

Risk Management Science

Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
RMS2001	Introduction to Risk Management	3
RMS4001	Simulation Methods for Risk Management Science and Finance	3
RMS4002	Data Analysis in Finance and Risk Management Science	3
RMS4003	Statistical Modelling in Financial Markets	3
RMS4004	Theory of Risk and Insurance	3
RMS4005	Stochastic Calculus for Finance and Risk	3

Course Description

(Unless otherwise specified, all are 3-unit term courses of three hours of lecture and one hour of tutorial per week.)

RMS2001

Introduction to Risk Management

1st or 2nd term

This course aims at providing a focused introduction to various concepts of risk and risk measures from a scientific perspective. The course will discuss the various roles that risk plays in insurance and financial applications. Current risk measures such as value at risk and shortfall risk will be introduced. These measures will be calculated for recent financial losses to illustrate their usefulness in risk management.

RMS 4001

Simulation Methods for Risk Management Science and Finance

1st or 2nd term

This course starts with presenting standard topics in simulation including random variable generations, variance reduction methods and statistical analysis of simulation outputs. The course then reviews the applications of these methods to derivative security pricing. Topics addressed include: importance sampling, martingale control variables, stratification and the estimation of derivatives. Additional topics include the use of low discrepancy sequence (quasi-random numbers), pricing American options and scenario simulation for risk management. Prerequisite: RMS2001 or consent of instructor.

RMS 4002

Data Analysis in Finance and Risk Management Science

1st or 2nd term

This course covers modern data analysis techniques that are commonly used in financial and risk management. Topics covered include: applications of multivariate techniques such as principal component and canonical correlation to asset management, Kalman filter and time series methods in term-structure analysis, and data mining methods such as modern nonlinear regression and classification tree methods in finance. Prerequisite: RMS 2001 or consent of instructor.

RMS 4003**Statistical Modelling in Financial Markets**

1st or 2nd term

This course is designed to introduce the current developments in risk management in the financial markets. Risk management ideas associated with three general important areas in finance will be discussed: asset management, derivative pricing and fixed income models. Emphasis will be placed on the statistical modelling aspects on some of the commonly used models in these areas. Prerequisite: RMS 2001 or consent of instructor.

RMS 4004**Theory of Risk and Insurance**

1st or 2nd term

This course covers the theory of risk and its applications to insurance. Topics include: classical and stochastic risk models, ruin theory, claims modelling and evaluations, risk premium pricing, loss distributions and methods for pension schemes. Prerequisite: STA 3007 or consent of instructor.

RMS 4005**Stochastic Calculus for Finance and Risk**

1st or 2nd term

This course starts with the introduction of the concepts of arbitrage and risk-neutral pricing. It then proceeds to discuss the stochastic calculus foundations for continuous-time finance models. Topics include: Brownian motion, stochastic integral, Itô's formula, Girsanov's change of measure, and the relationship between stochastic calculus and partial differential equations. Examples will be taken from equity options, including the Black-Scholes formula for foreign exchange and term-structure models. Prerequisites: RMS 2001 and STA 3007 or consent of instructor.

Study Scheme

1. Major Programme

Students are required to complete a minimum of 69 units of courses as follows:

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|------|---|----------|
| (i) | Required Courses (Please see Note 1): | 42 units |
| | ACY 1111, DSE 1030, FIN 2010 [#] , 3080 [#] , MAT 2010 [#] , 2310 [#] , RMS 2001, 4001, 4003, STA 2001 [#] , 2006 [#] , 3007 [#] and 3008 [#] | |
| (ii) | Elective Courses: | 27 units |
| | (a) One course from CSC 1110, 1500, STA 2009 | |
| | (b) At least eight courses from CSC 2520 [#] , ECO 3420 [#] , FIN 3010 [#] , 3050 [#] , MAT 3210 [#] , 3220 [#] , 3230 [#] , 3240 [#] , 4210 [#] , RMS 4002, 4004, 4005, STA 3006 [#] , 4003 [#] , 4004 [#] , 4005 [#] , 4006 [#] , 4008 [#] | |

Total: 69 units

[#] to be included in the Major GPA as well

Recommended course pattern

First Year of Attendance

ACY 1111, DSE 1030, FIN 2010, MAT 2010, 2310, RMS 2001, STA 2001, 2006, and one elective course from STA 2009, CSC 1110, 1500

29 units

<i>Second Year of Attendance</i>	19-22 units
FIN 3080, RMS 4003, STA 3007, 3008, and two or three elective courses from CSC 2520, ECO 3420, FIN 3010, 3050, MAT 3210, 3220, 3230, 3240, 4210, STA 3006, 4004	
<i>Third Year of Attendance</i>	18-21 units
RMS 4001 and five or six elective courses from CSC 2520, ECO 3420, FIN 3010, 3050, MAT 3210, 3220, 3230, 3240, 4210, RMS 4002, 4004, 4005, STA 3006, 4003, 4004, 4005, 4006, 4008	
	Total: 69units

Note 1: All Risk Management Science Major students should obtain Grade "D" or above in each of the courses of RMS 2001, STA 2001, 2006, 3007 and 3008. Otherwise, they are required to repeat the courses. Students who cannot meet the Grade "D" requirement in any one of the courses mentioned above after two attempts will be required to withdraw from the University. Please refer to Reg. 15.2(d) of the General Regulations Governing Full-time Undergraduate Studies.

2. *Minor Programme*

A. **Applicable to students admitted in 2002-03 and thereafter**

Students are required to complete a minimum of 21-23 units of courses as follows:

- | | |
|---|-------------|
| (i) Required Courses: | 12-14 units |
| RMS 2001, STA 2101 or 2001, 2102 or 2006, and either STA 2009 or CSC 1110 or 1500 | |
| (ii) Elective Courses (Please see Note 2): | 9 units |
| Three courses from RMS 4001, 4002, 4003, 4004, 4005, STA 4004 | |

Total: 21-23 units

Note 2: The elective courses in (ii) that are counted towards the fulfilment of the student's RMS Minor programme requirement cannot be counted towards the fulfilment of his/her other Major/Minor programme requirement. Students are required to declare which course(s) will be counted towards requirements of the Minor programme in RMS at their final term of attendance.

B. **Applicable to students admitted in 2001-02 and before**

Students are required to complete a minimum of 21-23 units of courses as follows:

- | | |
|---|-------------|
| (i) Required Courses: | 12-14 units |
| RMS 2001, STA 2101 or 2001, 2102 or 2006, and either STA 2009 or CSC 1110 or 1500 | |
| (ii) Elective Courses (Please see Note 3): | 9 units |
| Three courses from FIN 2010, RMS 4001, 4002, 4003, 4004, 4005, STA 4004 | |

Total: 21-23 units

Note 3: Statistics Majors minoring in RMS are required to declare which RMS courses will be counted towards requirements of the Minor programme in RMS at their final term of attendance. RMS courses counted towards the fulfilment of these student's Minor programme requirement cannot be counted towards the fulfilment of their Major programme requirement.

3. *Faculty Language Requirement*

(Please refer to the "Faculty Language Requirement" of Faculty of Science for details.)