FIN4453 : Financial Modeling

Instructor : Matthew Son

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Web: UF Canvas
Class Hours: TR 09:35-11:35 AM
Class Room: HVNR 220

Course Description

- This course is a hands-on, practice-based course with extensive use of spreadsheets and programming language. In particular, I'll teach you the workflow of financial modeling using Excel and Python (and some R). Practicing data manipulation, aggregation, visualization and statistical analyses in finance is the core part of the course.
- The objective of this course is to apply modeling techniques to solve financial problems. Topics include valuation of fixed income securities, portfolio management, and Monte Carlo simulation methods. Special topics such as data science in finance and machine learning will be introduced in the end if time permits.
- This course demands lots of time commitment. It will introduce a bunch of new technologies so those who are not technically inclined should expect to put in a lot of work. I will try to help everyone succeed in the course and build strong skills that would be applicable in a finance job, but your commitment is necessary. My goal is to make your programming experience enjoyable!

Prerequisites

Course prerequisites

FIN 3403 (Business Finance) is a prerequisite and I'll assume everyone has a solid understanding of finance concepts covered in the course. The lecture will more focus on practical applications and it will not discuss thorough details of financial concepts. Therefore, a steep learning curve is expected for students with weak backgrounds on those and should consider taking this course later if you are. However, it won't be too challenging if you are truly devoted. Your hard work is the most important factor to succeed in the course and I will be happy to help you by providing external resources and instructions outside of class. Please consult the instructor if you have any related concerns.

Technical skills

Basic knowledge of Excel and Financial calculator is required. Any experience with Python or other programming languages is a plus. It will be assumed that most students have introductory to intermediate skills in Excel and experience in Financial calculators, and no experience with

Python. If you have no experience with Excel, make sure to develop essential skills as early as possible. Please take a look at the resources at the end of the syllabus.

- Excel
  - Data entry, editing
  - Cell formatting
  - Formulas and Cell references
  - Generating graphs and charts
- Financial Calculator
  - Use of PV, FV, I/Y, PMT, N
  - NPV / IRR calculation

Course Materials

Textbook

Main reference

1. Simon Benninga, "Financial Modeling", Fourth Edition, MIT Press.
   - This book only uses Excel for modeling. It will be useful as a reference for the Excel material.
2. Jonathan B. Berk and Peter M. Demarzo, "Corporate Finance", Fourth Edition, Pearson

Other references

3. Eugene F. Brigham and Joel F. Houston, "Fundamentals of Financial Management", Sixteenth Edition, Cengage Press.
4. Bodie, Kane and Marcus, "Investments", Eleventh Edition, McGraw Hill.

Computer & Software

Please bring your laptop (macOS / Windows) computer to the class with Excel 2013 or later installed. We'll be installing Python 3 (i.e Miniconda) with RStudio IDE through the "reticulate" package on this machine on the first day of class.

Structure of the class

- The class is structured in two parts: lectures and interactive lab sessions. In the lecture part, I will be reviewing the concepts of financial models and demonstrate the workflow in Excel and Python. In the interactive lab session, you will work on problems that mimic the steps I made or applying the basics. This will give you a hands-on experience. You are encouraged to ask me questions during the session. I'll supervise and help when you encounter problems. I expect to use 60~70% of the total hours for lectures, and the remaining for the lab sessions.
- The time for interactive lab sessions is flexible and it can be shorter if the lecture part requires more time. All remaining lab problems will be left as an exercise.
- There will be assignments to reinforce the content from previous lectures. You are encouraged to discuss with your classmates, but everyone should complete and submit the answer on their own through Canvas.

Grading Policy

Assignments : 20%

Assignments will be graded by three criteria: replicability (others should get the same result with your code without errors), accuracy (getting the right answer) and readability (the code is written well with proper comments, code is without unnecessary codes so that your supervisor won't need to spend extra time to examine what you had gone through). You can freely discuss with your classmates but each assignment should be submitted individually to Canvas. No late assignments will be accepted.

Midterm Exam : 25%

The midterm exam will be in the form of a technical interview. You will be given problems to solve given limit of time. You are allowed to have all the resources you may need - course materials, code examples, cheat sheets, and internet connection. It is designed to test if you have firmly grasped the technology in the earlier part of the course. It will be a 2-hour in-class exam. No communications are allowed via electronic devices during the exam.

Final Project : 40%

Deadline: Dec 13th, 2021, 11:00 AM, Submission by Canvas

(In case of technical problem, send me an email with attachments by 11:10 AM)

Problems will be available **ten days** before the deadline.

The final project should be done individually, and copying others' work will be considered a violation of the University's Code of Student Conduct. You can however discuss them with your classmates, so long as the final submission is entirely your own work.

Creative Project

One part of the final project asks you to make your own project. Please develop interesting ideas as early as possible. Topics may not need to be related to finance subjects. It will be helpful to have project ideas related to the job fields you are interested in. Importantly, try to impress your skills as much as possible. You'll save lots of time for your final project if you have finished it already. Evaluation criteria include technological competence (able to impress your excel/python skills), accuracy (whether the approach to the problem is logical, and the execution is accurate), creativity (whether the idea is interesting/important), and aesthetics (document looks pleasing and professional). Python programming must be included as part of your analysis if not fully implemented, and if the python approach is too minimal it may adversely affect your score.

Projects

The other part of the final project will give you problems with some challenges. The questions will be uploaded **ten days** before the deadline. Please follow the instructions carefully. For evaluation, replicability (others should get the same result with your code without errors) and accuracy (getting the right answer) are important criteria that take 70%. Readability (the code is written well with proper comments, code is without unnecessary codes so that your supervisor won't need to spend extra time to examine what you had gone through) and aesthetics take the remaining 30%.

Class Participation/Presentation : 15%

Attendance is expected in all lecture and lab sessions. Active participation that helps the instructor and other students' learning will be given additional credit. (e.g. helpful comments for other students question on the discussion board, insightful comments to peer presentations, participating surveys)

Presentations

There will be idea presentations for your *Creative Project* near the end of the semester. Feel free to share what you would like to do in detail, why the project is important or interesting, which techniques you will be using, how you will be gathering data, etc. Other students (or teams) will be asked to comment and suggest ideas to improve the project. I'll give credit to good commentators as well as presenters.

Python Note (i.e. cookbook or cheat sheet): bonus

You may choose to submit your own python note with your final project, written in either raw python script (.py), RMarkdown(.rmd), Jupyter Notebook(.ipynb), .pdf, or .docx file generated from RMarkdown. There's no fixed format for this. Think of it as a file that you are allowed to bring for a coding exam. Not only this will help you understand the language in an efficient way, but also it will allow me to determine how much effort you have put in throughout the course. Try to extend contents that were not taught in the class and make it yours, and briefly write down essentials so that you can refer to them in the future. I recommend building your own from the beginning of the class. Students who explored inside / outside of course contents in depth will be considered for a bonus. Copying other's notes is prohibited.

Notes on Assignments and Final Project

Depending on the size of the class, instructor may make them as a team-based after the add/drop period. In this case, each student will be asked to submit their team-peer evaluation anonymously at the end of the semester. If someone is found not to be contributing to the project I'll consider a penalty, so please don't be a free-rider!

Grade Distribution

Grade	Grade Percentage
A	93% - 100%
A-	90% - 92%
B+	87% - 89%
B	83% - 86%
B-	80% - 82%
C+	77% - 79%
C	73% - 76%
C-	70% - 72%
D+	67% - 69%
D	63% - 66%
D-	60% - 62%
F	0% - 59%

Curve

I will strive for a B~B+ average in the class. Grades will be curved after the final project submission if needed.

How to Succeed in the Class

- First of all, if you feel lost at any time, please contact me and I can provide additional help.
- Try to experiment and tweak the code examples covered in the class to firmly grasp what is going on. Searching code manuals and topics on the internet (Google and Stackoverflow are best friends for coders) will be a routine, and sometimes expect to spend hours on finding the right one that answers your questions. Try to maximize the lab session and office hours if you couldn't find a good answer, and I'll do my best to help.
- It is a good practice to make your own cookbook to learn the programming language. It is frustrating when you realize you got the job done before but can't remember how you did it. Searching over the internet sometimes takes an awful lot of time. Not only this practice saves your time, but also it enhances your learning. It will be a great asset for your future career once you start building it.
- I highly recommend using some outside resources to learn some basic Python as it will help you to further understand the course content. I will be teaching the basics, but the lecture won't be able to provide exhaustive details. Please look at the bottom of the syllabus for recommended external resources.

Course Outline

The course outline is provided in a separate file.

External Resources

Matrix Algebra

- Khan Academy
- ritvikmath's Video Tutorial

Excel

- Trump Excel
- GCF Global Excel Tutorial
- EXCEL ESSENTIALS 2019 from LINKEDIN LEARNING at UF

Python

- Corey Schafer's Python Video Tutorial
- University of Waterloo Python Tutorial
- University of Waterloo Computer Science Circles

Other Course Policies

During Class

Please refrain from using computers for anything but activities related to the class. Phones are prohibited as they are rarely useful for anything in the course. Eating and drinking are allowed in class but please refrain from it affecting the course.

Attendance Policy

Attendance is expected in all lecture and lab sections. Valid excuses for absence will be accepted before class. In extenuating circumstances, valid excuses with proof will be accepted after class. Click here to read the university attendance policy for details.

Policies on Late Submissions

Late assignments / final projects will be accepted for no penalty if a valid excuse is communicated to the instructor before the deadline. In extenuating circumstances, valid excuses with proof will be accepted later.

No Late assignments / final project will be accepted else.

Missing exams

A valid excuse must be communicated to the instructor before the exam. In extenuating circumstances, valid excuses with proof will be accepted later. There won't be a make-up exam, but the portion for midterm evaluation will be added to the final project.

Academic Integrity and Honesty

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct. **I will not tolerate any kind of dishonesty.**

Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. Please consult the instructor or department to take advantage of available accommodations.

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center. Click here to get started with the Disability Resource Center. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or University of Florida policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or University of Florida policy and will not be tolerated.

Online Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available here. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

Video Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.