

**NANYANG TECHNOLOGICAL UNIVERSITY**  
**NANYANG BUSINESS SCHOOL**

**BR3209 Computing for Risk Management and Insurance Practices**

**A) Course Aims/Description**

This course is specially designed for the students who are interested in learning the software tools frequently used by the practitioners in the financial industry such as Excel, VBA, SQL and R and understanding how to communicate model and model results to the target audiences. The course uses various real-life examples for demonstration in order to give the students firsthand experience of how the practitioners using the software tools in solving the problems faced by them in their day-to-day works.

**B) Intended Learning Outcomes (ILO)/Objectives**

By the end of the course, you will be able to:

- ILO1: Discover and assess the various functionalities of software such as Excel, VBA, SQL and R;
- ILO2: Analyze and solve various insurance related issues with the use of software such as Excel, VBA, SQL and R; and
- ILO3: Communicate the model and model results to the audiences in an effective manner.

**C) Course Content**

The course covers the following key topics:

1. Introduction to Excel

First, this chapter provides the details of the key Excel features and functions used by the practitioners in developing the Excel model. Second, it demonstrates how to create proper graphs with Excel. Last, it shows the best practices in maintaining an Excel spreadsheet and plotting a graph.

2. Insurance and Financial Application: Excel

This chapter shows the theoretical concepts on Value-at-Risk (VaR) analysis. In particular, it demonstrates how Excel can be used to carry out the analysis. This chapter has two parts:

a. Monte Carlo Simulation & Curve Fitting

The first part shows how to fit a curve on a specific risk via a curve fitting exercise.

b. Value-at-Risk Analysis

The second part shows the concepts and pros and cons of the VaR methods – Parametric, Historical and Monte-Carlo. In addition, it explains and compares the results derived from the VaR methods.

### 3. Introduction to VBA

First, this chapter demonstrates the basic rules in VBA macro. Second, it illustrates the common VBA commands used by the practitioners when they develop the program.

### 4. Insurance and Financial Application: VBA

This chapter demonstrates the application of VBA in solving the financial and insurance related issues. This chapter has two parts:

#### a. Process automation

This part illustrates how VBA could be used to automate a (calculation) process.

#### b. Customized functions – Options and Forwards

This part explains the theoretical concepts on both options and forwards. In addition, it shows how to create a customized function to determine the value of options and forwards.

### 5. Introduction to SQL

This chapter illustrates the common SQL commands used by the practitioners when they develop the program.

### 6. Insurance and Financial Application: SQL

#### a. Policy Movement Analysis

This chapter explains the possible movement of the life insurance business. In addition, it demonstrates how SQL can be used to analyze the possible movement of the life insurance business through Policy Movement Analysis.

### 7. Introduction to R

This chapter illustrates the common R commands used by the practitioners when they develop the program.

### 8. Insurance and Financial Application: R

This chapter explains and discusses on how R can be used to carry out the Monte-Carlo Simulation, Monte-Carlo Value-at-Risk Analysis and Simple Regression Analysis. This chapter consists of three parts:

#### a. Monte Carlo Simulation

This part demonstrates how Monte Carlo Simulation on different statistical distributions can be carried out in R.

#### b. Monte Carlo Value-at-Risk Analysis

This part, an extension of the previous part, illustrates how R can be used to carry out the Monte Carlo Value-at-Risk Analysis.

#### c. Simple Regression Analysis

This part explains the theoretical concepts on simple regression analysis. In addition, it demonstrates how R can be used to carry out the analysis.

9. Model documentation

This chapter explains and discusses on the preparation of proper documentation on VBA, SQL & R programs and Excel models.

**D) Assessment (includes both continuous and summative assessment)**

Component	Weightage	Team/ Individual
1. Final Examination	60%	Individual
2. Mid-term Test	30%	Individual
3. Class Participation	10%	Individual
Total	100%	

**E) Planned Weekly Schedule**

Week	Topic
1	Introduction to Excel
2	Insurance & Financial Application: Excel I ✓ <i>Monte Carlo Simulation &amp; Curve Fitting</i>
3	Insurance & Financial Application: Excel II ✓ <i>Value-at-Risk Analysis</i>
4	Introduction to VBA I
5	Introduction to VBA II
6	Insurance & Financial Application: VBA ✓ <i>Process automation</i> ✓ <i>Customized functions – Options and Forwards</i>
7	Model Documentation
8	Recess
9	Midterm Test
10	Introduction to SQL
11	Insurance & Financial Application: SQL ✓ <i>Policy Movement Analysis</i>
12	Introduction to R
13	Insurance & Financial Application: R ✓ <i>Monte Carlo Simulation &amp; Value-at-Risk Analysis</i> ✓ <i>Simple Regression Analysis</i>
14	Revision