ST402-15 Risk Theory

23/24

Department
Statistics
Level
Undergraduate Level 4
Module leader
Larbi Alili
Credit value
15
Module duration
10 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module runs in Term 2 and is available for students on a course where it is a listed option. It is not available as an Unusual Option to students with their home department outside Statistics.

Prerequisites:
Integrated Masters: ST318 Probability Theory
MSc: ST903 Statistical Methods

Results from this module may be partly used to determine exemption eligibility in the Institute and Faculty of Actuaries module CM2. (Independent application with the IFoA may be required to receive the exemption.)

[Module web page](#)

Module aims

This module partly fulfils the aim of the MMORSE stream in Actuarial and Financial Mathematics to enable students to study more deeply the area named in the stream. It will cover material of use in general insurance such as loss distributions, ruin problems in compound Poisson processes and credibility theory.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Decision theory.
Loss distributions: standard examples. Excesses and retention limits.
Bayesian Statistics.
Ruin problem in compound Poisson processes; the adjustment coefficient and
Lundberg's inequality.
Credibility theory: Bayes and empirical Bayes approaches.
Run-off triangles: projection of future development; chain ladder method.
Use of GLMs in general insurance.
Time Series.
Simulation of a Stochastic Process.

Learning outcomes

By the end of the module, students should be able to:

- Know how probability models are used in general insurance
- Understand the concept of methods of re-insurance to hedge against risk.

Indicative reading list

P.J. Boland (2007) Statistical and probabilistic methods in actuarial sciences.
C.D. Daykin, T. Pentikainen, M. Pesonon (1994) Practical Risk Theory for Actuaries.
S.A. Klugman (1985) Loss distributions.
P. McCullagh, J.A. Nelder. (1989) Generalized Linear Models. Chapman and Hall, London.

View reading list on Talis Aspire

Subject specific skills

- Evaluate, select and apply appropriate techniques to solve problems.

- Demonstrate knowledge of and facility with formal concepts, both explicitly and by applying them to the solution of problems.

- Create structured and coherent arguments communicating them in written form.

- Construct logical mathematical arguments with clear identification of assumptions and conclusions.

- Reason critically, carefully, and logically and derive (prove) mathematical results.

Transferable skills

- Problem solving: Use rational and logical reasoning to deduce appropriate and well-reasoned conclusions. Retain an open mind, optimistic of finding solutions, thinking laterally and creatively to look beyond the obvious. Know how to learn from failure.

- Self awareness: Reflect on learning, seeking feedback on and evaluating personal practices, strengths and opportunities for personal growth.

- Communication: Present arguments, knowledge and ideas, in a range of formats.

- Professionalism: Prepared to operate autonomously. Aware of how to be efficient and resilient. Manage priorities and time. Self-motivated, setting and achieving goals, prioritising tasks.

Study

Study time

Type	Required	Optional
Lectures	30 sessions of 1 hour (20%)	2 sessions of 1 hour
Tutorials	9 sessions of 1 hour (6%)	
Private study	111 hours (74%)	
Total	150 hours	

Private study description

Weekly revision of lecture notes and materials, wider reading, practice exercises and preparing for class tests and the examination.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D3

	Weighting	Study time
Class Test 1	10%	

	Weighting	Study time
Term 2 Week 7		
Class Test 2	10%	
Term 2 Week 10		
In-person Examination	80%	
Answer ALL questions.		

- Answerbook Pink (12 page)
- Students may use a calculator

Assessment group R2

	Weighting	Study time
In-person Examination - Resit	100%	
Answer ALL questions.		

- Answerbook Pink (12 page)
- Students may use a calculator
- Cambridge Statistical Tables (blue)

Feedback on assessment

Feedback on Class Test 1 will be returned after 2 weeks, and feedback on Class Test 2 will be returned after 3 weeks, following each test. If the number of registered students is less than 30 then they will be given the opportunity to receive feedback via face-to-face meetings. Solutions and cohort level feedback will be provided for the examination.

[Past exam papers for ST402](#)

Availability

Courses

This module is Optional for:

- Year 1 of TMAA-G1PE Master of Advanced Study in Mathematical Sciences
- Year 1 of TSTA-G4P1 Postgraduate Taught Statistics
- USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and

Economics
  - Year 3 of G300 Mathematics, Operational Research, Statistics and Economics
  - Year 4 of G300 Mathematics, Operational Research, Statistics and Economics

This module is Option list A for:

- Year 4 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
- Year 5 of USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated
- USTA-G1G3 Undergraduate Mathematics and Statistics (BSc MMathStat)
  - Year 3 of G1G3 Mathematics and Statistics (BSc MMathStat)
  - Year 4 of G1G3 Mathematics and Statistics (BSc MMathStat)
- USTA-G1G4 Undergraduate Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)
  - Year 4 of G1G4 Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)
  - Year 5 of G1G4 Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)

This module is Option list D for:

- USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
  - Year 4 of G30C Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream)
  - Year 4 of G30C Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream)
- Year 5 of USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated

This module is Option list E for:

- Year 4 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
- Year 5 of USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated