

HANDBOOK 2025

MSc in Actuarial Science

DEPARTMENT OF STATISTICS

FACULTY OF SCIENCE, UNIVERSITY OF COLOMBO

1. Introduction

Recognizing the urgent need to fill a marked gap existing in the number of professionals demanded by the Actuary Industry in Sri Lanka, the Department of Statistics (DST) of the Faculty of Science of the University of Colombo has taken the initiative to introduce an MSc in Actuarial Science in 2014.

While offering students the opportunity to earn a master's level qualification (SLQF level 9), this program is also designed to provide a pathway for obtaining professional certifications. This program is designed to cover the core technical units of the Actuarial Examinations of the Institute and Faculty of Actuaries (IFoA), UK. The Department of Statistics has updated the syllabus to align with the 2019 IFoA syllabus revisions and received accreditation through the Subject Exemption Agreement from the IFoA in 2022. As a result, students who earn the MSc in Actuarial Science may be eligible for exemptions from IFoA exams corresponding to the modules covered in this program, provided their marks meet the standards set by the Independent Examiners. This accreditation enhances employment prospects for both current professionals and those aspiring to enter the field of Actuarial Science.

2. Rationale

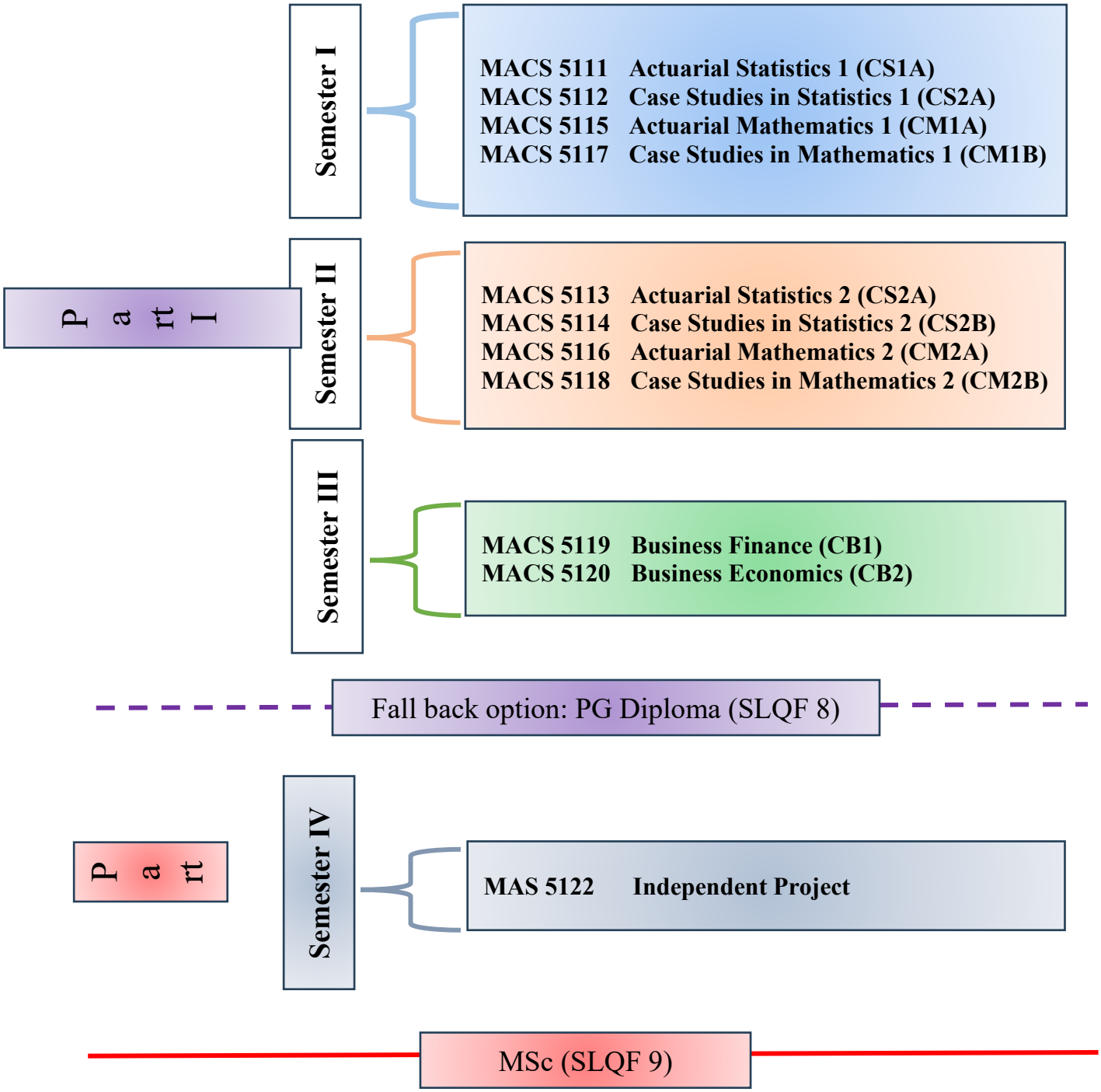
The aim will be to provide students in Sri Lanka as well as in the neighbouring countries, the opportunity to acquire the required knowledge in the field of Actuarial, while also providing a framework in obtaining an MSc in Actuarial Science and professional qualifications (Core Principles) within a shorter period of time and at an affordable cost, under the guidance of an expert panel.

3. Objective

- To provide students a comprehensive understanding of actuarial theory and practice, with the ability to apply advanced mathematical, statistical, and financial techniques to assess and manage risks in various sectors.

- To offer students the opportunity to gain professional qualifications that enhance their career prospects, equipping them with the skills and credentials necessary to pursue advanced employment opportunities in the actuarial and related fields.

4. Overview of the programme



The MSc in Actuarial science programme consists of two parts (Part I and Part II) with course modules including theory, practical sessions and a guided independent study (industrial project). All modules will be conducted online via Zoom platform. For a theory module, fifteen direct teaching hours (50 notional hours) of instruction is equivalent to one academic credit and in a practical module thirty hours of work (50 notional hours) is equivalent to one academic credit. The course structure is designed to map with the IFoA core principle modules considering the Master of Science By-Laws No. 8 of 2021 of Faculty of Science, and the guidelines issued by the Sri Lanka Qualifications Framework (SLQF 2015) to fulfill the criteria of Postgraduate Diploma / Master's Degree programme at SLQF levels 8/ 9.

PROFESSIONAL QUALIFICATION MAPPING	COURSE CODE	COURSE TITLE	CONTACT HOURS	SEMESTER	CREDITS
Part I					
CS1A	MACS5111	Actuarial Statistics 1	45L	I	3C
CS1B	MACS5112	Case Studies in Actuarial Statistics 1	10L 40P	I	2C
CM1A	MACS 5115	Actuarial Mathematics 1	45L	I	3C
CM1B	MACS 5117	Case Studies in Actuarial Mathematics 1	10L 40P	I	2C
CS2A	MACS 5113	Actuarial Statistics 2	45L	II	3C
CS2B	MACS 5114	Case Studies in Actuarial Statistics 2	10L 40P	II	2C
CM2A	MACS 5116	Actuarial Mathematics 2	45L	II	3C
CM2B	MACS 5118	Case Studies in Actuarial Mathematics 2	10L 40P	II	2C
CB1	MACS 5119	Business Finance	45L	III	3C
CB2	MACS 5120	Business Economics	45L	III	3C
Part II					
	MACS 5122	Industrial Project	150P	IV	5C
		TOTAL CREDITS			**31C**

(NOTE: 15L & 30P IS EQUIVALENT TO 1C)

For the CS and CM subjects the following weighting applies: 70% to the exams mapping to CS/CMA and 30% to the coursework/exams mapping to CS/CMB

5. Career Path

With an MSc in Actuarial Science, you have a range of career paths in various industries.

Some of the career paths are as follows.

Actuary	• Actuaries use mathematics, statistics, and financial theory to assess and manage risk. They analyze data to predict future events like life expectancy, insurance claims, or market fluctuations. They are employed in industries such as Insurance (life, health, general, reinsurance), pensions, finance, government, healthcare working as life insurance actuary, health insurance actuary, pension actuary etc.
Risk Manager	• Risk managers identify, assess, and manage risks that could affect an organization's assets, operations, or reputation.
Modeling and Analytics Specialist	• Develop and implement predictive models and simulations for businesses to inform decisions, often using actuarial and statistical methods.
Product Manager (in Insurance or Finance)	• Oversee the development and management of financial or insurance products, using actuarial knowledge to optimize the design and pricing.
Academia	• With an MSc, you may pursue an academic career in teaching actuarial science or related subjects at universities or other institutes.

6. Eligibility Criteria

The potential candidates will be those who have a bachelor's degree (with a sound knowledge in Mathematics and/or Statistics), a bachelor's degree and experience in the field of Actuarial Science, or any other qualification comparable to the above and accepted by the University of Colombo. The selection process will be based on an interview.

7. PROGRAMME ILOS

- **PLO1:** Identify real world problems which can be solved using methods and concepts in actuarial science.
- **PLO2:** Apply suitable models and techniques to solve the real-world problems in actuarial science.
- **PLO3:** Apply critical thinking in making decisions in instances related to risk and uncertainty
- **PLO4:** Communicate actuarial ideas effectively, in practice
- **PLO5:** Enhance the knowledge and learn theories to carry out research in actuarial science to develop new concepts in the field.
- **PLO6:** Practice professionalism and uphold ethical standards and improve/update skills required for employment and lifelong learning
- **PLO7:** Effectively communicate and disseminate knowledge, information and ideas to specialist and a wider society
- **PLO8:** Enhance the ability to work independently as well as collaboratively
- **PLO9:** Demonstrate self-direction and originality in tacking and solving problems and be able to plan and implement tasks at professional levels

8. PROGRAM STRUCTURE

Duration of the entire program is 2 years (4 semesters) which will be conducted on the part time basis. It consists of 31 credits including a component of independent study (5 credits). The programme aligns with the SLQF 9.

- The duration of Parts I and II of the MSc program is 24 months.

- Students registered for part II should complete it within 6 months.
- The maximum period allowed to complete the degree is five (05) years from the date of first registration.

Part I: Coursework (26 credits)

- Part I consists of theory modules, and practical modules comprising a total of 26 credits and is equivalent to **Level 8** of the SLQF.
- A student who obtains a GPA of **2.70** or above for Part I may be eligible for the award of **the Postgraduate Diploma in Actuarial Science**, upon request, provided the student fulfils other requirements as prescribed by the By-Laws and Rules and Regulations of the University of Colombo.
- Successful completion of **Part I with a minimum GPA of 3.00** is required to proceed to Part II.

Part II: Industrial Project (5 credits)

- Part II consists of a guided industrial project of 5 credits. Students undertaking the industrial project are required to carry out the research work under a supervisor/s assigned by the Department.
- Prior to the commencement of the industrial project, the student should submit and present the proposal to a panel of academics in the Department and acquire the approval.
- Students should complete Part II within 6 months.
- Parts I and II contain a minimum of 30 academic credits equivalent to **Level 9** of the SLQF.
- A student who obtains a GPA of **3.00** or above for **Part II** may be eligible for the award of **the Degree of Master of Science in Actuarial Science**, upon request, provided the student fulfils other requirements as prescribed by the By-Laws and Rules and Regulations of the University of Colombo.
- A student who fails to achieve a GPA of **3.00** or above for **Part II** may be eligible to be awarded **the Postgraduate Diploma in Actuarial Science**, upon request, provided the student fulfils other requirements as prescribed by these By-Laws and Rules and Regulations of the University of Colombo.

9. Mode of Delivery

Delivery of Lectures

The lectures of the program are conducted via Zoom. The Zoom links for lectures, notes and other resources will be posted on the MSc Learning Management System (LMS).

Learning Management System (LMS)

URL: https://sci.cmb.ac.lk/lms/

All the students are provided with access to the MSc LMS. The students are enrolled to the relevant courses in the LMS in each semester. All the lecture materials are uploaded into the LMS.

Student Information System (SIS)

URL: https://science.cmb.ac.lk/fms/fms/

In addition to the LMS students are also provided with access to the masters SIS. Students are required to use the SIS to register for courses, examinations, and to view results.

- **Registration for the Examination**
  - Exam registration is available in the MSc SIS.
  - Students can apply for the exam courses that are added by the coordinator to the exam events.
  - Students will be able to register/ cancel the exam courses until the deadline has expired.
  - Students can view the details until the exam event is closed by the coordinator.

- **Provisional Result**
  - Students will be able to see their results (Grade only) in the MSc SIS when the coordinator releases the provisional result for the courses.
  - The system generates auto-emails to registered students when releasing results for the exam course.

- **Final Result**
    - Students will be able to see their results (Grade) with GPA in the MSc SIS when the Exam branch releases the final result and enables the GPA.

For more information

- Please contact through the email <itsc@sci.cmb.ac.lk>, If you have an issue with logging into the FMS
- Please contact your MSc Coordinator, Faculty of Science, If you have an issue in exam registrations, provisional results or your details are wrong in the system if have not accessed it to update them.
- More: https://science.cmb.ac.lk/fms/fms/instruction

10. Compliance

- The SLQF level of MSc in Actuarial Science degree is Level 9.
- The SLQF level of Post Graduate Diploma in Actuarial Science is Level 8
- **Exemptions for Institute and Faculty of Actuaries, UK (IFoA, UK) Professional exams**

  Students who successfully complete the Master's program and have obtained IFoA approved marks for the subjects in Part I may apply for subject wise exemptions from IFoA, UK.

  Visit the website: : https://actuaries.org.uk/qualify/exam-exemptions/#:~:text=You%20can%20apply%20for%20IFoA,qualification%20with%20another%20professional%20body

11. Degree awarding criteria (registration, examination, repeat exams, GPA calculation)

- ## Registration

Date of Registration

A person who has been selected as a postgraduate student shall be required to register to follow the particular MSc programme. The date of registration shall be specified by the faculty.

Postponement of Registration

A student who desires to postpone his/her registration should do so in writing to the Dean, Faculty of Science, giving reasons for and duration of postponement. Each such request shall be considered by the faculty on the recommendation by the Higher Degrees Committee (HDC) and the relevant Department.

Cancellation of Registration

A registration may be canceled by the faculty on the recommendation by the HDC and the relevant Department for inadequate progress, for academic violation of rules and regulations of the University, failure to pay prescribed fees by the due dates, or any other reasons as decided by the Faculty.

- ## Leave of Absence

Leave of absence may be granted on medical grounds or any other valid reasons acceptable to the faculty.

- ## Examinations

  - The end of semester examinations are conducted at the university premises and dates will be announced via LMS.
  - The students are required to register for the examinations via PG SIS.

NOTE: The minimum grade a student should achieve to pass a paper/mini project/research component is B-.

Repeat Examinations:

If a candidate fails (Grade below B-), an examination he/she shall repeat the entire examination or the required part at the next first available opportunity. Candidates are allowed to repeat an examination paper only once.

- ## Scheme of Evaluation

The Grade Point Average (GPA) shall be computed using grades assigned for all papers in

Part I and Part II. The minimum grade a student should achieve to pass a paper/mini project/research component is B-.

The Grade Points will be assigned as given in the following table.

Marks Range	Grade	Point
85 – 100	A+	4
70 – 84	A	4
65 – 69	A-	3.7
60 – 64	B+	3.3
55 – 59	B	3
50 – 54	B-	2.7
45 – 49	C+	2.3
40 – 44	C	2
35 – 39	C-	1.7
30 – 34	D+	1.3
25 – 29	D	1
0 – 24	E	0

- ## GPA Calculation

If the Grade Point Average (GPA) of a student is required for any purpose, it shall be calculated using the following equation:

$$GPA = \frac{\sum w_i g_i}{\sum w_i}$$

Where, w_i = number of credit units and

g_i = grade points for the ith courses

The GPA is rounded to the second decimal place. Any student who has not appeared for the evaluation of a course may be assigned a GPA of 0.00 Value for such for the purpose of calculating his/her GPA.

- **Criteria for the awarding of the Degree**

  - **Awarding of the degree of Master of Science**

    A student who obtains a GPA of 3.00 or above for Part II may be eligible for the award of the Degree of Master of Science, provided the student fulfills other requirements as prescribed. No student shall be entitled to the award of the Degree of Master of Science unless he/she has satisfied all the prescribed requirements, and he/she has supplicated for the award of the Masters Degree at the relevant convocation of the University of Colombo.

  ✓ **Awarding of Postgraduate Diploma (Fall back option)**

    Students who obtain a GPA of 2.70 or above for Part I may be eligible for the award of the Postgraduate Diploma, where applicable, and upon request, provided the student fulfills other requirements as prescribed.

12. Awards and merits

- **Merit Pass**

  A student who obtains an overall GPA of 3.30 or above (B+ Grade) for Parts I and II of the MSc Degree without repeating any course unit, shall be eligible for the award of a Merit Pass, provided the student obtained at least 2.7 GPV (B- Grade) in all courses followed in the programme, and completes Part I and Part II within three academic years.

13. Curriculum

COURSE UNITS

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CS1B	MACS5112	Case Studies in Statistics I	10L 40P	I	2C
CS2A	MACS 5113	Actuarial Statistics 2	45L	II	3C
CS2B	MACS 5114	Case Studies in Statistics II	10L 40P	II	2C
CM1A	MACS 5115	Actuarial Mathematics 1	45L	I	3C
CM1B	MACS 5117	Case Studies in Mathematics I	10L 40P	I	2C
CM2A	MACS 5116	Actuarial Mathematics 2	45L	II	3C
CM2B	MACS 5118	Case Studies in Mathematics II	10L 40P		2C
CB1	MACS 5119	Business Finance	45L	III	3C
CB2	MACS 5120	Business Economics	45L	III	3C
Part II					
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		TOTAL CREDITS			**31C**

(NOTE: 15L & 30P IS EQUIVALENT TO 1C)

For the CS and CM subjects the following weighting applies: 70% to the exams mapping to CS/CMA and 30% to the coursework/exams mapping to CS/CMB

DETAILED SYLLABUS

<table>
<tr><td>Course Code / Title</td><td colspan="4">MACS 5111 – Actuarial Statistics 1</td></tr>
<tr><td>Credit Value</td><td colspan="4">3C (45L)</td></tr>
<tr><td>Prerequisites</td><td colspan="4">None</td></tr>
<tr><td rowspan="2">Details</td><td>Lectures hours</td><td>Practical hours</td><td>Independent Learning hours</td><td>Notional hours</td></tr>
<tr><td>45</td><td></td><td>105</td><td>150</td></tr>
<tr><td>Rationale</td><td colspan="4">The aim of the Actuarial Statistics 1 subject is to provide a solid foundation in mathematical and statistical techniques that are required and of relevance to actuarial work.</td></tr>
<tr><td>Intended Learning Outcomes</td><td colspan="4">After a successful completion of this course, students will be able to:
CLO1: Describe the essential features of statistical distributions.
CLO2: Summarize data using appropriate statistical analysis, descriptive statistics and graphical presentation.
CLO3: Describe and apply the principles of statistical inference.
CLO4: Describe, apply and interpret the results of the linear regression model and generalized linear models.
CLO5: Explain the fundamental concepts of Bayesian statistics and use them to compute Bayesian estimators.</td></tr>
<tr><td>Course Content</td><td colspan="4">Random variables and distributions: basic univariate distributions, calculate probabilities, quantiles and moments, Independence, joint and conditional distributions, linear combinations of random variables, Expectations, conditional expectations, Generating functions, Central Limit Theorem; Data analysis: Exploratory data analysis, Random sampling and sampling distributions; Statistical inference: Estimation and estimators, Confidence intervals, Hypothesis testing and goodness of fit; Regression theory and applications: Linear regression, Generalized linear models; Bayesian statistics: fundamental concepts of Bayesian statistics, use the concepts to calculate Bayesian estimators, loss function, credibility theory.</td></tr>
<tr><td>Method/s of Evaluation:</td><td colspan="2">Continuous Assessment ……..%</td><td colspan="2">Final Assessment ……100……%</td></tr>
</table>

References	● Miller, I. and Miller, M.; [Freund, J. E.], *John E. Freund's Mathematical statistics with applications*. 8th ed. Prentice Hall International, (2013). ● Edward W. Frees, *Regression Modeling with Actuarial and Financial Applications,* Cambridge University Press, (2010) ● Philip J Boland, *Statistical and Probabilistic methods in Actuarial Science* - Chapman & Hall, 1st edition (2007)

Course Code / Title	MACS 5112 – Case Studies in Statistics I			
Credit Value	2C (10L 40P)			
Prerequisites	None			
Details	**Lectures hours**	**Practical hours**	**Independent Learning hours**	**Notional hours**
	10	40	50	100
Rationale	The aim of this unit is to provide a practical exposure to students on problem solving using computer packages focusing on data analysis and statistical modelling.			
Intended Learning Outcomes	**After a successful completion of this course, students will be able to:** ● **CLO1:** solve real world problems through exploratory data analysis, inferential analysis and statistical modelling in relation to Actuarial Statistics I			
Course Content	Practical part of the contents of Actuarial Statistics I using the software package R.			
Method/s of Evaluation:	Continuous Assessment ……..%		Final Assessment ……100……%	
References	● Peng, R., *Report writing for data science in R*. Victoria (Canada): Lean Publishing, (2015).			

<table>
<tr><td>Course Code / Title</td><td colspan="4">MACS 5113 – Actuarial Statistics 2</td></tr>
<tr><td>Credit Value</td><td colspan="4">3C (45L)</td></tr>
<tr><td>Prerequisites</td><td colspan="4">MACS 5111</td></tr>
<tr><td rowspan="2">Details</td><td>Lectures hours</td><td>Practical hours</td><td>Independent Learning hours</td><td>Notional hours</td></tr>
<tr><td>45</td><td></td><td>105</td><td>150</td></tr>
<tr><td>Rationale</td><td colspan="4">The aim of the Actuarial Statistics 2 subject is to provide a grounding in mathematical and statistical modelling techniques that are of relevance to actuarial work, including stochastic processes and survival models and their application.</td></tr>
<tr><td>Intended Learning Outcomes</td><td colspan="4">After a successful completion of this course, students will be able to:
CLO1: describe and use statistical distributions for risk modelling.
CLO2: describe and apply the main concepts underlying the analysis of time series models.
CLO3: describe and apply Markov chains and processes.
CLO4: describe and apply techniques of survival analysis.
CLO5: describe and apply basic principles of machine learning.</td></tr>
<tr><td>Course Content</td><td colspan="4">Random variables and distributions for risk modelling: Loss distributions, with and without risk sharing, Compound distributions and their applications in risk modelling, Introduction to copulas, Introduction to extreme value theory; Time series: Concepts underlying time series models, Applications of time series models; Stochastic processes: Describe and classify stochastic processes, Define and apply a Markov chain, Define and apply a Markov process; Survival models: Explain concept of survival models, Describe estimation procedures for lifetime distributions, Derive maximum likelihood estimators for transition intensities, Estimate transition intensities dependent on, Graduation and graduation tests, Mortality projection; Machine learning: Explain and apply elementary principles of machine learning.</td></tr>
<tr><td>Method/s of Evaluation:</td><td colspan="2">Continuous Assessment, ……..%</td><td colspan="2">Final Assessment ……100……%</td></tr>
</table>

References	● Chalk, A. and McMutrie, C., *A practical introduction to machine learning concepts for actuaries*. Casualty Actuarial Society e-Forum (2016) ● Macdonald, A.S., Richards, S.J. and Currie, I.D., *Modelling mortality with actuarial applications.* - Cambridge University Press, (2018) ● Brzezniak, Z.; Zastawniak, T, *Basic stochastic processes: a course through exercises*. Springer, (1998) ● Nicolas Privault, *Understanding Markov Chains: Examples and Applications*, Springer Undergraduate Mathematics Series 2nd ed. (2018) ● Kalbfleisch, J.D.; Prentice, R.L., *The statistical analysis of failure time data*. 2nd ed., Wiley-Blackwell, (2002).

Course Code / Title	MACS 5114 – Case Studies in Statistics II			
Credit Value	2C (10L 40P)			
Prerequisites	None			
Details	**Lectures hours**	**Practical hours**	**Independent Learning hours**	**Notional hours**
	10	40	50	100
Rationale	The aim of this unit is to provide a practical exposure to students on problem solving using computer packages focusing on data analysis and risk modelling.			
Intended Learning Outcomes	**After a successful completion of this course, students will be able to:** ● **CLO1:** solve real world problems through exploratory data analysis, inferential analysis and risk modelling in relation to Actuarial Statistics 2.			
Course Content	Practical part of the contents of Actuarial Statistics 2 using the software package R.			
Method/s of Evaluation:	Continuous Assessment ……..%		Final Assessment ……100……%	
References	● Lantz, B., *Machine learning with R: expert techniques for predictive modeling to solve all your data analysis problems.* 2nd ed. - Packt Publishing, (2013). ● P. S. P. Cowpertwait, & Metcalfe, A. V., *Introductory time series with R*. (2009).			

<table>
<tr><td>Course Code / Title</td><td colspan="4">MACS 5115 – Actuarial Mathematics 1</td></tr>
<tr><td>Credit Value</td><td colspan="4">3C (45L)</td></tr>
<tr><td>Prerequisites</td><td colspan="4">None</td></tr>
<tr><td rowspan="2">Details</td><td>Lectures hours</td><td>Practical hours</td><td>Independent Learning hours</td><td>Notional hours</td></tr>
<tr><td>45</td><td></td><td>105</td><td>150</td></tr>
<tr><td>Rationale</td><td colspan="4">The aim of the Actuarial Mathematics 1 subject is to provide a grounding in the principles of modelling 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.</td></tr>
<tr><td>Intended Learning Outcomes</td><td colspan="4">After a successful completion of this course, students will be able to:
CLO1: describe the basic principles of actuarial modelling.
CLO2: describe, interpret and discuss the theories on interest rates.
CLO3: describe, interpret and discuss mathematical techniques used to model and value cash-flows which are contingent on mortality and morbidity risks.</td></tr>
<tr><td>Course Content</td><td colspan="4">Data and basics of modelling: principles of actuarial modelling, generalized cash-flow model to describe financial transactions; Theory of interest rates: interest rates expressed in different time periods, real and nominal interest rates, time value of money using the concepts of compound interest and discounting, present value and accumulated value for a given stream of cashflows, compound interest functions, duration, convexity and immunisation of cashflows; Equation of value and its applications: concept of equation of value, discounted cashflow and equation of value techniques; Single decrement models: various assurance and annuity contracts, means and variances of the payments under various assurance and annuity contracts; Multiple decrement and multiple life models: methods of valuing cashflows, projecting and valuing expected cashflows; Pricing and reserving: gross random future, gross premiums and reserves, expected future cashflows.</td></tr>
<tr><td>Method/s of Evaluation:</td><td colspan="2">Continuous Assessment, ……..%</td><td colspan="2">Final Assessment ……100……%</td></tr>
</table>

References	● Promislow, D., *Fundamentals of actuarial mathematics*. 3rd ed. John Wiley, (2015) ● Garrett, S. J., *An introduction to the mathematics of finance. A deterministic approach*, 2nd ed, Butterworth-Heinemann, (2013) ● Wilders, R.J., *Financial Mathematics for Actuarial Science: The Theory of Interest*, CRC Press, (2020) ● Dickson, D.C.M.; Hardy, M.R.; Waters, H.R., *Actuarial mathematics for life contingent risks*. 3rd ed, Cambridge University Press, (2020).

Course Code / Title	MACS 5117 – Case Studies in Mathematics I			
Credit Value	2C (10L 40P)			
Prerequisites	None			
Details	**Lectures hours**	**Practical hours**	**Independent Learning hours**	**Notional hours**
	10	40	50	100
Rationale	The aim of this unit is to provide a practical exposure to students on problem solving using computer packages focusing on Actuarial Mathematics I.			
Intended Learning Outcomes	**After a successful completion of this course, students will be able to:** ● **CLO1:** solve real world problems in relation to Actuarial Mathematics I			
Course Content	Practical part of the contents of Actuarial Mathematics 1 using the Excel package.			
Method/s of Evaluation:	Continuous Assessment ……..%		Final Assessment ……100……%	
References	● Not applicable			

Course Code / Title	MACS 5116 – Actuarial Mathematics 2
Credit Value	3C (45L)

<table>
<tr><td>Prerequisites</td><td colspan="4">MACS 5115</td></tr>
<tr><td rowspan="2">Details</td><td>Lectures hours</td><td>Practical hours</td><td>Independent Learning hours</td><td>Notional hours</td></tr>
<tr><td>45</td><td></td><td>105</td><td>150</td></tr>
<tr><td>Rationale</td><td colspan="4">The aim of the Actuarial Mathematics 2 subject is to provide a grounding in the principles of modelling 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.</td></tr>
<tr><td>Intended Learning Outcomes</td><td colspan="4">After a successful completion of this course, students will be able to:
CLO1: describe, interpret and discuss the theories on the behaviour of financial markets.
CLO2: discuss the advantages and disadvantages of different measures of investment risk.
CLO3: describe, construct, interpret and discuss the models underlying asset valuations.
CLO4: describe, construct, interpret and discuss the models underlying liability valuations.
CLO5: describe, construct, interpret and discuss the models underlying option pricing.</td></tr>
<tr><td>Course Content</td><td colspan="4">Theories of financial market behaviour: Rational expectations theory, Rational choice theory, Behavioural economics; Measures of investment risk: Properties of risk measures, Risk and insurance companies; Stochastic interest rate models: simple stochastic models for investment returns; Asset valuations: Mean-variance portfolio theory, Asset pricing models, Single and multifactor models for investment returns, Stochastic models for security prices, Models of the term structures of interest rates, Simple models for credit risk; Liability valuations: Ruin theory, Run-off triangles, Value basic benefit guarantees using simulation techniques; Option theory: Option pricing and valuations, Value basic benefit guarantees using option pricing techniques.</td></tr>
<tr><td>Method/s of Evaluation:</td><td colspan="2">Continuous Assessment, ……..%</td><td colspan="2">Final Assessment ……100……%</td></tr>
</table>

References	● Moller, T. and Steffensen, M., Market-valuation methods in life and pension insurance, Cambridge University Press (2007) ● Hull, J. C., *Options, futures and other derivatives: global edition*. 9th ed. Prentice Hall, (2017) ● Panjer, H. H., *Financial economics: with applications to investments, insurance and pensions*. The Actuarial Foundation, (2001)

Course Code / Title	MACS 5118 – Case Studies in Mathematics II			
Credit Value	2C (10L 40P)			
Prerequisites	None			
Details	**Lectures hours**	**Practical hours**	**Independent Learning hours**	**Notional hours**
	10	40	50	100
Rationale	The aim of this unit is to provide a practical exposure to students on problem solving using computer packages focusing on Actuarial Mathematics I.			
Intended Learning Outcomes	**After a successful completion of this course, students will be able to:** ● **CLO1:** solve real world problems in relation to Actuarial Mathematics II.			
Course Content	Practical part of the contents of Actuarial Mathematics 2 using the Excel package.			
Method/s of Evaluation:	Continuous Assessment ……..%		Final Assessment ……100……%	
References	● Not applicable			

Course Code / Title	MACS 5119 – Business Finance			
Credit Value	3C (45L)			
Prerequisites	None			
Details	**Lectures hours**	**Practical hours**	**Independent Learning hours**	**Notional hours**
	45		105	150

Rationale	The aim of the Business Finance subject is to provide a basic understanding of corporate finance including a knowledge of the instruments used by companies to raise finance and manage financial risk. Also provide the ability to interpret the accounts and financial statements of companies and financial institutions.	
Intended Learning Outcomes	**After a successful completion of this course, students will be able to:** ● **CLO1:** describe how companies are governed and structured. ● **CLO2:** recognize appropriate ways to finance a company. ● **CLO3:** analyze published accounts. ● **CLO4:** produce management information.	
Course Content	**Corporate governance and organization:** purpose and process of regulating the financial reporting information, key principles of corporate governance and the regulation of companies, key principles of finance; **How corporates are financed:** structure of a company and the different methods by which it may be financed, basic principles of personal and corporate taxation, characteristics of the principal forms of financial instrument issued or used, deciding on company capital structure and dividend policy, company growth and restructuring, mergers and acquisitions; **Evaluating projects:** cost of capital interacts with the nature of the investment projects; **Constructing and interpreting company accounts:** basic construction of accounts and role and principal features of the accounts, Assess the accounts and limitations of assessment; **Constructing management information and evaluating working capital:** working capital position of a company, function of forecasts and budgets as sources of management information.	
Method/s of Evaluation:	Continuous Assessment, ……..%	Final Assessment ……100……%
References	● Berry, A.; Jarvis, R. - Cengage, *Accounting in a business context*. 5th ed. (2011) ● Sloman, J.; Hinde, K; Garratt, D., *Economics for business*. 7th ed., Pearson, (2016) ● Brealey, R. A.; Myers, S. C.; Allen, F., *Principles of corporate finance: global edition*. 12th ed. McGraw-Hill, (2016)	

Course Code / Title	MACS 5120 – Business Economics

<table>
<tr><td>Credit Value</td><td colspan="4">3C (45L)</td></tr>
<tr><td>Prerequisites</td><td colspan="4">None</td></tr>
<tr><td rowspan="2">Details</td><td>Lectures hours</td><td>Practical hours</td><td>Independent Learning hours</td><td>Notional hours</td></tr>
<tr><td>45</td><td></td><td>105</td><td>150</td></tr>
<tr><td>Rationale</td><td colspan="4">The aim of the Business Economics subject is to introduce students to the core economic principles and how these can be used in a business environment to help decision making and behaviour. It provides the fundamental concepts of microeconomics that explain how economic agents make decisions and how these decisions interact. It explores the principles underlying macroeconomics that explain how the economic system works, where it fails and how decisions taken by economic agents affect the economic system.</td></tr>
<tr><td>Intended Learning Outcomes</td><td colspan="4">After a successful completion of this course, students will be able to:
CLO1: use a systematic knowledge and critical awareness of economic theory in the areas of syllabus covered by the subject.
CLO2: apply a range of techniques to solve problems in the areas of syllabus covered by the subject. appreciate recent developments and methodologies in economics.
CLO3: describe the relevance of economic theory to the business environment and the links between economic theory and its application in business.
CLO4: apply basic microeconomic and macroeconomic theory to business problems.</td></tr>
<tr><td>Course Content</td><td colspan="4">Economic models and recent historical applications: relevance of economics to the world of business, main strands of economic thinking, recent macroeconomic history; Microeconomics – the behaviour of consumers, firms and markets: workings of competitive markets, consumer demand and behavior, importance of advertising, production; function, costs of production, revenue and profit, profit maximization, pricing strategies; Macroeconomics: relationships between governments, markets and firms, government policies and international trade.</td></tr>
<tr><td>Method/s of Evaluation:</td><td colspan="2">Continuous Assessment, ……..%</td><td colspan="2">Final Assessment ……100……%</td></tr>
<tr><td>References</td><td colspan="4">Sloman, J.; Hinde, K.; Garratt, D., Economics for Business, 6th ed, Pearson, (2016).</td></tr>
</table>

<table>
<tr><td>Course Code / Title</td><td colspan="4">MACS 5122 – Industrial Project</td></tr>
<tr><td>Credit Value</td><td colspan="4">5C (150P)</td></tr>
<tr><td>Prerequisites</td><td colspan="4">None</td></tr>
<tr><td rowspan="2">Details</td><td>Lectures hours</td><td>Practical hours</td><td>Independent Learning hours</td><td>Notional hours</td></tr>
<tr><td></td><td>150</td><td>350</td><td>500</td></tr>
<tr><td>Rationale</td><td colspan="4">The aim of these components is to provide students with the opportunity to apply the theories covered under different units taught during the programme. Students will be assigned industry oriented mini projects related to Actuarial Science (assigned by academics/professionals) that has to be done in small groups (of 3) under the guidance and supervision of industry personnel/academics, in the field of Actuarial Science.</td></tr>
<tr><td>Intended Learning Outcomes</td><td colspan="4">After a successful completion of this course, students will be able to:
CLO1: identify a real-world problem related to actuarial field
CLO2: solve the real-world problem identified using the proper actuarial techniques.
CLO3: Interpret the results in layman’s terms.</td></tr>
<tr><td>Course Content</td><td colspan="4">Not applicable</td></tr>
<tr><td>Method/s of Evaluation:</td><td colspan="2">Continuous Assessment, ……20……..%</td><td colspan="2">Final Assessment +Viva ……40+40…%</td></tr>
<tr><td>References</td><td colspan="4">Not applicable</td></tr>
</table>

14. Program Mapping

Courses vs Program Learning Outcomes (PLOs) Map

H - Highly correlated; M - Moderately correlated; L – Correlated

Course Code	Course Title	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
MACS5111	Actuarial Statistics 1	H	M	M	L	H	M	M	L	L
MACS5112	Case Studies in Statistics I	H	H	H	H	M	H	H	M	M
MACS 5113	Actuarial Statistics 2	H	M	M	L	H	M	M	L	L
MACS 5114	Case Studies in Statistics II	H	H	H	H	M	H	H	M	M
MACS 5115	Actuarial Mathematics 1	H	M	M	H	H	M	M	L	L
MACS 5116	Case Studies in Mathematics I	H	H	H	L	M	H	H	M	M
MACS 5117	Actuarial Mathematics 2	H	M	M	L	H	M	M	L	L
MACS 5118	Case Studies in Mathematics II	H	H	H	H	M	H	H	M	M
MACS 5119	Business Finance	H	M	M	M	H	M	M	L	L
MACS 5120	Business Economics	H	M	M	M	H	M	M	L	L
MACS 5122	Industrial Project	M	H	H	H	H	H	H	H	H

Course modules vs Level Descriptors Learning Outcomes for SLQF Level 9

H - Highly correlated; M - Moderately correlated; L - Correlated

Course Code	Course Title	Level Descriptors Learning Outcomes for SLQF Level											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
		Subject / Theoretical Knowledge	Practical Knowledge and Application	Communication	Teamwork and Leadership	Creativity and Problem Solving	Managerial and Entrepreneurship	Information Usage and Management	Networking and Social Skills	Adaptability and Flexibility	Attitudes, Values and Professionalism	Vision for Life	Updating Self/ Lifelong Learning
		PLO1 PLO2 PLO5	PLO2 PLO3 PLO5 PLO6	PLO4 PLO7	PLO8 PLO9	PLO2 PLO3 PLO5 PLO9	PLO8 PLO6 PLO9	PLO1 PLO2 PLO3 PLO5	PLO4 PLO7 PLO8 PLO9	PLO6 PLO7 PLO8 PLO9	PLO6 PLO7 PLO8 PLO9	PLO9	PLO5 PLO6 PLO9
MACS5111	Actuarial Statistics 1	H	M			M		H		L	L		M
MACS5112	Case Studies in Statistics I	M	H	H	H	H		H	M	M	M	L	M
MACS 5113	Actuarial Statistics 2	H	M			M		H		L	L		M
MACS 5114	Case Studies in Statistics II	M	H	H	H	H		H	M	M	M	L	M
MACS 5115	Actuarial Mathematics 1	H	M			M		H		L	L		M
MACS 5116	Case Studies in Mathematics I	M	H	H	H	H		H	M	M	M	L	M
MACS 5117	Actuarial Mathematics 2	H	M			M		H		L	L		M
MACS 5118	Case Studies in Mathematics II	M	H	H	H	H		H	M	M	M	L	M
MACS 5119	Business Finance	H	H	L		M	M	H	L	L	H	M	H
MACS 5120	Business Economics	H	H	L		M	M	H	L	L	H	M	H
MACS 5122	Industrial Project	M	H	H	H	H	H	H	H	H	H	H	H

Course Learning Outcomes Mapped to SLQF Learning Outcomes

Program Learning Outcomes (PLOs)		PLO1 PLO2 PLO5	PLO2 PLO3 PLO5 PLO6	PLO4 PLO7	PLO8 PLO9	PLO2 PLO3 PLO5 PLO9	PLO8 PLO6 PLO9	PLO1 PLO2 PLO3 PLO5	PLO4 PLO7 PLO8 PLO9	PLO6 PLO7 PLO8 PLO9	PLO6 PLO7 PLO8 PLO9	PLO9	PLO5 PLO6 PLO9
S e m e s t e r	**Course Unit**	1	2	3	4	5	6	7	8	9	10	11	12
		Subject / Theoretical Knowledge	Practical Knowledge and Application	Communication	Team work and Leadership	Creativity and Problem Solving	Managerial and Entrepreneurship	Information Usage and Management	Networking and Social Skills	Adaptability and Flexibility	Attitudes, Values and Professionalism	Vision for Life	Updating Self/ Lifelong Learning
I	MACS5111	CLO 1,3,5 OL, L, SEQ, ES, T						CLO 2,4 SEQ, ES, T					
I	MACS5112		CLO 1 PR, PT, T, P	CLO 1 P, GP	CLO 1 GP, VV	CLO 1 GP, T, PR		CLO 1 GP, PR, RE					
II	MACS 5113	CLO 1,2,3,4,5 OL, L, SEQ, ES, T						CLO 1,2,3,4,5 SEQ, ES, T					
II	MACS 5114		CLO 1 PR, PT, T, P	CLO 1 P, GP	CLO 1 GP, VV	CLO 1 GP, T, PR		CLO 1 GP, PR, RE					
I	MACS 5115	CLO 1,2,3 OL, L, SEQ, ES, T						CLO 1,2,3 SEQ, ES, T					
I	MACS 5116		CLO 1 PR, PT, T, P	CLO 1 P, GP	CLO 1 GP, VV	CLO 1 GP, T, PR		CLO 1 GP, PR, RE					
II	MACS 5117	CLO 1,2,3,4,5 OL, L, SEQ, ES, T						CLO 1,2,3,4,5 SEQ, ES, T					
II	MACS 5118		CLO 1 PR, PT, T, P	CLO 1 P, GP	CLO 1 GP, VV	CLO 1 GP, T, PR		CLO 1 GP, PR, RE					
III	MACS 5119	CLO 1,2,3,4 OL, L, MCQ, SEQ, ES, T	CLO 3,4 PR, T, P					CLO 1,2,3,4 GP, PR, RE			CLO 1,4 SE, P, RF		CLO 1,2,4 SE, RF, P
III	MACS 5120	CLO 1,2,4 OL, L, MCQ, SEQ, ES, T	CLO 2,4 PR, T, P					CLO 1,2,3,4 GP, PR, RE			CLO 1,4 SE, P, RF		CLO 1,2,4 SE, RF, P
IV	MACS 5122		CLO 1 PR, P, RF, IV, RP	CLO 1 PR, IV, VV	CLO 1 PR, IV	CLO 1 PR, P, RF, RP	CLO 1 PR, RF, RP	CLO 1 P, RF, RP	CLO 1 P, RF, IV, VV	CLO 1 P, IV	CLO 1 P, RF, IV	CLO 1 RE, P, RF, IV	CLO 1 RE, P, RF, IV, VV

CLO: Course learning outcomes	PR: Practical	GP: Group Projects	VV: viva voce
RE: Reports	IV: Industrial Visit	MCQ: Multiple Choice Questions	A: Assignment
L: Lecture	RP: Research Project	SEQ: Structured Essay Questions	PT: Practical Test
OL: Online activities	PJ: Projects	ES: Essay Questions	T: Tutorials
RF: Reference Work	SE: Seminars	P: Presentations	S: Supervision

15. Information for students

Contact information about some important personnel are given below.

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Program Study Board of MSc in Actuarial Science

1. Dr. CH Magalla (Chairperson)
2. Dr. RAB Abeygunawardane
3. Dr. GP Lakraj
4. Dr. RV Jayatillake
5. Ms. NLDTD Krishnaratna (External member)
   Executive Director/ ActuaryExecutive Director/ Actuary
   Actsure Lab
6. Mr. Dilanjana Rajamantri (External Member)