HIV/AIDS, Male involvement in Reproductive health- Indian
Scenario.
- Module 9** Nutrition-Nutrients Functions and Sources, Nutritional deficiency diseases,
Nutritional requirement of special groups- Pregnant and lactating
women and infants and children- Nutrition Survey, Nutritional Tables-
Nutritional situation in India (NFHS-1,2,3) Anemia.

Assessment Details

No	Assessment	Marks Assigned
1	Continuous Assessment	40
	Class Participation	5
	Assignments	10
	Mid Semester Exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	TOTAL	100

References

1. J E Park and K Park, Textbook of Preventive and Social Medicine
2. Kleinbaum D G; Kupper L L & Morgenstern H (1982) : “Epidemiologic Research – Principles and Quantitative Methods”. A Van Nostrand Reinhold Book, New York
3. Charles H Hennekens and Julie E Burning (1987), ‘Epidemiology in medicine’ edited by Sherry L Meyrent; Little, Brown and Company

4. W W Daniel (1974), Biostatistics: A foundation analysis in the Health Sciences, John Wiley and Sons, Inc. New York
5. Monica Das Gupta, L C Chen and T N Krishnan (Editors) "Epidemiologic and morbidity transition" in the book Health, Poverty and Development in India
6. Shyvin S Mader, 'Human Biology' Win C Brown Publishers
7. WHO (1971) International Health Regulations
8. Chatterji K D (1952), Human Parasites and Parasitic Diseases, Calcutta
9. Kark S L (1974), Epidemiology and Community Medicine
10. ICMR and ICSSR (1981) Health for All : An Alternative Strategy, Indian Institute of Education, Pune.

DAS 521	Foundations of Financial Mathematics – Part-II	4 Credits	Semester II
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Aim of the course

The course aims to develop fine understanding of the working and application of advanced financial products like loan, stocks, derivatives, options etc..The ability to apply the concept of randomness in various financial variables like interest rates will be achieved.

Course description

Creation of a systematic loan schedule is described. Comparison of two projects based on their respective cash flows is illustrated. A broad description of various higher order financial products and elementary practical compound interest problems will be analysed. The stochastic interest rates and performances of portfolios will be done practically.

Module-1 Analysis of Loan Schedules and EMI – introduction and an example, calculating the capital outstanding-the theory,prospective and retrospectiveloan calculation, calculating the interest and capital elements, the loan schedule, instalments payable more frequently than annually, consumer credit: flat rates and APRs

Module-2 Project Appraisals – introduction, estimating cashflows, fixed interest rates-accumulated value, net present values, internal rate of return, the comparison of two investment projects, different interest rates for lending and borrowing, payback periods, other considerations, measurement of investment performance-money-weighted rate of return, time-weighted rate

of return, linked internal rate of return

Module-3 Investments and their valuation- fixed interest government borrowings- fixed interest government bonds, government bills, fixed interest borrowing by other bodies- characteristics of corporate debt, debentures, unsecured loan stocks, eurobonds, certificate of deposit, shares and other equity-type borrowing-ordinary shares, preference shares, convertibles, property, derivatives, futures, options, swaps

Module-4 Some important Compound Interest problems – fixed interest securities- calculating the price, allowing for income tax, calculating yields, the effect of the term to redemption on the price, the effect of the term to redemption on the yield, optional redemption dates, deferred income tax, uncertain income securities-equities, property, real rate of interest-inflation adjusted cashflows, index linked bonds, capital gains tax

Module-5 Spot, forward contracts – Arbitrage – some discussions on derivatives – the "no arbitrage" assumption, forward contracts, calculating the forward price for a security with no income, calculating the forward price for a security with fixed cash income, calculating the forward price for a security with known dividend yield, hedging, the value of a forward contract.

Module-6 Interest rates variations related to term structure and their importance – discrete time-discrete time spot rates, discrete time forward rates, continuous time rates- continuous time spot rates, continuous time forward rates, instantaneous forward rates, theories of the term structure of interest rates, , yield to maturity, par yields, duration, convexity and immunisation.

Module-7 Stochastic interest models – basics- simple models, fixed interest rate models, varying interest rate model, the log-normal distribution,

Module-8 Portfolios, Different types of portfolios, Performance of Portfolios– equity Bonds and Macaulay's duration in Bonds.

Assessment Details

No.	Assessment	Marks assigned
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1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References

1. Mark S. Joshi " The Concepts and Practice of Mathematical Finance", Cambridge University Press, 2nd Edition (2008)
2. Mc Cutcheon and Scott "Introduction to the Mathematics of Finance", Heinemann Professional Publishing, 1989
3. Paul Wilmott, Sam Howison and Jeff Dewynne "The Mathematics of Financial Derivatives" Cambridge University Press, 1995
4. S M Ross " An introduction to Mathematical Finance", Cambridge University Press

DAS 222	Group Insurance and Employee Benefits	Credits	Semester II
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Aim of the course

A thorough understanding of group insurance concept through various branches of business will be achieved on completion of this course. The understanding level of work of various employee benefit schemes will be achieved.

Course description

The course content is mostly of descriptive nature. It narrates superannuation schemes, group life insurance schemes, gratuity benefits etc.. The advantages of group schemes and its social benefits are demonstrated throughout the course with well explained real time examples.

- Module-1** Introduction to Superannuation Schemes - Object of the Scheme-
Development of Scheme-Pension as a Retirement Benefit-Different ways of
arranging Schemes-Trustee Administered Schemes VIS-À-VIS Insured
Schemes-Employer to take Basic Decisions-Financial Resources-Non-
Contributory Schemes-Contributory Scheme-Approved Schemes-Unapproved
Schemes-Minimum Membership-Pattern of Benefits-Funding Media-Pension
on normal Retirement date-Commutation of Pension-Pension in other
Contingencies-Method of Costing Pensions-Single Premium Costing-Annual
Premium Costing- Single Premium Costing VIS-A VIS Annual Premium Costing-
Life Assurance to Augment Widow's Pension-Cash Accumulation system-
Costing of past Service Pensions
- Module-2** Group Life Insurance - Object of Scheme-Development of Scheme-Group
Insurance distinguished from individual Insurance-Conditions for Eligibility-
Eligible Groups-Group size and minimum participation-Employer must
contribute-Benefit Schedule-Financial Aspect-Group Selection-Rate Making in
Group Insurance-Experience Rating-Benefits-Group Insurance scheme in lieu
of E.D.L.I.Scheme,1976-Group Creditor Insurance-Level Premium Temporary
Assurance Plan-Group Life Insurance for Non-Employer Groups-Module
Linked Insurance Scheme-Group Savings Linked Insurance Scheme-Extension
of Term Assurance to individual needs
- Module-3** Gratuity benefit under Payment of Gratuity Act -Object of the Scheme-
Evolution of Gratuity as a Service Benefit-Nature of Liability-Need for Funding
Gratuity Liability-Different ways of meeting Gratuity Liability-Trustee
Administered Scheme VS Insured Scheme-Life Insurance Benefit-Some special
Aspects -Methods of Costing-Cash Accumulation System
- Module-4** Compensated paid absence – (Privilege and Sick Leave) - Recognised
Provident Fund-Employee's Provident Fund Scheme-Administration-
Employee's Family Pension Scheme-Employee's Deposit-Linked Insurance
Scheme
- Module-5** Group Savings Linked Insurance-Why Tax Relief?-Recognised Provident
Funds-Conditions for Recognition-Income Tax Relief-Approved
Superannuation Schemes-Conditions for Approval-Rationale of Conditions
- Module-6** Employees State Insurance Schemes-Two alternatives of arranging Pension-
Income tax Relief-Income Tax Liability-Trustees Liable to Deduct Tax-Taxation
Under Unapproved Schemes-Gratuity Schemes-Conditions for approval-
Rationale of conditions-Initial Contributions
- Module-7** Salient feature of Group Pension Schemes - Gratuity to be Paid in Lump sum-
Relief on Contributions-Gratuity Liable to Tax-Exemption from Tax on
Gratuity-Tax Relief-Gratuity paid by Employer is admissible Expenditure-

Contribution to be Paid for Claiming Relief-taxation under Group Insurance Schemes

Module-8 Group Medi Claims Schemes- The Computer-Equipment in use-Computer systems for Administration of Group Schemes-Group Insurance Schemes- Group Gratuity Schemes-Group Superannuation Schemes

Assessment Plan

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References

1. Group Insurance – William F Bluhm et el ISBN 978-1-56698-613-7
2. Group Insurance – A text Book by S G Diwan
3. Pensions – E M Lee
4. Payment of Gratuity Act 1972
5. Accounting Standard AS15 (revised 2005) by ICAI
6. Employees State Insurance Act & Rules
7. Essentials of Health Insurance Management – Principles and Practice – Michelle A Green & Mary Jo Brownie
8. Module Link Insurance Plan 1971 – UTI product details

9. Insurance regulatory and development authority guidelines and regulations relevant to these subjects.

DAS523	Practical	2 Credits	Semester II
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Aim of the Course

Basic analytic tool the students trained through various courses has to be supplemented with some practice in the lab. It will enable their ability to work with data and practical problems of analysis in an elementary level.

Course Description

The student will be given a list of problems from various parts of the course material already covered with a set of data. They have to reach possible conclusions and validate the same. The interpretation of their results has particular importance in this course.

Module 1 Questionnaire preparation, Data entry – Data view – variable view, insert variable, insert cases, sort cases, merge files, aggregate files, copy data set, split files, select cases, weight cases.

Module 2 Compute variable, count values within cases, record – into same variables, into different variables, automatic record, rank cases, time series creation, replace missing values, random number generators.

Module 3 Reports – OLAP cubes, case summaries, report summaries in rows and in columns, Descriptive statistics – frequencies, descriptives, explore, cross tabs, ratios, Q-Q plots, P-P plots. Tables – custom tables, multiple response sets.

Module 4 Parametric tests - Compare Means – Means, one sample t test, independent samples t test, paired-samples t test, one way ANOVA, Non-parametric tests – Chi square, Binomial, one sample K-S test, two samples tests.

Module 5 Data interpretation and inference, report writing.

Assessment Plan

No.	Assessment	Marks assigned
1	End Semester Assessment	100
	Total	100

DAS 531	Life and Other Contingencies –Part I	4 Credits	Semester III
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Aim of the Course

Develop a sound knowledge in different types of life tables and its applications and to develop technical knowledge to calculate premium and achieve a deep understanding of the concept of reserve.

Course Description

The financial interpretation of joint life and its impact on different life insurance products not only have business importance but also have social significance. The course introduces different joint life functions and discusses the optimum premium. It gives the important factors that has to be considered while a company decide to reserve a certain amount of money. Calculation of premium and the decision of reserve are the points of central importance.

- Module-1** Basic aspects of Mortality Tables – Mortality experience, the mortality table, probabilities of living and dying, graph of l_x
- Module-2** concept of force of mortality and application of calculus- The force of mortality, estimation of μ_x , laws of mortality
- Module-3** Select and Ultimate Mortality - Select period, selection, notations, ultimate mortality table, aggregate mortality table, comparison of these rates, pension fund tables
- Module-4** Important Mortality Tables in use – LIC (1970-73) ultimate at 6%, a(90) table for annuitants 8% interest, English life table N0.12 males, Annuity table a(55) males and females
- Module-5** Calculation of Pure premiums for Assurances and annuities - Pure endowments, Annuities, accumulations, assurances, net premiums, office premiums, varying annuities and assurances
- Module-6** Commutation Tables and their applications - C_x , D_x , M_x , N_x , R_x and S_x , simplifications of values of benefits and premiums using commutation functions
- Module-7** Policy Values, nature of reserves, prospective and retrospective methods - Nature of reserve, prospective and retrospective reserves, relationship between successive reserves, mortality profit

Module-8 Miscellaneous problems in annuity and assurances - Increasing life annuity, (increasing annually, continuously)

Assessment Details

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References

1. B.H. Smith "Contingencies of Value", Harward University Press, 1988
2. Alistair Neil "Life Contingencies", Butterworth-Heinemann Ltd., Illustrated Edition (1977)
3. Griffith Davis "Table of Contingencies", Longman & Co, 1825: University of California Library
4. Michael M Parmenter, "Theory of Interest and Life Contingencies with Pension", 3rd Edition.
5. Life and Other Contingencies- P F Hooker & L H Longley-Cook – Cambridge – ISBN 0- 521-05327-7

Students will be expected to read relevant papers currently available in the net

DAS 532	Multivariate Analysis and Computer Applications	4 Credits	Semester III
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Aim of the Course

The course is to train the students on a variety of statistical methods used to analyze measurements on two or more variables.

Course Description

This course intended to give the concepts , methods and application of various statistical techniques which helps to solve the problems of our day to day life.

RE-REQUISITES , IF ANY : KNOWLEDGE IN BASIC STATISTICS

COURSE CONTENT

- Module – 1** The need for Multivariate analysis in Actuarial Science- data requirements , Statistical modelling –need, causal relationships.Dummy variables, Multi Collinearity , Interaction, Auto correlation Homo Scedasticity, P- value
- Module – 2** Dummy variables, Multi Collinearity , Interaction, Auto correlation Homo Scedasticity, P- value.
- Module – 3** Correlation & regression, Bi variate linear Regression, Non Linear Regression- Least Square line as a casual model- Regression model as a statistical model – statistical inference, goodness of fit.
- Module – 4** Multiple Correlation and Regression-Multiple Regression with time predictor variables, Correlation matrix, Multiple Regression with three or more predictor variables, stepwise regression
- Module – 5** Path Analysis, Factor Analysis
- Module – 6** Multiple Classification Analysis, The basic MCA-unadjusted and adjusted values MCA with interactions.
- Module – 7** Linear probability model, Logit regression , model-Logistic function, Multivariate Logistic function and odds ratio, Statistical inference.
- Module –8** Survival Models-I - Life Tables, Actuarial Life Tables, Product Limit Life Table. Survival models-II- Proportional Hazard Model-Basic form, Baseline Hajnal

function, Relative risk, Hajnal Regression Coefficient as measure of effect-
Statistical inference, Goodness of Fit.

Module –9 Computer software for Multivariate Analysis – Introduction – Applications and hands out training.

Assessment Details

No	Assessment	Marks Assigned
1	Continuous Assessment	40
	Class Participation	5
	Assignments	10
	Mid Semester Exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	TOTAL	100

References

1. J Medhi “Statistical Methods – An Introductory Text” New Age International (P) Ltd. Publishers, New Delhi
2. Richard F Gunst and Robert L Mason “Regression Analysis and its application – A Data Oriented Approach” Library of Congress Cataloging in Publication Data 270 Madison Avenue, New York
3. Jane Miller “Statistics for Advanced Level – Second Edition” Press Syndicate of the University of Cambridge, New York
4. James Stevens Lawrence “Applied Multivariate Statistics for the Social Sciences” Erlbaum Associates, Publishers Hillsdale, New Jersey
5. Donald F Morrison “Multivariate Statistical Methods, Second Edition” Mc Graw Hill Book Company, Singapore
6. Alexander M Mood, Frankilin a Graynil and Guane C Boes “Introduction to the Theory of Statistics Third Edition” Mc Graw Hill Book Company, Singapore
7. Donald F Morrison “Multivariate Statistical Methos Second Edition” Mc Graw Hill Book Company, Singapore
8. George H Dunteman “Introduction to Linear Models” Sage, New Delhi

DAS 533	Basic Rate making and related matters in General Insurance	4 Credits	Semester III
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Aim of the Course

Be familiar with the real industrial practice of rate making. The student will be able to comprehend the real meaning different ratios relating to premium calculations. She/he will also achieve the structure of database that the insurance data is kept in a computer memory in order to calculate or analyze various objectives.

Course Description

A general picture of rate making manuals will be evolved at the beginning of the course. Various insurance terms are deeply explained with descriptive examples. The calculation of loss has central importance among all calculations. The structure of the database will be explained later with different concepts years. The course concludes with a detailed description of expense ratios.

- Module-1** Introduction – Origin and history of Rating Manuals, Basic Insurance terms, Fundamental insurance equation, Basic insurance ratios in use and simple calculations.
- Module-2** Rating Manuals – Rules, Underwriting, an example of a rating manual, Workman’s Compensation Act, Maintenance and up gradation of rate making manuals. Role of actuaries in maintaining Rate making manuals.
- Module-3** Nature of Insurance data. Collection and classification of data – data checking - Internal data, Maintenance of data, data aggregation, external data, use of database management systems.
- Module-4** Exposures in general insurance – Written exposures, Earned Exposures, Unearned exposures and in-force exposures illustrations with examples.
- Module-5** Premiten Premiums, Earned Premiums, Unearned Premiums and in-force premiums – Experience based Method, Model Based Methodums – Writ, Credibility ratings

Module-6 Distinction between Claim and Loss – Accounting for Losses-Loss definitions, loss data aggregation methods, common ratios involving loss statistics, adjustments to losses, extra ordinary losses, catastrophe losses changes in coverage or benefit levels, loss development, loss trend, overlap fallacy, loss adjustment expenses

Module-7 determination of Pure Premium and loading for contingencies and expenses.

Module-8 Expense Ratios – Underwriting Expense Ratio, Operating Expense Ratio and Combined Expense Ratio, Retention Ratio, calculation and compositions of the ratios and their interpretation

Assessment Details

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References:

1. Non-Life Insurance Mathematics – Erwin Straub ISBN 3-540-18787-1
2. Mathematical Methods in Risk Theory – Hans Buhlmann – ISBN 3-540-61703-5 –springer-verlag
3. Foundations of Casualty Actuarial Science Vol I
4. Introductory Statistics with applications in General Insurance – Hossack, Pollard & Zehnirith – Relevant chapters – ISBN 0-521-24781-0
5. Loss Distributions – Robert V Hogg, Stuart A Kulgmann – relevant chapters – ISBN- 0-471-87929-0
6. Basic Ratemaking – Geoff Werner – Casualty Actuaries Society USA publication

7. Papers on ratemaking available in the net
8. IRDA Regulations and guidelines in ratemaking

DAS 535	Reinsurance (Basic Principles, Techniques)	2 Credits	Semester III
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Aim of the course

Introduce the concept of reinsurance and its various methodologies is the primary aim of this course. A better capability of assessing various reinsurance treaties and working of reinsurance market around the globe will be evolved.

Course description

Reinsurance as an important variant of insurance business is described extensively. A good understanding on reinsurance treaties between an insurer and reinsurer will be established through practical examples. Various problems and its possible solutions around the globe in reinsurance market will be discussed at the conclusion of the course.

Module-1 Reinsurance – Introduction- Functions, Forms, Programs, cost of reinsurance - Nature of reinsurance, Law of large numbers, Risks emanating from the insured, Risks emanating from the insurer or reinsurer, Risks beyond the control of the contractual parties, Risks inherent to reinsurance, Uberrima fides, The situation in case of insolvency of the ceding insurer, Insolvency of the reinsurer, Historical background, Reinsurance in india, Reinsurance before nationalization, Statutory cessions, Pools, Reinsurance after nationalization, Reinsurance after liberalization, GIC Re, Regional co-operation, Functions of reinsurance, Increased capacity, Financial stability, Stabilization of claims ratio, Accumulation of claims under different classes, Spread of risks, Protection of solvency margins, Stabilize profitability, Other functions, Advantages of reinsurance

Module-2 Reinsurance Pricing – Facultative, Quota Share, proportionate etc – original Premium and Risk Premium Methods - Facultative reinsurance, Treaty reinsurance, Facultative obligatory treaty, consideration for facultative placement,

Module-3 Reinsurance Treaties – Proportional Surplus reinsurance, Quota share, Proportional treaty, The reinsurer's share, The business covered, The class of

business covered, The territorial scope, Underlying basis, Exclusions, Bordereaux, Premiums, Ceding commission, Claims, Quota share treaty, Quota share and surplus combined, Inception and termination, Specimen treaty slip, Specimen of surplus treaty slip

Module-4 Stop Loss and Excess of Loss differentiated - Non-proportional Catastrophe - Excess of loss-working (per risk), Cover, Excess of loss-catastrophe, Stop loss, Aggregate excess of loss, Non-proportional treaty, Ultimate net loss, The reinsured's retention ?, Per risk Premium Burning cost Exposure rating/ pareto loss distribution analysis, Reinstatement Claims, Inception and termination Specimen treaty slip, Specimen of catastrophe excess of loss slip

Module-5 Reinsurance Commission - Settings retentions, Factors influencing retention, The insurer's assets, capital, free reserves, The portfolio of risks, Corporate liquidity, Competition and rating in the market, Types of retentions, Examples of accumulation within a branch, Examples of accumulation between branches, Fixing retentions for property insurance, Fixing retention for property-engineering insurance, Fixing retention-accident/liability insurance, Fixing retention for marine- cargo insurance, Fixing retention in marine – hull insurance, Fixing retention in aviation insurance, Fixing retention in life insurance, Special factors for- property, accident/ liability, marine and aviation reinsurance, Life reinsurance, Property reinsurance, Fire reinsurance, Engineering reinsurance, Industrial all risks reinsurance, All risks property package reinsurance, Accident/liability reinsurance, Marine reinsurance, Reinsurance methods, Aviation reinsurance, General exclusions Life reinsurance.

Module-6 Reinsurance Loss Reserving - Programme objectives, Primary objectives, Other objectives, Gross to net evaluation, Reinsurer's accounts Funds flow and liquidity.

Module-7 Miscellaneous topics associated with reinsurance - Negotiation and placement, Key considerations in negotiations, Marker considerations, Forms of reinsurance, Reciprocal negotiation, Other issues in negotiations, Direct placement, participation in local market pool, Group underwriting and retention, Placement with professional reinsurers, placement through intermediaries.

Assessment Plan

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5

	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References:

1. Reinsurance – Chris Paine Global Professional Publishing ISBN 13-978-0852977125
2. Reinsurance- Fundamentals and New Challenges – Ruth Gostel –Amazon
3. reinsurance – Robert W Strain ISBN 10-0937727005
4. Reinsurance Principles and Practices – Harrison ISBN 10-0894631799
5. Relevant Chapters in “Foundations of Casualty Actual Science
6. Recently available papers on Reinsurance risks and related matters
7. IRDA regulations and guidelines on reinsurance

DAS 534	Risk Management	2 Credits	Semester III
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Aim of the course

The course aims to develop a complete understanding of various financial risks and its management. It will enable a student to think like a risk manager to apply his/her assimilated knowledge to understand and manage risk.

Course description

An extensive and thorough description of various types of risks will be discussed. The course will fill the gap between understanding a risk and managing a risk. The enterprise risk management techniques will be introduced to the students. This course will also give them a better professional consciousness on enterprise risk management.

Module-1 Risk Theory and Probability - Risk concept, Risk and Uncertainty, Risk classification, Risk attitudes, Risk costs, Risk concept, Risk and Uncertainty, Risk classification, Risk attitudes, Risk costs

- Module-2** Risk Management – Scope and Objectives - Risk management approach, Risk management- definition and basic components, Risk management – contributions and benefits, Strategic management vs. Risk management
- Module-3** Building up an effective Risk Management Programme - Deciding the programme objectives, Defining the role, responsibilities and function of risk manager, organising and putting the programme in place, Formulating a risk management policy
- Module-4** Important measures in Risk management and decision making - Identifying and analysing loss exposures, Risk identification – Purpose and details, Assessment of risk exposures, Prioritising of risks, Risk mapping, The feasibility of alternate risk management techniques, Risk control – purpose and details, Risk financing and insurance, Selecting the best technique, Implementing the chosen risk management technique, Monitoring and improving the risk management programme.
- Module-5** Risk Transfer methods and their utility - Alternative risk transfer market, Finite risk reinsurance and risk transfer to the capital markets, Capital markets as an additional source of capacity, Alternative risk financing products.
- Module-6** Concept of ERM (Enterprise Risk Management) - Role of Risk Officer - Enterprise risk management (ERM) definitions, Drivers of change and development of the discipline of ERM, Limitations of ERM, ERM impact on management practices, Other ways that ERM can contribute to value creation, Organisational objectives for pursuing ERM, ERM process, ERM implementation, Decision making.
- Module-7** Enterprise Default Risk and measures to detect the same and corrective actions - Emergency/ disaster / catastrophe, Threats that can lead to emergency / disaster / catastrophe, Business continuity plan – objectives and features, Phases of a disaster, Business continuity planning process, Standards and extracts.
- Module-8** Risk exposures, their classification, measurement and checklists preparation - Loss exposures, Property loss exposures, Net income loss exposures, Liability exposures, Personnel exposures, Security and safety checklist, Property protection checklist, Checklist to assess vulnerability of data systems, Liability – a short checklist, Product liability and risk control audit checklist, Sexual harassment and discrimination checklist.

Assessment Plan

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References:

1. Risk Management and Insurance – Trieschmann, Gustavson, Hoyt – ISBN 10-0324016638
2. Introduction to Risk Management – Mark S Dorfman
3. Risk Management and Insurance – S Arunajatesan & T R Viswanathan, Macmillan ISBN 9780230638983
4. Essentials of Risk Management – Michael Crouchy
5. Recently available papers on Risk Management in Net

DAS 541	Life and Other Contingencies- Part-II	4 Credits	Semester IV
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Aim of the course

To introduce advanced concepts in life insurance using life table calculations. To introduce pension fund calculations.

Course description

The course demands advanced mathematical thought in policy calculations with the help of life table functions. Different types of joint life functions are discussed and the method of calculations are practiced throughout the course by introducing suitable annuity functions. Mathematical basis of pension calculations are done with the help of already developed tools of annuity functions.

- Module-1** Surrender Value and Paid up Value in Life Insurance – Considerations for special risks - Surrender values, Paid up policies, bonus: with profit policies, children’s deferred assurances.
- Module-2** Policy alterations – basic principles and methods - Alterations usually allowed, methods of alteration
- Module-3** Population theory and application of calculus- central and initial death rates - Differential coefficients with respect to age(x), differential coefficients with respect to the rates of interest i , stationary population
- Module-4** Joint Life assurances and Last survivor annuities/assurances - Joint life functions, law of uniform seniority, last survivor status
- Module-5** Contingent Functions and Reversionary annuities - Contingent probabilities, contingent assurances, premiums for contingent assurances, reversionary annuities
- Module-6** Construction and applications of Multiple decrement tables - The multiple decrement table, forces of decrement , central rates, years associated single-decrement tables, construction of a multiple decrement table
- Module-7** Some simple Pension Fund functions and Miscellaneous topics - Service tables and salary scales, pensions not dependent on salary, pension based on final salary, contributions, capital terms on retirement and death

Assessment Plan

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References:

1. B.H. Smith "Contingencies of Value", Harward University Press, 1988
2. Alistair Neil "Life Contingencies", Butterworth-Heinemann Ltd., Illustrated Edition (1977)
3. Griffith Davis "Table of Contingencies", Longman & Co, 1825: University of California Library
4. Michael M Parmenter, "Theory of Interest and Life Contingencies with Pension", 3rd Edition.
5. Life and Other Contingencies- P F Hooker & L H Longley-Cook – Cambridge – ISBN 0- 521-05327-7

Students will be expected to read relevant papers currently available in the net PFRDA related papers

DAS 542	Estimating Unpaid Claims in General Insurance	4 Credits	Semester IV
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Aim of the Course

To develop the skills on claim estimation and To expertise the use of development triangles.

Course Description

Estimating claim have major importance in actuarial work. Since claim amount is related with a future unknown event, a good skill statistical operations is required. Various problems on estimation of claims in general insurance is explained with industry experience. The evolution of development triangle is practiced in the course thoroughly.

Module-1 Importance of accurate estimate of Unpaid claims- Internal Management, Investors, Regulators, Further Requirements for Accurate Reserves, Ranges of Unpaid Claim Estimates, Key Terminologies

Module-2 Understanding the features and abnormalities of available data and allied problem for claim reserving - Claims Professionals, A Claim is Reported, The Life of a Claim, Further Claim Examples, Sources of Data, Homogeneity and Credibility of Data, Types of Data Used by Actuaries, Organizing the Data, Understanding the Environment

Module-3 Construction of Claim Development Triangle and its use as a pointer to ultimate claims - Rows, Diagonals and Columns, Alternative Format of Development Triangles, Detailed Example of Claim Development Triangles, Other Types of Development Triangle

Module-4 Basic techniques of estimating IBNR – Chain Ladder Methods, Expected Value Methods, Model Based methods and further refinements - Key Assumptions, Common Uses and Mechanics of the Development Technique and Expected Claims Technique, Unpaid Claim Estimate Based on the Development Technique and Expected Claims Technique, Reporting and Payment Patterns, Observations and Common Relationships, When the Development Technique and Expected Claims Technique Works and When it Does Not, Influence of a Changing Environment on the Claim Development Technique and Expected Claims Technique

Module-5 Bornhuetter-Ferguson technique, Frequency-Severity Techniques – evaluation of merits and applicability of various techniques - Key Assumptions, Common Uses and Mechanics of the Bornhuetter-Ferguson Technique and Frequency-Severity Techniques, Unpaid Claim Estimate Based on Bornhuetter-Ferguson Technique and Frequency-Severity Techniques, When the Bornhuetter-

Ferguson Technique and Frequency-Severity Techniques Works and When it Does Not, The Bornhuetter-Ferguson Method and Cumulative CDF's Less than 1.00, Influence of a Changing Environment on the Bornhuetter-Ferguson Method and Frequency-Severity Techniques, Enhancements for Frequency-Severity Techniques Frequency- Severity Projection as Input to Bornhuetter-Ferguson Technique

Module-6 Problems associated with estimating claim related expenses and their projections – Salvage, Subrogation, and Collateral Sources, Estimating S&S Recoveries – Auto Physical Damage insurer, Reinsurance and Aggregate Limits

Module-7 Some guiding principles associated with determining an estimate of unpaid claims -Choosing a Technique for Estimating Unpaid ALAE, Monitoring and Interim Techniques for Unpaid Claim Estimates

Assessment Plan

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References:

1. Estimating Unpaid Claims using Basic Techniques – Casualty Actuarial Society Publication
2. relevant chapters in Introductory Statistics with applications in General Insurance – Hossack, Pollard and Zenwirth – ISBN 0-521-24781-0
3. Stochastic Claim Reserving Methods in Insurance- Maino v Vuthrich Michael Merz , John Wiley – ISBN 0470772727 9780470772720
4. Relevant recent papers on claim reserving available in the net.

DAS 543	Basic Principles of Investment	2 Credits	Semester IV
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Aim of the Course

The primary aim of this course is to gain knowledge on most basic principles of investments and its practice. The student has to appreciate those principles which are unique to investment market.

Course Description

The course is mostly theoretical in nature. It demand a lot of reading from different books to assimilate basic principles of investments. Through out this course finding apt and accurate examples plays the key role in understanding basic principles. Certain problems that are very unique with investment theory and practice is also mentioned.

- Module 1** Preliminary look round, Public Authority Quoted Stocks – National savings, Building Societies, finance houses, local authority mortgage loans, real property mortgages, annuities, some basic features, significance of dates, gilts, foreign bonds
- Module 2** Company Stocks and Shares, Companies and their Shareholders - loan capital, share capital, convertibles, limited liability, company formation, meetings, annual report and account, capital alterations
- Module 3** Settlement, Transfer of Title - the contract, the account system, options, registered securities, bearer securities, mechanics of settlement
- Module 4** New Issues, Taxation - to shareholders, to the general public, the allotment letter, personal taxation, corporation tax, double taxation relief
- Module 5** Tax on Capital gains, Yield - the two taxes, pre budget day 1965 holding, part disposals long terms tax, capital changes, other taxable occasions, influence of decisions, flat yield, redemption yield, switching
- Module 6** Assessment of Ordinary Shares, Spreading the Risk -the value of assets, earnings, reserves, management, sources of information, investment trusts, Module trusts, equity linked life assurance, single premium policies or bonds, property bonds
- Module 7** Market movements, Portfolio Planning- factors affecting prices, the indices, timing, general principles, special position of trustees

Module 8 Protecting the Unwary, The Creation of Wealth – the prevention of fraud (investment) Act 1958, the protection of depositors Act 1963, the city code of takeovers and mergers, bad advice, the facilities of the market, Government participation

Assessment Details

No.	Assessment	Marks assigned
1	Continuous Assessment	40
	Class participation	5
	Assignments	10
	Mid semester exam	15
	Test/Seminar/Quiz	10
2	End Semester Assessment	60
	Total	100

References

1. T G Goff, “the theory and practice of investment”
2. Timothy E. Johnson, “Investment Principles”, Prentice Hall College Div; 2 Sub edition (December 1982)
3. Michael G. McMillan, Jerald E. Pinto, Wendy Pirie and Gerhard Van de Venter (Feb 8, 2011) “Investments: Principles of Portfolio and Equity Analysis”

DAS 544	Project work	6 Credits	Semester IV
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Aim of the Course: This six credit course provides the students an opportunity to work on a specific area in Actuarial Science in which they are interested in by taking up a specific problem of interest and submit a detailed report on the same after a scientific investigation of the problem. By the end of the course the students will be able to

- Carry out scientific research on any area in Actuarial Science
- Design and carry out research and analyze data using any software package
- Write a detailed report of the scientific research carried out

Course Description: The dissertation allows students to consolidate and extend the knowledge and skills acquired during the coursework and apply these in a practical way. There will be faculty supervisors helping the students in doing the project work and to write a dissertation on the same.

Assessment Plan

No	Assessment	Marks Assigned
1	Written report of the research undertaken	75
2	Presentation of findings on the research work	25
	TOTAL	100

