FIN513
Financial Modeling
Module 4, 2020-2021

Course Information

Koger's Financial Modeling won the Excellence Course Award of Peking University in 2017, the only one from PHBS!

Instructor: Fritz Koger, CFA, PhD
Office: PHBS Building, Room 752
Phone: It is best to contact me via email.
Email: fritzkoger@phbs.pku.edu.cn

Email is the best way to contact me for questions regarding course content.

I request that the student send me no emails regarding his/her absence. Such emails are not needed.

Any email regarding the content of the course, i.e., the topics, including questions, will be warmly addressed in a timely manner! ☺

Office Hour: Fridays 12:30-13:30, or by appointment.

Teaching Assistant:
Carol, 杨璇, YANG xuan, student ID: 1901212657, yangxuan15@pku.edu.cn,
2019 masters of finance student, WeChat: yangxuancarol, Cell phone: 158-1853-2360.

Classes:
Lectures: Tuesdays & Fridays 08:30 am - 10:20 pm.
Venue: PHBS Building, Room 403

1. Course Description

1.1 Context

Course overview:
This course is intended for the student who wishes to learn how to utilize financial theory in real world applications. The course is practical in nature. Upon completion of the course, the student will be fluent in both Excel as well as financial modeling. Such fluency will position him/her very well for essentially any 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 financial modeling and portfolio of models will prove invaluable during both interviews with potential employers as well as execution of finance-related employment tasks.

Course Prerequisites:
Either:
(i) (a) *Corporate Finance* or *Financial Markets*, (b) *Financial Economics*, and (c) *Investments*; or
(ii) 2nd year PHBS economics students with adequate finance training per professor's assessment; or
(iii) 2nd year NUS students; or
(iv) proper finance background per professor's assessment.
Per school policy, the school reserves the right to evaluate a student's background for preparedness.

1.2 Textbooks and Reading Materials

Textbook
"*Financial Modeling in Excel*", Koger, F, will be provided by the professor for 60 RMB.

Recommended Readings
Simon Benninga, "Financial Modeling", 4th Ed., 2014, Massachusetts Institute of Technology, ISBN-13: 860-1401358411; ISBN-10: 0262027283
Chandan Sengupta, "Financial Modeling Using Excel and VBA", 2nd Ed., 2010, Wiley Finance, ISBN-13: 78-0471267683; ISBN-10: 0471267686
Michael Rees, "Financial Modelling 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.

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 Assessment/Grading Details

Assessment task	**Weighting**
Professor's Subject Evaluation	20%
Average of student's Group Project Scores*	30%
Individual Final Exam Score	50%
Total	100%

***Group Peers' Subjective Evaluation:** Each student will self-select into groups of five or six 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 TEACHING ASSISTANT. 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 than (less than) his/her proportional weight will have a factor greater than (less than) 100%.

Subjective Evaluation: 20% of the student's final score will be a subjective evaluation, based in part, on his/her punctuality, attendance, classroom behavior, preparedness, etc… The student is expected to attend lectures and to be punctual so as to not disturb an ongoing lecture. In short, this captures whether or not the student is doing what he/she should do. Inappropriate actions will be penalized.

No cell phones are allowed during lectures. Students may take photos of whiteboard information when the professor says so, though it is all in the course textbook.

There is no need to inform the professor that the student will be absent or to explain an absence afterward. The student should refrain from sending corresponding emails. The professor treats each student as an adult, and as such, does not judge the student's absences per reasons. There is no prejudice regarding absences.

***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 the lecture notes provided by the professor, then the final exam will be straightforward.

FINAL EXAM GUIDELINES: The professor will grade that which is saved onto his/her USB (thumb) drive. The student be able to confidently work quickly and efficiently and save his/her work afterward.

2.3 Academic Honesty and Plagiarism

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 Schedule

Day	Dates	Primary Text Book Chapters* and Topics	Projects; Comments
1	T. 05/11	Ch. 1 (sheet **1 1**** in Templates file on capital budgeting: NPV, IRR;) From scratch, complete half of figure 1.1 of course textbook; (Excel functionality includes copy/paste: absolute vs. relative, handle, data tables, conditional formatting, charts; IF statement; user-defined array functions;)	Sign-up sheet; English names; brief syllabus; Distribute textbooks;
2	F. 05/14	Ch. 1 (sheet **2 1**** in Templates file on uniform random variables; average; variance; count; pi; frequency charts; conditional sums and means; TEXT;) Ch. 2 (**sheet 2 2**** in Templates file on standard normal random variables; numerical integration;)	Sign-up sheet; English names; brief syllabus Distribute textbooks; Team compositions due **Fri 05/21, 13:00**
3	T. 05/18	Ch. 2 (sheet **3 1** bonds; spinner control;) Ch. 3 (sheet **3 2**** in Templates file; lognormal stock price paths; continuously compounded returns;)	Review Syllabus; Team compositions due **Fri 05/21, 13:00**
4	F. 05/21	Ch. 3 (Finish sheet **3 2**;) Ch. 3 (sheet **4 1**; regression analysis inserting a trendline, its equation and R^2; OFFSET;)	Team compositions due **Fri 05/21, 13:00**
5	T. 05/25	Ch. 3 (Complete sheet **4 1**;) Ch. 3 (sheet **4 2**: multiple regressors;) Ch. 4 (sheet **4 3**: amortization tables: PMT, IPMT, PPMT;) Ch. 5 (sheet **5 1**: option payoffs; MAX; nested IF statements; multiple function data tables; Boolean functions; TRANSPOSE; VLOOKUP; HLOOKUP;)	
6	F. 05/28	Finish sheet **5 1**; Ch. 4 (sheet **5 2**: matrix functions;) Ch. 5 (sheet **6 1**: calculating growth rates; transforming data (logarithm); inserting an exponential trendline;)	**Project #1, Sat., 05/29, 20:00**
7	T. 06/01	Ch. 5 (sheet **6 2**: polynomial regression, ytm(T, T^2, T^3);) Ch. 6 (sheet **7 1**: revisit capital budgeting; Goal Seek; Solver;)	
8	F. 06/04	Ch. 6 (sheet **7 2**: identity matrix; ROWS, ROW, COLUMNS, COLUMN; more user-defined array functions;) **Gauss-Siedel** method of simultaneous functions; Ch. 7 (review completed sheet **8 1**: Firm and equity valuation;) Ch. 8 (sheet **8 2**: impact of dividends upon return calculations;)	Completion of 98% of Excel functionality needed for this course. Student reads chapter 8 on his/her own.

9	T. 06/08	Ch. 8 (sheet **9 1**: variance-covariance matrix; Ch. 8 (sheet **9 2**: introduction to value at risk (VaR);) Ch. 8 (sheet **9 3**: 2-asset portfolio risk-reward; impact of correlation among asset returns upon risk;)	Student reads chapter 10 on his/her own.
10	F. 06/11	Ch. 9 (sheet **10 1**: portfolio management, with and without short sales; global minimum variance portfolio; VaR in a portfolio context: diversification benefits to combining assets;) Ch. 9 (finish sheet **10 1**;)	**Project #2, Sat., 06/12, 20:00**
11	T. 06/15	Ch. 9 (sheet **10 2**: market model to estimate variance-covariance matrix;) Ch. 9 (sheet **11 1**: event studies; market model; root mean square error: STEYX;)	
12	F. 06/18	Ch. 11 (sheet **11 2**: Black-Scholes-Merton (BSM) call, put; intrinsic values;) Ch. 11 (begin sheet **12 1**: BSM applications, e.g., collar, implied volatility, structured products, option value elasticities, money back guarantees, protective puts as return floor;)	
13	T. 06/22	Finish **12 1**;	
14	F. 06/25	Ch. 12 (whiteboard lecture, followed by sheet **Ch 12 Protective Put**: portfolio replications if options on the desired underlying asset do not exist;)	**Project #3, Sat., 06/26, 20:00**
15	T. 06/29	Ch. 14 (sheet **Ch 14 Binomial M**: binomial stock price and option value model; binomial distribution; combination function; American options: (a) value; (b) nodes in which early exercise is optimal; (c) probability of early exercise each period;	
16	F. 07/02	Finish any of the previous four sheets as need be; Ch. 14 (sheet **Ch 14 MC**: Monte Carlo analysis;) Ch. 15 (sheet **Ch 15 Retirement**: an application of Monte Carlo analysis;)	**Project #4, Sat., 07/03, 20:00**
17	T. 07/06	Ch. 15 (sheet **Ch 15 Path Dep Options**: path-dependent options, four Asians and four barrier options;) **As time permits**: Ch. 16 (1) whiteboard formulas for price-yield approximations: first order and second order; (2) sheet **Ch 16 Bonds**: price-yield curve and its approximations;)	
18	F. 07/09	Ch. 15 (sheet **Ch 15 Real options**: expansion call & abandonment put;) As time permits: (1) Ch. 16 (sheet **Ch 16 Bonds**: pricing; price-yield approximations) (2) 30-minute demonstration of coding Visual Basic in Excel: (a) writing programs for users; (b) writing user-defined Excel functions; (c) simulations, e.g., Monte Carlo analysis;	**Project #5, Sat., 07/10, 20:00**
Final Exam	***Jul 12 Monday?***	Cumulative final exam on Monday, July 12.	

Brief Contents

I Basics of Excel Functionality 3
Chapter 1: Array Functions; Goal Seek; Data Tables 7
Chapter 2: Boolean Functions; Excel's PV Function 35
Chapter 3: Regressions in Excel; Matrix Functions 45
Chapter 4: Excel's Amortization Functions; VLOOKUP 65
Chapter 5: Scatter Plot; Polynomial Regressions 79
Chapter 6: Excel's Solver; Excel's IRR Function 95

II Absolute Valuation and Portfolio Management 115
Chapter 7: Pro-forma Accounting Statements; Firm Value 119
Chapter 8: Value at Risk; Portfolio Theory Introduction 155
Chapter 9: Portfolio Theory; Market Model; Events 169

III Options 195
Chapter 10: Option Payo_s and Premia 199
Chapter 11: Black-Scholes-Merton Model Applications 241
Chapter 12: Replicating Portfolios Involving Options 259
Chapter 13: Revisiting Option Replicating Portfolios 289
Chapter 14: Binomial Pricing Model; Monte Carlo 301
Chapter 15: Path Dependent Options; Real Options 341

IV Bonds 361
Chapter 16: Price-yield Curve & Approximations; Spot Rates; Pricing Between Coupon Dates 365
Chapter 17: Bond Immunization Portfolio 405

Appendices
Appendix Chapter A: Review of Financial Basics 425
Appendix Chapter B: Financial Accounting Statements 431
Appendix Chapter C: Earnings Multiplier Model 443
Appendix Chapter D: Rate and Yield Metrics 451

References and Selected Readings 463

Index 466

* Chapters refer to those of the primary course textbook, "*Financial Modeling in Excel*", Koger, F, provided by the professor for 50 RMB.
** Designations in the schedule of lectures such as sheet **3 1,** sheet **3 2,** sheet **4 1,** sheet **4 2**, etc… refer to an Excel file of templates that the professor will provide to the student before the fourth lecture. This file contains all the templates that we will complete together in lectures beginning with the fourth lecture. These templates include inputs needed for each model and also have simple calculations consistent with previous lectures. Their purpose is so that we don't lose precious lecture time simply filling in input cells or programming output cells that we have already programmed in previous lectures. Completing these templates in lecture together has the huge advantage of allowing us to focus exclusively on new material, be it new Excel functionality or new financial models.

4. Miscellaneous

Professor's Subjective Evaluation: 20% of the student's final score will be a subjective evaluation, based in part, on his/her punctuality, attendance, classroom behavior, preparedness, etc… The student is expected to attend lectures and to be punctual so as to not disturb an ongoing lecture. In short, this captures whether or not the student is doing what he/she should do. Inappropriate actions will be penalized.

No cell phones are allowed during lectures. Students may take photos of whiteboard information when the professor says so, though it is all in the course textbook.

There is no need to inform the professor that the student will be absent or to explain an absence afterward. The student should refrain from sending corresponding emails. The professor treats each student as an adult, and as such, does not judge the student's absences per reasons. There is no prejudice regarding absences.

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.

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.

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 the relevant chapters in the book 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 for the professor. Hence, 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.

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