

PAPER OUTLINE

Paper Title: **Advanced Financial Modelling**

Paper Code: **FINA515-09B (HAM)**

School: **Waikato Management School**

Department: **Finance**

Location: **Main Campus, Hillcrest Road, Hamilton**

Convenor: **Kurt Hess (Dr)**
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STAFF

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Student Representative(s)

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TIMETABLE DETAILS:

In the first half of the course, Tuesday classes are mainly lecture sessions. The usual class format is the presentation of a model/problem often with an introduction to an associated assignment. Thursday is used for an Excel/VBA introduction / brush up. Note that for scheduling reasons we might switch around Tuesday and Thursday lessons at times. Classes in the second half (topics to be confirmed): Tuesdays will be dedicated to the presentation of modelling methods & ideas in the finance area. Thursdays are generally support tutorials where you can get help on the final project and assignments.

Note that you will have to sit two tests together with the Friday FINA 415 class in Week 4 - Friday, 7 August 2009, 11am - 1pm

Week 8 - Friday, 18 September 2009, 11am - 1pm

Lectures

Lecture Time	Room
Tue 1pm – 3pm	MSB.0.20
Thu 10am – 12pm	MSB.0.20

Group Information

PURPOSE STATEMENT

The purpose of this paper is the practical implementation and application of some advanced models in finance. It is taught in a computer lab format. While the theoretical basis for each model family is briefly reviewed, the emphasis is on honing the numerical modelling and data handling skills. The first part of the paper is devoted to laying the foundations both in terms of programming skills and familiarity with software tools (mainly Excel/VBA, EViews, but also script languages, econometric software if necessary). These are acquired through examples drawn from various areas of finance such as portfolio theory, foreign exchange, financial institutions analysis, valuation of derivative instruments, etc. The second part of the course is dedicated to the presentation of selected models from the following topic areas: market and credit risk, corporate finance, numerical and simulation methods, GARCH volatility modelling. Besides three smaller assignments, students must complete a major modelling project. This includes implementation and description of a financial model drawn from the academic literature or specialised modelling/derivatives books.










LEARNING OUTCOMES

- 1 : Implementation of selected models in the areas of fixed income, credit risk and derivatives using the EXCEL/VBA software tool
- 2 : Become familiar with methods to prepare data for empirical analysis.
- 3 : Get exposure to programming with lower level computer languages for applications in financial models
- 4 : Independent implementation and testing of a model from the subject areas of finance or economics

ASSESSMENT

Internal Assessment/Final Examination 1:0

Internally Assessed Components

Component Details			Submission Details		
Component	Due Date	Weighting	Compulsory	Where	How
 Assignment 1: Company Financial Planning Model	6/08/2009 at 11:00 pm	12.00%		Online	Web Submit
 Test 1 (together with FINA 415 class)	7/08/2009 at 1:00 pm	10.00%	✓	Online	Web Submit
 Project Assignment - Proposal	4/09/2009 at 11:00 am	5.00%	✓	to Lecturer	Web Submit
 Assignment 2 User-defined VBA financial & statistical functions	11/09/2009 at 11:00 pm	16.00%		Online	Web Submit
 Test 2 (together with FINA 415 class)	18/09/2009 at 1:00 pm	10.00%	✓	Online	Web Submit
 Assignment 3: Portfolio Simulation	24/09/2009 at 11:00 pm	12.00%		to Lecturer	Web Submit
 Optional assignments	25/10/2009 at 11:00 pm	0.00%		Online	Web Submit
 Project Assignment - Report	2/11/2009 at 11:00 am	10.00%	✓	to Lecturer	Web Submit
 Project Assignment - Model	2/11/2009 at 11:00 pm	25.00%	✓	to Lecturer	Web Submit
Total		100%			

Notes

- The above Internally assessed components make up **100.00%** of the total assessment.
- The Final Examination makes up the remaining **0%**
- You are required to complete the Assessments marked as "Compulsory".
YOU MUST do the Compulsory Assessment otherwise you will not pass the Paper.

Assignment Details

Assignment 1: Company Financial Planning Model (Due Date: Thursday, 6 August 2009 at 11:00 pm)

In this assignment you can practice the use of some advanced spreadsheet features applied to implementation of a company financial planning model. Requirements in separate document. Students need to submit the model (Excel file) and slides (Powerpoint slides)

Test 1 (together with FINA 415 class) (Due Date: Friday, 7 August 2009 at 1:00 pm)

This item of assessment is Compulsory.

TEST DATE:

Friday, 7 August 2009 / TIME: 11am to 1pm

together with FINA 415 class (FINA515 test 1 may be different from the FINA415 version). You will be advised in which computer lab to sit the test.

This test checks on your skill to

- (1) solve basic time value of money problems using Excel
- (2) understand the fundamental structure and company financial statements and the linkages among them. (2) also requires a basic knowledge of financial performance ratios.

The test format will be explained in the class and an example test for you to practice will be provided. The topics will be briefly covered in the Excel brush-up classes (Thursdays) as it is assumed the students of this advanced graduate paper already possess the the necessary skills. If they wish, students are welcome to attend FINA 415 classes (Tuesdays and Fridays) where the subject is covered in more depth.

You must pass this mandatory test in order to continue with the course. Students who have completed FINA415 in earlier years and have achieved an A grade average in the three tests, need not attend this test.

Project Assignment - Proposal (Due Date: Friday, 4 September 2009 at 11:00 am)

This item of assessment is Compulsory.

Consult the requirements for the major modelling project for more details. Your proposal will be reviewed in a personal appointment in the first week after teaching recess. Time/place to be announced (appointments during regular class time).

Assignment 2 User-defined VBA financial & statistical functions (Due Date: Friday, 11 September 2009 at 11:00 pm)

Develop user-defined VBA functions for applications in statistics and finance. Includes valuation of options by Monte Carlo simulation of random stock price paths.

Test 2 (together with FINA 415 class) (Due Date: Friday, 18 September 2009 at 1:00 pm)

This item of assessment is Compulsory.

TEST DATE:**Friday, 18 September 2009 / TIME: 11am to 1pm**

together with FINA 415 class (note FINA515 test 2 may be different from FINA415 version).
You will be advised in which computer lab to sit the test.

The topics will be covered in the Excel brush-up classes (Thursdays) and FINA 515 students are also invited to attend FINA 415 classes if required.

A sample test from last year will be provided. You must pass this mandatory test in order to continue with the course.

Students who have completed FINA415 in earlier years with excellent results in tests (usually A or higher), need not attend this test.

Assignment 3: Portfolio Simulation (Due Date: Thursday, 24 September 2009 at 11:00 pm)

Find the efficient frontier by VBA simulation of feasible portfolios

Optional assignments (Due Date: Sunday, 25 October 2009 at 11:00 pm)

There is a possibility that an optional assignment might be offered at the discretion of the lecturer. This could be for students wishing to make up for weak marks in one of the mandatory assignments. If it is well done, it will be used to increase the mark of another assessment component (again at the lecturer's discretion).

Project Assignment - Report (Due Date: Monday, 2 November 2009 at 11:00 am)

This item of assessment is Compulsory.

Requirements in separate document.

Project Assignment - Model (Due Date: Monday, 2 November 2009 at 11:00 pm)

This item of assessment is Compulsory.

See requirements in separate document.

RESOURCES

Required

Recommended

The list of books below is likely to "blow" an average student's budget. None of them is specifically required to follow the lab sessions. It depends on a student's particular interests which modeling book, if any, he/she might want to use as a starting point for his/her project assignment. All of them should be available in the library.

Financial Modeling / Financial Derivatives

Benninga, Simon.(2008). *Financial Modeling*, MIT Press. 3rd edition.

Benninga, Simon.(2006) *Principles of Finance with Excel*. New York: Oxford University Press . ISBN 0195301501

Haug, Espen Gaarder. (2007)*The Complete Guide to Option Pricing Formulas (2nd edition)*. McGraw-Hill .

Hull, J.C. (2006). *Options, futures & other derivatives* (6th ed.). Upper Saddle River, NJ:

Pearson Prentice Hall.

Jackson, Mary. *Staunton Mike. (2001) Advanced modelling in finance using Excel and VBA*, John Wiley & Sons

Löffler, G., & Posch, P. N. (2007). *Credit risk modeling using Excel and VBA*. Hoboken, NJ: Wiley.

Rebonato, R. (1998). *Interest-rate option models : understanding, analysing and using models for exotic interest-rate options*: Wiley, Chichester ; New York.

Sengupta, C. (2004). *Financial modeling : using Excel and VBA*. Hoboken, N.J.: Wiley.

van Deventer, D. R., & Imai, K. (1997). *Financial risk analytics : a term structure model approach for banking, insurance and investment management*. Chicago, Ill: Irwin Professional Publ.

Wilmott, P. (2006). *Paul Wilmott on quantitative finance (2nd edition)*: John Wiley. Volumes 1-3

Wilmott, P. (2007). *Paul Wilmott introduces quantitative finance (2nd edition)*: John Wiley.

Related subject fields:

Albright, S. C. (2001). *VBA for modelers : developing decision support systems with Microsoft Excel*: Duxbury/Thomson Learning.

Lewis, N. D. C. (2004). *Operational risk with Excel and VBA : applied statistical methods for risk management*. Hoboken, N.J.: John Wiley & Sons.

Winston, W. L. (2007). *Microsoft Office Excel 2007 : data analysis and business modeling*. Redmond, Wash.: Microsoft Press.

Excel/VBA Resources:

Blattner, P. (2001). *Using Microsoft Excel 2002 (Special ed.)*. Indianapolis, Ind.: Que. (available as ebook from library <http://proquest.safaribooksonline.com/0789725118>)

Birnbaum, D., & ebrary Inc. (2002). *Microsoft Excel VBA programming for the absolute beginner*. Indianapolis, IN: Premier Press. (available as ebook from library <http://site.ebrary.com.ezproxy.waikato.ac.nz/lib/waikato/Doc?id=10066542>)

Hawley, D. E., & Hawley, R. (2007). *Excel hacks (2nd ed.)*. Sebastopol. CA: O'Reilly Media.

Jelen, B., & Syrstad, T. (2004). *VBA and macros for Microsoft Excel*. Indianapolis, Ind., London: Que ; Pearson Education. The many example files for this book can be downloaded from the following website: <http://www.mrexcel.com/getcode.html>

Jelen, B., & Syrstad, T. (2008). *VBA and macros for Microsoft Office Excel 2007 (2nd ed.)*. Indianapolis, Ind.: Que Pub.

Walkenbach, J. (2001). *Excel 2002 power programming with VBA*: M&T Books.

Walkenbach, J. (2007). *Excel 2007 power programming with VBA*. Hoboken, N.J. Chichester: Wiley ;

Numerical recipes:

Press, W. H., Flannery, B. P., Teukolsky, S. A., & Vetterling, W. T. (1992). *Numerical recipes in*

C: the art of scientific computing: Cambridge University Press.

Other Resources

The course folder contains an Endnote library containing references to books and articles used in this course. Many are also there in the form of a PDF file.

SCHEDULE

The schedule for the second half of this course is preliminary. It will be adjusted to the special needs, abilities and interests of the participants.

Title	Topics
Week1 - Course Week1 beginning 13/07/2009	Tuesday: Present course contents and structure Thursday Excel brush-up: Spreadsheet basics, time value of money calculations.
Week2 - Course Week 2 beginning 20/07/2009	Tuesday: Introduction to assignment (Financial Planning Model) Thursday Excel brush-up: Company financial modelling
Week3 - Course Week 3 beginning 27/07/2009	Excel brush-up: Data Handling (e.g. PIVOTs, data table example), visualization of financial data Excel data analysis example: testing normality of stock returns
Week4 - Course Week 4 beginning 3/08/2009	Introduction to VBA (1) Thursday (before test): Optional Q&A session test 1 / assignment 1
Week5 - Course Week 5 beginning 10/08/2009	Introduction to assignment 2: VBA functions assignment including related exercises. Excel brush-up: VBA(2)
Week6 - Course Week 6 beginning 17/08/2009	Introduction to assignment 3: Simulation of portfolios and related exercises (show statistical functions and portfolio examples) Excel brush-up: bits & pieces
Week7 - Teaching recess week 1	Teaching Recess Week 1

beginning 24/08/2009	
Week8 - Teaching recess week 2 beginning 31/08/2009	Teaching Recess Week 2
Week9 - Course Week 7 beginning 7/09/2009	Tuesday /Thursday classes: review project proposals in individual meetings with each student. We will organize the appointments before the teaching recess.
Week10 - Course Week 8 beginning 14/09/2009	Tuesday class: GARCH modelling Thursday class: Optional Q&A session for test 2 / assignment 3 Hull (2006) chapter 19 Handout
Week11 - Course Week 9 beginning 21/09/2009	Market & credit risk models (1) VAR examples with handout from Don Chance book. Benninga (2008), chapter 15 Loeffler & Posch (2007) Hull (2006), chapter 18 Crouhy, M., Galai, D., & Mark, R. (2000). <i>A Comparative Analysis of Current Credit Risk Models</i> . <i>Journal of Banking & Finance</i> , 24(1,2), p. 59-117.
Week12 - Course Week 10 beginning 28/09/2009	Market & credit risk models (2) Topics in corporate finance (real options, Schwartz & Moon, 2001) Benninga (2008), chapter 24 Article Schwartz & Moon (2001) on pricing internet companies in course directory. Hull (2006), chapter 31
Week13 - Course Week 11 beginning 5/10/2009	Numerical procedures: grids, lattice methods Lattice (tree models): Hull (2006) chapters 11,17, 28.6-7 Benninga (2008) chapter 17 Grids, finite element method: Hull (2006) chapters 17.8 Wilmott (2007)
Week14 - Course Week 12	Course evaluation & review. Topics on request.

beginning 12/10/2009	
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REVIEW AND EVALUATION

There will be an on-line evaluation of course content and the lecturer. Details to be announced.

LINKAGES TO OTHER PAPERS

This is quite a challenging paper for students without 'computer-phobia'. The pace will be faster than the undergraduate FINA 415 (Computer Modeling in Finance) which is targeted to improving analytical skills in a work environment. FINA 515 is more demanding both in terms of quantitative and programming skills. The modelling topics are geared to improving modelling skills in research.

Students who have done FINA 415 before have the benefit of a solid base knowledge of the Excel/VBA analysis tool. This will allow them to tackle more involved project topics, possibly using alternative software packages. Furthermore, the complexity of assignments in FINA 515 goes beyond the level of FINA 415 assignments.

Pre-requisites: FINA311, FINA312, ECON404, or FINA415

Restrictions: FINA518

DEPARTMENTAL POLICY