

# ST402-15 Risk Theory

**20/21**

**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

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## 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. Pesonen (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

TBC

## Transferable skills

TBC

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## 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 D1

	Weighting	Study time
Class Test 1	10%	
Term 2 Week 7		
Class Test 2	10%	
Term 2 Week 10		
On-campus Examination	80%	
Answer ALL questions.		
~Platforms - Moodle		

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

#### Assessment group R

	Weighting	Study time
In-person Examination - Resit	100%	

Answer ALL questions.

~Platforms - Moodle

## 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](#)

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## 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 Intercolated)
- 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)
- Year 4 of USTA-G1G4 Undergraduate Mathematics and Statistics (BSc MMathStat) (with Intercolated 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