COURSE DETAILS

Course Code: F70RT
Full Course Title: Risk Theory
SCQF Level: 10
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL

Undergraduate: Yes  Postgraduate Taught: Yes  Postgraduate Research: No
Additional Information:

COURSE AIMS

To provide an introduction to risk theory as applied to insurance processes and problems

To teach students methods of assessing premium for short term insurance policies

To introduce students to simple methods of claims reserving

LEARNING OUTCOMES – SUBJECT MASTERY

- Explain and apply the concepts of conditional expectation and compound distribution, including the derivation of the moments of a compound distribution from its moment and cumulant generating functions.

- Calculate probabilities and moments of loss distributions (including gamma, lognormal and Pareto), including situations in which simple reinsurance arrangements (proportional, excess of loss) and/or excess (deductible) arrangements are in place.

- Construct and use collective and individual risk models (including the compound Poisson model, the compound binomial model, and the compound negative binomial model), including situations in which simple reinsurance and/or excess arrangements are in place.

- Explain the properties of, and apply, some simple premium calculation principles (including utility-based approaches).

- Explain the workings of a simple no claims discount (NCD) experience-rating system; determine the stationary distribution involved; calculate the numbers of policyholders at different levels of discount; calculate the probabilities that policyholders will make claims.

- Explain what is meant by the surplus process for a risk; define probabilities of ruin in infinite/finite time and explain relationships between them; define the adjustment coefficient for a compound Poisson process and state Lundberg's inequality.

- Describe the problem of reserving in short-term insurance and explain what run-off triangles are; calculate outstanding
claims reserves using the chain ladder method (including the use of adjustments for inflation and interest), the average cost of claim method, and the Bornhuetter-Ferguson Method.

- Understand basic simulation methodologies; simulate data from specified probability distributions and in other risk theory contexts.
- Apply copulas to model dependencies between risks
- Understand basic concepts of extreme value theory

**LEARNING OUTCOMES – PERSONAL ABILITIES**

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

- Demonstrate the ability to learn independently
- Manage time work to deadlines and prioritise workloads
- Use an appropriate computer package to process data
- Present results in a way which demonstrates that they have understood the technical and broader issues of risk theory

**SYLLABUS**

- Loss distributions
- Aggregate risk model and Individual risk model
- Risk sharing – simple reinsurance and deductibles
- Premium calculation principles
- Experience rating – No Claims Discount Systems
- Ruin Theory
- Claims reserving – run-off triangles
- Simulation
- Copulas
- Extreme Value Theory

**COURSE RELATIONSHIPS**

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<th>Course Code</th>
<th>Level</th>
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<th>School</th>
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<td>F79MA</td>
<td>9</td>
<td>Statistical Models A</td>
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**LOCATION AND ASSESSMENT METHODS**

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## F70RT Risk Theory

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Assessment Semester 2