FIN-551
Financial Risk Management
1st module, 2020-2021

Course Information

Instructor:
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Office Hours: Mondays 10:30-11:30, or by appointment.

Teaching Assistant:
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Classes:
Lectures: Monday and Thursday, 8:30 – 10:20
Venue: PHBS Building, Room 403 (Final Exam: Room TBD)

The course will be conducted via pre-recorded videos as the professor is not yet allowed into China. While students can review the videos multiple times, it is highly recommended that they be watched during the course's assigned lecture time.

Course Website:
N/A

1. Course Description

1.1 Context

This course is intended for the student who wishes to learn how to analyse and utilize financial risk concepts, especially with respect to managing risk. Key concepts include managing risk associated with market variables (stock prices, interest rates, volatilities, etc…) that impact securities such as equities, fixed income securities, and options.

The student will learn to program risk management tools and models in Excel. The course is Excel based; it is not a lecture-based course of theory. It is an applications-oriented course, and as such the student is expected to learn to program these concepts and applications in Excel. Indeed, the comprehensive final exam will be conducted via Excel.

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

PDFs of lecture notes will be provided by the professor for 30 RMB. A brief table of contents is provided on the final page of this syllabus. We will cover most of these topics.

An excellent reference is John C. Hull's Risk Management and Financial Institutions, 4th edition.

Hull, John C; Options, Futures, and other Derivatives, 9th Edition, Pearson Press.

2. Learning Outcomes

2.1 Intended Learning Outcomes

Learning Goals	**Objectives**	**Assessment (YES with details or NO)**
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

Upon completion of this course, students will be able to:
- Develop problem-solving and critical thinking skills in financial risk management
- Develop teamwork habit and skills by completing group projects
- Dynamically hedge trading risks, utilizing financial derivatives
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- Summarize the equity risk exposure using simulation and various measures of risk including Value-of-Risk
- Test the accuracy of risk models, including EWMA and GARCH models
- Understand dependence measures (copulas) beyond linear correlation and its importance for portfolio risk

- Understand concepts of interest-rate related financial products, and utilize term-structure models to price those products
- Utilize durations to measure interest-rate risk, and understand the procedure to dynamically hedge the risk

As time permits:
- Understand the pros and cons of structural and reduced-form credit risk models, and utilize the models to estimate credit risks
- Provide a detailed description of the meaning and interpretation of the output from these models using the terminology and concepts of risk management

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

20% (Professor's Subjective Evaluation)
+ 30% (Average of student's Group Project Scores*)
+ 50% (Individual Exam Score).

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.

***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 TA*. 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%.

***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 exam will be straightforward. *Otherwise, the student will likely be incapable of negotiating it*.

EXAM GUIDELINES: The exam will be via Excel on one's own personal computer. The student will record his screen during the entire two hours. Failure to do so will result in a severe penalty. The exam will be a series of Excel worksheets completed in series. Failure to return these sheets by the due time will result in severe penalties.

Professor's Subjective Evaluation: Students are expected to consume materials provided by the professor, attend lectures, be punctual, and master material before the subsequent lecture.

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. Miscellaneous

4. Course Schedule

Day	Dates	Ch.	Primary Text Book Chapters and Topics	Projects; Comments
1	9/6 Mon	1	Excel functionality includes copy/paste: absolute vs. relative, handle; **01 Returns and Moments.xlsx**; negative skew & positive excess kurtosis;	Sign-up sheet; English names; brief syllabus; Distribute textbooks;
2	9/9 Thurs	**3**	**02 A Option Pays Profs SOLN.xlsx**; **02 B BSM Values Deltas SOLN.xlsm**; Review VBA code and user-defined functions;	Sign-up sheet; English names; brief syllabus Distribute textbooks;
3	9/13 Mon	**5** **6**	**03 A BSM Greeks SOLN.xlsm**; (VBA code; MACROS) Begin **03 B Delta Hedge Short Calls.xlsm**	Review Syllabus; Team compositions due **Thurs 9/17, 13:00**
4	9/16 Thurs	**6** **6**	Finish **03 B Delta Hedge Short Calls.xlsm** **04 B Delta Gamma Hedge Short Calls SOLN.xlsm**	Team compositions due **Thurs 9/17, 13:00**
5	9/20 Mon	**6** **7**	**05 A Delta Gamma Vega Hedge Short Calls.xlsm** Begin **05 B Static Replications VBA SOLN.xlsm**	
6	9/23 Thurs	**7** **8,9**	Finish **05 B Static Replications VBA SOLN.xlsm** Begin **06 07 A American Opt GREEKS Bin Mod.xlsx**	
7	9/27 Mon	**8,9** **11**	Finish **06 07 A American Opt GREEKS Bin Mod.xlsx** **07 B Fixed Coupon Bonds SOLN.xlsx**	
8	10/11 Mon	**12**	**08 Bond Immunization SOLN.xlsx**;	
9	10/13 Wed	**13**	**09 Key Rate Durations.xlsx**	**Project #1, Sat., 10/17, 20:00**
10	10/14 Thurs	**13** **14**	**10 A Data Rtns VarCov Corr Swap Rates.xlsx** **10 PCA A.xlsx**	
11	10/18 Mon	**14**	**11 PCA B.xlsx**	
12	10/21 Thurs	**15**	**12 13 Volatility GARCH EWMA MA.xlsx**	
13	10/25 Mon	**15**	Continue: **12 13 Volatility GARCH EWMA MA.xlsx** **14 A Volatility Covariances EWMA SOLN.xlsx**	**Project #2, Sat., 10/31, 20:00**
14	10/28 Thurs	**15** **16**	**14 B Volatility Jarque Bera Ljung Box SOLN.xlsx** **14 C Fat Tails T Dist Vs Normal SOLN.xlsx**	
15	11/01	**16**	**15 A Fat Tails Contaminated Model SOLN.xlsx**	**Project #3, Sat.,**

	Mon	**16**	**15 B Cholesky SOLN.xlsx**	**11/07, 20:00**
16	11/4 Thurs	**16** **16**	**16 A Normal and T Copulas SOLN.xlsm** **16 B Correlated Returns SOLN.xlsm**	
17	11/8 Mon	**17**	**17 A VaR Subadditivity SOLN.xlsx** **17 B VaR and ES Fat Tails Vs Normal SOLN.xlsx** **17 C VaR Back Testing SOLN.xlsx** **17 D VaR and ES Back Testing SOLN.xlsx**	
18	11/11 Thurs	**18**	**18 A VaR ES of Portfolios SOLN.xlsx** **18 B VaR ES Hist Simuls SOLN.xlsx** **18 C VaR ES MC Simul Portf SOLN.xlsx**	
Final Exam	**Nov. 15 Monday**			

Brief Contents