

VICTORIA APPLIED FINANCE PROGRAMME  
School of Economics and Finance

**MMAF 525 FINANCIAL MODELLING**

Trimester 1, 2016

**COURSE OUTLINE**

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**Prescription**

This is a practical course delivered through a combination of lectures and workshops in which students build spreadsheet models to tackle problems in finance including: risk analysis via simulation and bootstrapping; portfolio analysis; computing the efficient frontier; Black-Scholes model; option pricing via simulations; value at risk; duration and immunization; default adjusted expected bond returns.

**Course Learning Objectives**

This course is designed to provide a link between theory and practice in Finance. The key objective is to equip students with the skills and knowledge of building financial models using Excel. To achieve this, students will need to acquire essential programming and modelling skills in VBA and Excel. These skills will be applied to build financial models using materials covered in this and other more advanced courses offered in the VIAF programme. On completion of this course, students would have developed the confidence and skills required to build their own financial models to handle a range of problems in Finance.

**\*\* Pre-requisite Skills**

Prior knowledge in VBA programming is neither required nor assumed. However, students are expected to have already attained intermediate-level Excel skills before taking this course. You would likely have met this requirement if you are a regular Excel user. However, if you are new to Excel or your Excel skills are still at the beginner-level, it is essential that you undertake additional work in Excel on your own prior the start of this course.

***Note: While students are not required to have prior programming experience, this course does involve a substantial amount of time reading and writing VBA codes. For some students, this could be a highly time-consuming and frustrating experience. Therefore, before you commit to taking this course, it is strongly recommended that you consider very carefully whether you are prepared to invest the time and effort to learn some programming and more advanced Excel modelling skills. If you are not prepared to put in the time and effort, it is most likely that you would struggle to pass this course.***

## **Course Content**

### ➤ **First Block (Saturday 23<sup>rd</sup> April – Monday 25<sup>th</sup> April): Introduction to VBA with Applications in Financial Modelling**

#### ***Materials to be covered***

The main objective of the first block is to introduce students to basic VBA programming and modelling skills in Excel. These skills will form the basis for building a number of financial models.

#### Excel and VBA skills:

- Advanced Excel functions, arrays operations and interactive charts
- Object oriented programming and VBA programming environment
- The use of VBA variables
- VBA objects and properties
- Basic VBA programming language structures
- Arrays and dynamic arrays
- Writing VBA simple and array functions
- Writing VBA subroutines

#### Applications in Finance:

- Financial arithmetic with user-defined functions
- Term structure problems such as deriving a zero-coupon yield curve and curve fitting
- Modelling price and return distributions of financial assets
- Performing simulations in Excel and VBA
- Value at risk and bootstrapping methods

#### ***Reading materials***

1. Text: Simon Benninga, Financial Modeling, 4<sup>th</sup> edition, the MIT Press.

<i>Textbook chapter(s)</i>	<i>Topic</i>
31, 32, 33, 34, 35	Data tables, functions, arrays/matrices and other useful Excel features
36, 37, 38, 39	Introduction to VBA: User-defined functions, VBA loop structures, macros and user interaction, arrays and objects
1	Basic financial calculations
22.1, 22.2 22.3	Modelling the term structure
25, 26, 27.1 to 27.5	Random number generation, lognormal distribution and simulating stock prices
28	Value at risk and bootstrapping

2. Supplementary notes on Excel and VBA (these are distributed separately and available on Blackboard).

### ➤ **Second Block (Saturday 18<sup>th</sup> June – Monday 20<sup>th</sup> June): Building Advanced Models in Finance**

#### ***Materials to be covered***

The objective of this session is to extend the VBA modelling skills developed in the first session and apply them to a selection of more advanced topics in Finance including: option valuation, portfolio optimisation, reverse optimisation, duration, immunisation and default-adjusted expected bond returns.

### ***Reading materials***

Text: John Simon Benninga, Financial Modelling, 4<sup>th</sup> edition, the MIT Press.

<b><i>Textbook chapter(s)</i></b>	<b><i>Topic</i></b>
15, 17, 30.1, 30.2	Option valuation
8, 9, 10, 12	Portfolio selection
13	Black-Litterman approach to portfolio optimisation
20, 21	Duration and immunisation
23	Default-adjusted expected bond returns

### **Materials and Equipment**

All assignments, class examples and tests for this course will be based on Excel 2013. The tests will be open-book and you will be asked to answer the test questions in Excel 2013 in the computer lab. Therefore, students need to have access to Excel 2013 for Windows in order to study for this course.

#### ***\*\*Excel Version***

The computer labs at Victoria University only have Excel 2013 installed and therefore you will need to sit the tests in Excel 2013. Even if you are a proficient user of other Excel versions, it might take you some time to be familiar with Excel 2013. Therefore, it is important that you have access to Excel 2013 and use Excel 2013 in completing all the assignments. There are many introductory Excel 2013 books available in bookstores that you might find useful.

While Excel 2011/2015 for Mac does support VBA, there are many compatibility issues that you will encounter when switching between Excel for Mac and Excel 2013 for Windows. You should use Excel 2013 for Windows to do all your assignments and preparations for this course and avoid using Excel 2011/2015 for Mac.

### **Trimester Dates**

The teaching/study and assessment period is Monday 29<sup>th</sup> February – Friday 1<sup>st</sup> July 2016.

(Note: The due date for the course project for this paper is Friday 1<sup>st</sup> July 2016.)

### **Withdrawal from Course**

1. Your fees will be refunded if you withdraw from this course on or before Friday 11<sup>th</sup> March 2016.
2. The standard last date for withdrawal from this course is Friday 11<sup>th</sup> May 2016. After this date, students forced to withdraw by circumstances beyond their control must apply for permission on an '*Application for Associate Dean's Permission to Withdraw Late*' including supporting documentation. The application form is available from either of the Faculty's Student Customer Service Desks or [online](#).

### **Names and Contact Details**

The course coordinator is Joe Cheung. Joe is based in Auckland and therefore the preferred contact is via email in the first instance: [jcheung@xtra.co.nz](mailto:jcheung@xtra.co.nz).

The administrator for this course is Rachel Zhang, Room RWW120.

Email: [Rachel.Zhang@vuw.ac.nz](mailto:Rachel.Zhang@vuw.ac.nz)

Phone: 04 4636148

## **Block Release Times and Room Numbers**

**Block Release 1:** 9:00am Saturday 23<sup>rd</sup> April – 12:30pm Monday 25<sup>th</sup> April 2016.

**Block Release 2:** 9:00am Saturday 18<sup>th</sup> June – 12:30pm Monday 20<sup>th</sup> June 2016

A detailed schedule of each block release course will be supplied closer to the respective sessions. Classes will take place at the Kelburn Campus – please see the schedule for details.

*Attendance at all sessions of both block releases is compulsory.*

## **Course Delivery**

The contact hours of the course will be during the two block releases detailed above. There is also an optional Excel workshop held early in the trimester. During the rest of the trimester, students will be expected to be engaged in self-directed study using their textbooks and materials posted on Blackboard, and completing assignments which will be posted on Blackboard

## **Readings (also see Course Contents section above)**

- Simon Benninga, *Financial Modeling*, 4<sup>th</sup> edition, the MIT Press.
- Supplementary notes for the first session.
- If required, introductory books on Excel 2013 (you will need to get hold of these books yourself).

## **Mandatory course requirements**

To achieve a pass in this paper, a student must:

1. obtain an average mark of at least 50% across all course assessments; **and**
2. **obtain an average of 45% or higher in the two tests; and**
3. attend both block releases.

If you have, or become aware of, any health condition that could prevent you attending a VIAF compulsory block release, then you should notify the Programme director immediately to [maf-programme@vuw.ac.nz](mailto:maf-programme@vuw.ac.nz) .

If you cannot complete an assignment or sit a test or examination, refer to [www.victoria.ac.nz/home/study/exams-and-assessments/aegrotat](http://www.victoria.ac.nz/home/study/exams-and-assessments/aegrotat).

## **Expected Workload**

Total average expected workload is 200 hours. During the 6 weeks or so of term prior to each block release, students will need to allow about 14 hours per week for study, research and preparation of assignments for this course. The two block courses each involve approximately 18 hours of work.

## **Assessment**

The Assessment Handbook will apply to all VUW courses: see

<http://www.victoria.ac.nz/documents/policy/staff-policy/assessment-handbook.pdf>.

Assessment items in this course include three assignments, one course project and two tests:

<b>Assessment Item</b>	<b>Weight</b>	<b>Learning Objectives</b>
Test 1 (3 hours)	30%	Acquire essential programming and modelling skills in VBA and in Excel
Test 2 (3 hours)	30%	Apply financial modelling skills to more advanced topics in Finance
Assignment 1a	3%	Acquire essential programming and modelling skills in VBA and in Excel
Assignment 1b	3%	Acquire essential programming and modelling skills in VBA and in Excel
Assignment 2	6%	Apply financial modelling skills to more advanced topics in Finance
Project	28%	Build a financial model on your own using skills acquired in the course to solve some practical problem
<i>Total</i>	<i>100%</i>	

Dates when assessment items take place or are due:

<b>Assessment Item</b>	<b>Date/Due Date</b>
Assignment 1a	(Fri) 1 <sup>st</sup> April 2016
Assignment 1b	(Fri) 15 <sup>nd</sup> April 2016
Test 1 (3 hours)	(Mon) 25 <sup>th</sup> April 2016
Assignment 2	(Wed) 8 <sup>th</sup> June 2016
Test 2 (3 hours)	(Mon) 20 <sup>th</sup> June 2016
Project	(Fri) 1 <sup>st</sup> July 2016

Note: All assignments are to be submitted via Blackboard. (<http://blackboard.vuw.ac.nz/>)

### ***Course Project***

A key learning outcome of this course is that students are capable of building an Excel model to tackle a practical problem of substance in Finance. The course project is therefore an integral part of the assessment process. The 28% weight allocated to the course project is a reflection of its importance.

Please note that the course project is an individual assignment and NOT a group project. You must develop your own Excel model. A jointly developed model submitted by more than one person will not be marked.

A financial model will generally consist of a set of inputs, a processing module and a set of outputs (tables, graphs, etc.). It should also be designed in such a way that it can readily accommodate a 'what-if' or sensitivity analysis, i.e. the model should allow assessments of how changing input values can affect the model outputs (values, profits, losses, etc).

It is expected that modelling skills covered in this course will be applied to build the model. You can also develop a financial model to solve a problem or as a project at work. However, in that case, you should not use any commercially sensitive data in the model.

If you would like to get some advance feedback on your ideas about the project, you can choose to hand in a one-page proposal of your project when you submit Assignment 2 (by 8<sup>th</sup> June), although this is not mandatory.

When you hand in your final project, you should attach a brief summary of the project which highlights what the model is intended to do and key features in your model to ensure that the efforts you put into the project will be given due considerations.

Note that no submission of the course project will be accepted after the due date (1<sup>st</sup> July).

### **Penalties**

Marks for assignments 1a, 1b and 2 will be reduced by 5% of the maximum for every day late (e.g. if your score is 70/100, it will be adjusted to 65/100 if the assignment is submitted 1 day late, or 60/100 if it is 2 days late, etc.). The date of submission to Blackboard (until midnight that day) shall be taken as the date of delivery. There will be a final cut off date, which is one week after the due date for each assignment, after which no assignment will be accepted. No late submission of the course project will be accepted.

### **Use of Turnitin**

Student work provided for assessment in this course may be checked for academic integrity by the electronic search engine <http://www.turnitin.com>. Turnitin is an on-line plagiarism prevention tool which compares submitted work with a very large database of existing material. At the discretion of the Head of School, handwritten work may be copy-typed by the School and submitted to Turnitin. A copy of submitted materials will be retained on behalf of the University for detection of future plagiarism, but access to the full text of submissions will not be made available to any other party.

### **Student feedback**

Student feedback on University courses may be found at:  
[www.cad.vuw.ac.nz/feedback/feedback\\_display.php](http://www.cad.vuw.ac.nz/feedback/feedback_display.php).

### **Communication of Additional Information**

Additional information including assignment questions, details of the block course schedule, feedback on course assessments, etc. will be provided online via Blackboard.

Students are responsible for logging onto Blackboard regularly to check for any updates or announcements, and for ensuring that the VIAF Senior Administrator ([viaf-programme@vuw.ac.nz](mailto:viaf-programme@vuw.ac.nz)) has your up-to-date email and postal addresses.

If you would like your assessments to be returned to your own personal email address rather than your default Victoria University email address, please ensure that you enter your personal email address in Blackboard and/or notify the course coordinator ([jcheung@xtra.co.nz](mailto:jcheung@xtra.co.nz)) via email directly.

### **Link to general information**

For general information about course-related matters, go to  
<http://www.victoria.ac.nz/vbs/studenthelp/general-course-information>

**Note to Students**

Your assessed work may also be used for quality assurance purposes, such as to assess the level of achievement of learning objectives as required for accreditation and academic audit. The findings may be used to inform changes aimed at improving the quality of VBS programmes. All material used for such processes will be treated as confidential, and the outcome will not affect your grade for the course.

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