

ST345-15 Life Contingencies

23/24

Department

Statistics

Level

Undergraduate Level 3

Module leader

Joan Nakato

Credit value

15

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module runs in is available for students on a course where it is a listed option and as an Unusual Option to students who have completed the prerequisite modules.

Pre-requisites: ST334 Actuarial Methods. It is recommended to take ST338 in parallel with ST345.

Results from this module may be partly used to determine exemption eligibility in the Institute and Faculty of Actuaries (IFoA) module CM1. (Independent application with the IFoA may be required to receive the exemption.)

[Module web page](#)

Module aims

To cover the syllabus required for the Institute and Faculty of Actuaries modules concerning financial schemes like pensions and life insurance where payments are contingent on the occurrence or non-occurrence of events such as death.

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.

- Simple assurance and annuities, and their evaluation
- Net premiums and reserves
- Variable benefits and annuities
- Gross premiums and reserves for fixed and variable benefit contracts
- Annuities and assurances involving two lives
- Multiple state models, including multiple decrements
- Cashflow projection techniques
- Factors affecting mortality; selection and standardisation

Learning outcomes

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

- Define the actuarial symbols related to assurance and annuity contracts, understand their interrelationships, and perform relevant calculations.
- Understand and use life tables for calculations such as expected values and variances for simple contracts.
- Describe and calculate net and gross premiums and premium reserves for various assurance and annuity contracts.
- Describe and use methods to estimate cashflows for contracts involving two lives or multiple states, including the use of multiple decrement models.
- Describe and use methods for assessing profitability and for pricing contracts.
- Explain heterogeneity in populations, and simple methods to deal with heterogeneity.

Indicative reading list

Core Reading for the 2018 exams - CT5 Contingencies. Institute and Faculty of Actuaries (2018) [Available for purchase from the Undergraduate Support Office].;

Formulae and Tables for Examinations of the Faculty of Actuaries and the Institute of Actuaries. Institute of Actuaries and Faculty of Actuaries (2002) [Available on loan from the Undergraduate Support Office].;

Dickson, D.C., Hardy, M., Hardy, M.R. and Waters, H.R.. Actuarial mathematics for life contingent risks. Cambridge University Press, Second edition (2013).;

Dickson, D.C., Hardy, M., Hardy, M.R. and Waters, H.R.. Solutions manual for actuarial mathematics for life contingent risks. Cambridge University Press, Second edition (2013).;

Turnbull, C.. A History of British Actuarial Thought. Palgrave Macmillan (2017).

[View reading list on Talis Aspire](#)

Subject specific skills

- Demonstrate facility with rigorous statistical methods.
- Evaluate, select and apply appropriate statistical techniques.

- Demonstrate knowledge of and facility with formal statistical concepts, both explicitly and by applying them to the solution of mathematical problems.
- Create structured and coherent arguments communicating them in written form.
- Construct logical arguments with clear identification of assumptions and conclusions.
- Reason critically, carefully, and logically.

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	8 sessions of 1 hour (5%)	
Private study	112 hours (75%)	
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.

Assessment group D4

	Weighting	Study time	Eligible for self-certification
Class test 1	15%		No
This class test will take place in lecture in Term 2, Week 5.			
Class test 2	15%		No
This class test will take place in lecture in Term 2, Week 10			
In-person Examination	70%		No
Answer ALL questions.			

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- Formulae & Tables for Actuarial Examinations
 - Answerbook Pink (12 page)
 - Actuarial Tables
 - Students may use a calculator
 - Cambridge Statistical Tables (blue)

Assessment group R3

	Weighting	Study time	Eligible for self-certification
In-person Examination - Resit	100%		No
Answer ALL questions.			

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- Answerbook Pink (12 page)
 - Actuarial Tables
 - Students may use a calculator
 - Cambridge Statistical Tables (blue)
 - Formulae & Tables for Actuarial Examinations

Feedback on assessment

Solutions and cohort level feedback will be provided for the class tests within 4 weeks of the test. Your paper will not be returned as it must be retained for the external examiners but you may make an appointment with the module leader to view your script and receive individual feedback.

Solutions and cohort level feedback will be provided for the examination.

[Past exam papers for ST345](#)

Availability

Pre-requisites

To take this module, you must have passed:

- All of
 - [ST334-15 Actuarial Methods](#)

Courses

This module is Optional for:

- 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
- 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 A for:

- Year 3 of USTA-G300 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics
- Year 4 of USTA-G301 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics (with Intercalated

This module is Option list B for:

- Year 3 of USTA-Y602 Undergraduate Mathematics, Operational Research, Statistics and Economics