

**COURSE NAME: EVALUTION ACTUARIAL MODELS**

**COURSE CODE: MATH3802**

**LEVEL: III**

**SEMESTER: II**

**NUMBER OF CREDITS: 3**

**PREREQUISITES:**

Introduction to Actuarial Mathematics (MATH2220), Probability Theory (MATH2140), Statistical Inference (MATH2150)

**RATIONALE**

The goal of the syllabus is to provide an understanding of the fundamental concepts of risk and how these concepts are applied in the general insurance industry to calculate premiums and reserves, as well as the management of the risks embedded in an insurance portfolio. Whereas Introduction to Actuarial Mathematics applies to life insurance, this course applies to general insurance.

**COURSE DESCRIPTION**

This is a compulsory Level III course, which is an important foundation course in actuarial science. Candidates should master the fundamental concepts of risk and its simple applications as learned in the “Learning Outcomes”. This course allows the candidate to begin preparation for the professional actuarial examinations (the Society of Actuaries Exam C, Casualty Actuarial Society Course 4 and the Faculty/Institute of Actuaries CT6 exam).

**LEARNING OUTCOMES:**

At the end of studying this course, students should be able to:

- Describe and apply the concepts of independence, convolution, conditional expectation and compound distribution
- Calculate probabilities and moments of loss distributions both with and without simple reinsurance arrangements.
- Construct risk models appropriate to short term insurance contracts and calculate the moment generating function and the moments for the risk models both with and without simple reinsurance arrangements.
- Calculate and approximate the aggregate claim distribution for short term insurance contracts.

- Explain the concept of ruin for a risk model. Calculate the adjustment coefficient and state Lundberg's inequality. Describe the effect on the probability of ruin of changing parameter values and of simple reinsurance arrangements.

## **CONTENT**

### **Loss Distributions and Reinsurance**

Pareto, Log-normal, Weibull and Burr distributions for modelling claims, Reinsurance arrangements, Reasons for reinsurance, Policy excesses

### **Individual Risk Models**

Properties of Conditional Expectations, Individual Risk Models, Relative Security Loading, Premiums

### **Collective Risk Models**

Cumulative generating functions, Properties of Compound distributions, Distribution of Aggregate Claims and approximations therefrom, Poisson Process.

### **Ruin Theory**

Continuous Time Model, Discrete Time Model, Probability of Ruin, Claim Processes, Adjustment Coefficient, Lundberg's Inequality, Analysis of Reinsurance using Ruin Theory, First surplus below the initial level, Maximal Aggregate Loss

## **TEACHING METHODOLOGY:**

This course will be delivered by a combination of theoretical classes, practices (tutorials) and other group activities. The delivery mode will be largely interactive. The total estimated 37 contact hours are broken down as follows: 27 hours of lectures and 10 hours of tutorials. The course material (complementary notes, practice problems and assignments) will be posted on our vle <http://ourvle.mona.uwi.edu/>

## **ASSESSMENT:**

The course assessment will be divided into two components: a coursework component worth 25% and a final exam worth 75%.

- Coursework exam worth 15% of the final grade
- Two written assignments each worth 5% of the final grade

- The final exam will be two hours in length and consists of compulsory questions.

## **REFERENCE MATERIALS:**

### *Prescribed Texts:*

- Bowers, N.L. et al, *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries

### *Highly Recommended Text:*

- Hossack, I.B., Pollard, J.H., Zehnwirth, Benjamin, *Introductory Statistics with applications in General Insurance* (Second Edition), 1999, Cambridge University Press.

### *Recommended Text:*

- Dickson, D.C.M., *Insurance Risk and Ruin* (First Edition), 2005, Cambridge University Press
- Daykin, C.D., Pentikainen, T., Pesonen, M., *Practical Risk Theory for Actuaries* (First Edition), 1994, Chapman and Hall.
- Klugman, S., Panjer, H., Willmot, G., *Loss Models: from Data to Decisions* (Third Edition), 2008, John Wiley.

### Online Resources:

The following are free online lectures which the student may access for revision purposes:

<http://www.soa.org/files/pdf/edu-2008-spring-mlc-28-n.pdf>

<http://www.actuarialseminars.com/Misc/SNorderform.html>