



北京大学
汇丰商学院

Peking University HSBC Business School

FIN-516 Financial Modeling II Fall Semester, Mod. 2, 2017-2018

Course Information

Instructor:

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TA Review Sessions: N/A

Classes:

Lectures: Tuesday and Friday, 8:30 – 10:20

Venue: PHBS Building, Room 401 (Final Exam: Room 501, **Jan 19, 2018 8:30-10:20**)

Course Website:

N/A

1. Course Description

1.1 Context

Course overview:

As an extension of Financial Modeling (*FM*), this course is intended for the student who wishes to learn how to utilize financial theory in real world applications in a more profound manner. Financial Modeling II (*FM2*) extends *FM* in two key dimensions. *Firstly*, more topics regarding Excel modeling of financial opportunities are introduced. *Secondly, and much more importantly*, students will learn and master Excel's user-defined capabilities. Such extensions include repetitive calculations lacking branches/loops captured via Excel's *Macros* as well as more advanced models using Excel's powerful programming language, *Visual Basic for Applications (VBA)*, which allows for conditional branching and looping. As in *FM*, students of *FM2* will develop financial models in a breadth of topics. However, the focus of *FM2* will be on applications in which *VBA* is most valuable. In addition to conditional branching and looping, *VBA* is useful for modeling user-defined functions of multi-variables, e.g., Black-Scholes. Such calculations can be done more efficiently with user-defined functions, *especially* those buried inside other analyses. Indeed, more complex (i.e., multi-step) functions inside of repetitive calculations (e.g., Monte Carlo analysis) can really

only be done via *VBA*. In short, whereas casual Excel users do *not* need user-defined programs, such tools are indispensable for professional practitioners of finance.

Course Prerequisites: *Financial Modeling, FIN-513*.

1.2 Textbooks and Reading Materials

Simon Benninga, “*Financial Modeling*”, 3rd Ed., 2008, Massachusetts Institute of Technology, ISBN: 978-0-262-02628-4

Additional References and Supplemental Textbooks:

Michael Rees, “*Financial Modeling in Practice*”, 2008, Wiley Finance, ISBN: 978-0-470-99744-4.

Mary Jackson and Mike Staunton, “*Advanced Modelling in Finance using Excel and VBA*”, 2001, Wiley Finance, ISBN-13: 978-0-471-49922-0.

John Charnes, “*Financial Modeling with Crystal Ball and Excel*”, 2012, Wiley Finance, ISBN 978-1-118-17544-6.

Simon Benninga, “*Principles of Finance with Excel*”, 2006, Oxford University Press, ISBN-13: 978-0-19-530150-2.

Isaac Gottlieb, “*Next Generation Excel, Modeling in Excel for Analysts and MBAs*”, 2010, John Wiley and Sons, ISBN: 978-0-470-82473-3.

John Walkenbach, “*Microsoft Excel 2010 Power Programming with VBA*”, 2010, Wiley Publishing, Inc., ISBN-978-0-470-47535-5

2. Learning Outcomes

2.1 Intended Learning Outcomes

Learning Goals	Objectives	Assessment
1. Our graduates will be effective communicators.	1.1. Our students will produce quality business and research-oriented documents.	
	1.2. Students are able to professionally present their ideas and also logically explain and defend their argument.	
2. Our graduates will be skilled in team work and leadership.	2.1. Students will be able to lead and participate in group for projects, discussion, and presentation.	
	2.2. Students will be able to apply leadership theories and related skills.	
3. Our graduates will be trained in ethics.	3.1. In a case setting, students will use appropriate techniques to analyze business problems and identify the ethical aspects, provide a solution and defend it.	
	3.2. Our students will practice ethics in the duration of the program.	
4. Our graduates will have a global perspective.	4.1. Students will have an international exposure.	
5. Our graduates will be skilled in problem-solving and critical thinking.	5.1. Our students will have a good understanding of fundamental theories in their fields.	
	5.2. Our students will be prepared to face problems in various business settings and find solutions.	
	5.3. Our students will demonstrate competency in critical thinking.	

2.2 Course specific objectives

Relative to *FM*, *FM2* will spend a small amount of time (up to 20% of course time) *introducing topics* for which there is simply no time during *FM*. Otherwise, the remaining 80%+ of *FM2* *introduces the power of (macros and) VBA*.

The course is practical in nature. Upon completion of the course, the student will be fluent in not only Excel and financial modeling, but also Macros (which generate VBA code) and *VBA* directly. Such fluency will position him/her very well for essentially any introductory financial job. The student will also have a nice tool kit of many real world financial models across a very broad range of topics. This combination of fluency of advanced financial modeling and portfolio of models will prove invaluable during both interviews with potential employers as well as execution of finance-related employment tasks.

The professor has two primary goals: arm the student with

- (1) many practical financial Excel models and
- (2) programming knowledge of Excel, its Macros (which generate VBA code used in repetitive calculations) and *VBA* in order to develop his/her own models as the need arises in his/her professional and personal life.

Each student is required to possess a laptop equipped with Excel and *VBA*.

FM2 is very "hands-on", with most of the grade determined via demonstration of building models via group (homework) projects. Group membership numbers six (6) and will be determined by the students themselves by the fourth lecture. (The professor is happy to assign groups to those students who prefer not to choose their own group members.) The purpose of group homeworks/projects is to reinforce and to extend the student's knowledge regarding models built during lectures.

The final exam will be easier if you have actively participated in the group projects. Otherwise, the final exam will likely be beyond the student's capability.

2.3 Assessment/Grading Details

Course Guidelines: There are two overarching themes: the professor's aims are to (1) be as fair as possible to everyone, and (2) create the optimal learning environment for everyone! The professor firmly believes that treating individuals differently is inherently unfair. Thus, everyone will be treated the same.

The student's final grade will be

$$\begin{aligned} & \mathbf{10\% \text{ (Professor's Subjective Evaluation)}} \\ & \mathbf{+ 40\% \text{ (Average of student's Group Project Scores*)}} \\ & \mathbf{+ 50\% \text{ (Individual Final Exam Score).}} \end{aligned}$$

***Group Peers' Subjective Evaluation:** Each student will self-select into groups of six (6) students. (The professor will assign any student to a group who chooses not to self-select.) Evaluations from each student's group peers will be done during the final week of the module. *NO HUMAN BEING OTHER THAN THE PROFESSOR WILL SEE ANY STUDENT'S EVALUATIONS; NOT EVEN THE TAs*. These evaluations will factor into the "Average of student's Group Project Scores". So a student who receives his/her proportional weight from his peers' evaluations will have a *factor of 100%*. A student who receives more (less) than his/her proportional weight will have a *factor greater (less) than 100%*.

FINAL EXAM: If the student has actively participated in all project work, if the student has attended all lectures, if the student has kept up with textbook lecture readings, and if the student has studied carefully any lecture notes provided by the professor, then the final exam will be straightforward. *Otherwise, the student will likely be incapable of negotiating it.*

FINAL EXAM GUIDELINES: Please review carefully the guidelines. *If the student is uncomfortable with these, then the student should not take this course.* The professor will grade that which is handed in on time. The final exam will either be completed in Excel along with its extensions and/or hand written. **THE STUDENT SHOULD PREPARE FOR BOTH TYPES OF FINAL EXAMS DURING THE SEMESTER, AS BOTH TYPES ARE POSSIBLE.** (Students will be informed of the exact nature of the exam no later than the final course lecture.) If part/all of the exam is performed via computer, the professor will grade that which is

saved onto the student's USB (thumb) drive. If the student can NOT confidently work quickly and efficiently and save your work afterward, then he/she should NOT take the course. The student who chooses to take the final exam with inferior equipment does so at his own peril.

Professor's Subjective Evaluation: This is based in part, on his/her punctuality, attendance, classroom behavior, attitude, preparedness, etc... Per PHBS policy, if he/she is absent 6 (or more) lectures, then he/she *automatically fails* the course. The professor appreciates the student letting him know *in advance* if he/she will be tardy or absent. However, this does not excuse an absence. Please note that the number of absences is independent of whether or not they are approved by the University or HSBC Business School. (The professor does *not* distinguish between approved or unapproved absences.) Also, the professor does *not* sign PHBS forms related to the student's planned absence(s).

To minimize classroom disruptions, the professor strongly urges the student to be punctual. All announcements are made at the beginning of class, making punctuality all the more important. If you miss a lecture, you are responsible for material covered. *Secure information missed from a fellow student*, not from the professor.

Disturbing class lectures will negatively impact the student's subjective evaluation. Talking during class, having a cell phone ring, etc... are disturbances that are unacceptable. These rules are designed to optimize the learning environment for all students.

2.4 Academic Honesty and Plagiarism

This class will be conducted in full accordance with PKU's policies regarding academic integrity. Anyone caught cheating will be punished as severely as the school permits.

On group projects, each group is to work independently of other groups. Whereas it is OK for students between different groups to consult each other, each group's deliverable should be independently developed. Simply copying one group's project by another group will result in penalties for *both* groups. For the final (individual) exam, no consultation between students is allowed. The final (individual) exam is to be solely developed by each individual, with no assistance of any kind from any other person. Again, policies are designed with fairness in mind.

Educational Norms and Expectations: The student is responsible for material covered in any class. If a student misses a class, he/she should retrieve lecture notes from a classmate. It is in the student's best interest to *read any assigned material BEFORE the lecture*. That way, the student will find the lecture period to be much more productive.

Suggestions for improving the course: The professor is committed to making this course as good as possible. If the student has suggestions to improve the course, he/she should inform the professor, *IN PRIVATE*. (During a lecture is *not* the appropriate time for such feedback, as there is no time during the lecture for such discussions.) The course is obviously for the student's benefit, not the professor's. So any feedback is greatly appreciated and is seriously considered.

Add/Drop the Course: Per PHBS policy, the student is not allowed to add or drop this course after the first week.

Any issue not specifically addressed here will be handled at the discretion of the professor.

It is important for a student's effort and credit to be recognized through class assessment. Credits earned for a student work due to efforts done by others are clearly unfair. Deliberate dishonesty is considered academic misconducts, which include plagiarism; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis.

All assessments are subject to academic misconduct check. Misconduct check may include reproducing the assessment, providing a copy to another member of faculty, and/or communicate a copy of this assignment to the PHBS Discipline Committee. A suspected plagiarized document/assignment submitted to a plagiarism checking service may be kept in its database for future reference purpose.

Where violation is suspected, penalties will be implemented. The penalties for academic misconduct may include: deduction of honour points, a mark of zero on the assessment, a fail grade for the whole course, and reference of the matter to the Peking University Registrar.

For more information of plagiarism, please refer to *PHBS Student Handbook*.

3. Topics, Teaching and Assessment Schedule

Lecture	Dates	Lecture Topics	Projects
1	Friday, Nov 17, '17	VBA Example: Loan Amortization; Debug via MsgBox, via pause/break mode, via Immediate window.	
2	Tuesday, Nov 21, '17	VBA Basics: recording Macros, VBE, R1C1, simple commands, optimal VBE Option settings. VBA Quick Reference handout.	
3	Friday, Nov 24, '17	MsgBox, InputBox, operators	
4	Tuesday, Nov 28, '17	Arrays (static and dynamic), For Loops via Identity Matrix, Off-diagonal Matrix	
5	Friday, Dec 1, '17	For Each...Next Loops; collections of objects; Range object	<i>Group Selections Due, 8:25</i>
6	Tuesday, Dec 5, '17	VBA Goal Seek; Buttons for users; Do Loop constructs;	
7	Friday, Dec 8, '17	With Blocks via multi-series scatter-plot Macro; Branching: (1) IF lines and blocks, (2) Select Case (3) GoTo Statement;	
			#1, Due Mon., Dec 11, <i>14:00</i>
8	Tuesday, Dec 12, '17	Begin SUBs and FUNCTIONs; debug via stepping (step: into, out of, over; run to cursor);	
9	Friday, Dec 15, '17	More SUBs and FUNCTIONs;	
			#2, Due Mon., Dec 18, <i>14:00</i>
10	Tuesday, Dec 19, '17	Subs and Functions; Variables (names, scopes, data types)	
11	Friday, Dec 22, '17	Subs and Functions; Variables (names, scopes, data types)	
			#3, Due Mon., Dec 25, <i>14:00</i>
12	Tuesday, Dec 26, '17	Error handling in Subs, Functions; more on variable scope;	
13	Friday, Dec 29, '17	Plot Simulating Stock Prices; Black Scholes	
			#4, Due Mon., Jan 01, <i>14:00</i>
14	Tuesday, Jan 2, '18	(Option) Portfolio Payoff at Expiration; $\mu - \sigma^2/2$ Vs. μ ; review Binomial Options Pricing Model (both Amer. And Euro) in Excel; sketch outline of project #5: VBA for vanilla call and put;	
15	Friday, Jan 5, '18	Review Monte Carlo Analysis, Estimate of Pi in VBA; Convexity and duration in VBA;	
			#5, Due Mon., Jan 08, <i>14:00</i>
16	Tuesday, Jan 9, '18	Bond valuation using Transition Matrices;	
17	Friday, Jan 12, '18	Revisit random number generation in VBA, including correlated random variables;	
			#6, Due Mon., Jan 15, <i>14:00</i>
18	Tuesday, Jan 16, '18	Tying-up loose ends in VBA and more examples.	
Final EXAM	<i>Thursday, Jan 19, '18</i>	<i>8:30 – 10:20</i>	Room 501?, 523?

Chapters in Simon Benninga, “*Financial Modeling*”, 3rd Ed., 2008, Massachusetts Institute of Technology, ISBN: 978-0-262-02628-4.

Part	Chapter	Title
Part 1		CORPORATE FINANCE MODELS
	1	Basic Financial Calculations
	2	Calculating the Cost of Capital
	3	Financial Statement Modeling
	4	Building a Financial Model: PPG Corporation
Part 2		PORTFOLIO MODELS
	8	Portfolio Models – Introduction
	9	Calculating Efficient Portfolios with No Short Sale Restrictions
	10	Calculating the Variance-Covariance Matrix
	12	Efficient Portfolios without Short Sales
	14	Event Studies
	15	Value at Risk
Part 3		OPTION-PRICING MODELS
	16	An Introduction to Options
	17	The Binomial Option-Pricing Model
	18	The Lognormal Distribution
	19	The Black-Scholes Model
	20	Option Greeks
	21	Portfolio Insurance
	22	An Introduction to Monte Carlo Methods
	23	Using Monte Carlo Methods for Option pricing
	24	Real Options
Part 4		BONDS
	25	Duration
	26	Immunization Strategies
	27	Modeling the Term Structure
	28	Calculating Default-Adjusted Expected Bond Returns
Part 5		TECHNICAL CONSIDERATIONS
	29	Generating Random Numbers
	30	Data Tables
	31	Matrices
	32	The Gauss-Seidel Method
	33	Excel Functions
	34	Using Array Functions and Formulas
	35	Some Excel Hints
Part 6		INTRODUCTION TO VISUAL BASIC APPLICATIONS
	36	User-Defined Functions with VBA
	37	Types and Loops
	38	Macros and User Interaction
	39	Arrays
	40	Objects and Add-Ins
	41	Information from the Web
	Appendix 1	Excerpts from the Help File
	Appendix 2	The R1C1 Reference Style

4. Miscellaneous