ST347-30 Actuarial Methods and Life Contingencies

26/27

Department
Statistics
Level
Undergraduate Level 3
Module leader
Joan Nakato
Credit value
30
Module duration
20 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This module runs in Term 1 and Term 2 and 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.

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

Pre-requisites

- Statistics Students: ST118 Probability 1 and ST119 Probability 2
- Non-Statistics Students: ST120 Introduction to Probability

Useful background. Students taking this module may benefit from taking ST338 Actuarial Models since it may help students comprehend or learn the material more effectively but it is not required to study this module.

For anti-requisite modules please check the availability tab and the course handbook.

Module web page

Module aims

To cover the syllabus for CM1 Actuarial Mathematics. The course consists of two parts entitled Actuarial Methods and Life Contingencies. The first part is taught in Term 1 and the second in Term 2.

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.

Part A Actuarial methods:
Interest rates and discount rates.
Cash flow, equations of value and appraisal.
Perpetuities, Annuities and Loans.
Basic financial instruments.
Bonds, equity and inflation.
Interest rate problems.
Arbitrage and forward contracts.

Part B Life Contingencies:
Simple assurance and annuities, and their evaluation.
Variable benefits and annuities.
Net premiums and reserves.
Annuities and assurances involving two lives.
Multiple state models, including multiple decrements.
Cash flow projection techniques.

Learning outcomes

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

- be familiar with basic financial terminology and be able to understand the financial press.
- 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 cash flows 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.

Indicative reading list

Reading lists can be found in Talis

Specific reading list for the module

Interdisciplinary

Students learn beyond the boundary of statistics and probability connecting their learning with the professional expectations of the chartered professional body dedicated to educating, developing and regulating actuaries based both in the UK and internationally.

Subject specific skills

- Evaluate mathematical and/or statistical techniques.
- Create structured and coherent arguments communicating them in written form.
- Construct and develop logical mathematical arguments with clear identification of assumptions and conclusions.
- Communicate subject-specific information effectively and coherently.
- Evaluate data/problems, including potentially conflicting or incomplete information, abstract essential information and formulate an appropriate analysis/solution strategy using appropriate mathematical language and pursue these strategies through a complete solution cycle.

Transferable skills

- Critical thinking: extracting patterns from incomplete data and using them to form evidence-based conclusions.
- Problem solving: use of logical reasoning to build arguments grounded in evidence and with explicit underlying assumptions.
- Self-awareness: monitoring of your own learning and seeking feedback.
- Communication: verbal discussion of ideas in seminars and among peers; written communication in assignments and the final project.
- Information literacy: evaluation of data and uncertainty in a model-based way.
- Professionalism: self-motivation, taking charge of your own learning, and prioritising effectively.
- Ethics: reflect on professional responsibilities as a statistician in conjunction with the generation and dissemination of information.

Study

Study time

Type	Required
Lectures	60 sessions of 1 hour (20%)
Total	300 hours

Type	Required
Tutorials	12 sessions of 1 hour (4%)
Private study	153 hours (51%)
Assessment	75 hours (25%)
Total	300 hours

Private study description

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

Other activity description

Revision support equivalent to approximately 2 hours.

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 D2

	Weighting	Study time	Eligible for self-certification
Class Test 1	5%	15 hours	No
Class test which will take place during the term that the module is delivered.			
Assessment 1	10%	22 hours 30 minutes	Yes (waive)
A computer-based assessment of practical aspects of the module relating to the CM1B exemption.			
Class Test 2	5%	15 hours	No
This class test which will take place during the term that the module is delivered.			
Assessment 2	10%	22 hours 30 minutes	Yes (waive)
A computer-based assessment of practical aspects of the module relating to the CM1B exemption.			
Centrally-timetabled examination (On-	35%		No

	Weighting	Study time	Eligible for self-certification

campus)

You will be required to answer all questions on this examination paper.

- Answerbook Pink (12 page)
- Students may use a calculator
- Formulae & Tables for Examinations (Inst of Actuaries 2002) GOLD HARDBACK BOOK
- Cambridge Statistical Tables (blue)

Centrally-timetabled examination (On-campus)	35%		No

You will be required to answer all questions on this examination paper.

- Formulae & Tables for Examinations (Inst of Actuaries 2002) GOLD HARDBACK BOOK
- Answerbook Pink (12 page)
- Students may use a calculator

Assessment group R2

	Weighting	Study time	Eligible for self-certification
On-campus Examination - Resit	100%		No

You will be required to answer all questions on this examination paper.

- Answerbook Pink (12 page)
- Actuarial Tables
- Students may use a calculator
- Formulae & Tables for Examinations (Inst of Actuaries 2002) GOLD HARDBACK BOOK
- Graph paper
- Cambridge Statistical Tables (blue)

Feedback on assessment

Solutions and/or commentary and cohort level feedback will be provided for the class tests and examinations. Provisional results for the January exam will be available by week 10 of term 2.

Past exam papers for ST347

Availability

Anti-requisite modules

If you take this module, you cannot also take:

- ST334-15 Actuarial Methods
- ST345-15 Life Contingencies

Courses

This module is Optional for:

- USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
    - Year 3 of G30A Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream)
    - Year 3 of G30J Master of Maths, Op.Res, Stats & Economics (Data Analysis Stream)
    - Year 3 of G30B Master of Maths, Op.Res, Stats & Economics (Econometrics and Mathematical Economics Stream)
    - Year 3 of G30C Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream)
    - Year 3 of G30C Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream)
    - Year 3 of G30D Master of Maths, Op.Res, Stats & Economics (Statistics with Mathematics Stream)
    - Year 3 of G300 Mathematics, Operational Research, Statistics and Economics
    - Year 3 of G300 Mathematics, Operational Research, Statistics and Economics
    - Year 3 of G300 Mathematics, Operational Research, Statistics and Economics
    - Year 4 of G30A Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream)
    - Year 4 of G30J Master of Maths, Op.Res, Stats & Economics (Data Analysis Stream)
    - Year 4 of G30B Master of Maths, Op.Res, Stats & Economics (Econometrics and Mathematical Economics Stream)
    - 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 4 of G30D Master of Maths, Op.Res, Stats & Economics (Statistics with Mathematics Stream)
    - Year 4 of G300 Mathematics, Operational Research, Statistics and Economics
    - Year 4 of G300 Mathematics, Operational Research, Statistics and Economics
    - Year 4 of G300 Mathematics, Operational Research, Statistics and Economics
- USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated
    - Year 3 of G301 BSc Master of Mathematics, Operational Research, Statistcs and

Economics (with Intercalated Year)
    - Year 3 of G30E Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream) Int
    - Year 3 of G30K Master of Maths, Op.Res, Stats & Economics (Data Analysis Stream) Int
    - Year 3 of G30F Master of Maths, Op.Res, Stats & Economics (Econometrics and Mathematical Economics Stream) Int
    - Year 3 of G30G Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream) Int
    - Year 3 of G30H Master of Maths, Op.Res, Stats & Economics (Statistics with Mathematics Stream)
    - Year 4 of G301 BSc Master of Mathematics, Operational Research, Statistcs and Economics (with Intercalated Year)
    - Year 4 of G30E Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream) Int
    - Year 4 of G30K Master of Maths, Op.Res, Stats & Economics (Data Analysis Stream) Int
    - Year 4 of G30F Master of Maths, Op.Res, Stats & Economics (Econometrics and Mathematical Economics Stream) Int
    - Year 4 of G30G Master of Maths, Op.Res, Stats & Economics (Operational Research and Statistics Stream) Int
    - Year 4 of G30H Master of Maths, Op.Res, Stats & Economics (Statistics with Mathematics Stream)
- 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 3 of G1G4 Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)
    - Year 4 of G1G4 Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)
- USTA-GG14 Undergraduate Mathematics and Statistics (BSc)
    - Year 3 of GG14 Mathematics and Statistics
    - Year 3 of GG14 Mathematics and Statistics
- Year 3 of USTA-GG17 Undergraduate Mathematics and Statistics (with Intercalated Year)
- USTA-Y602 Undergraduate Mathematics,Operational Research,Statistics and Economics
    - Year 3 of Y602 Mathematics,Operational Research,Stats,Economics
    - Year 3 of Y602 Mathematics,Operational Research,Stats,Economics
- Year 3 of USTA-Y603 Undergraduate Mathematics,Operational Research,Statistics,Economics (with Intercalated Year)