UNIVERSITY OF VIRGINIA
McIntire School of Commerce

Commerce 3721 — Patrick J. Dennis
Quantitative Finance — Spring 2021

What This Course Covers

- Derivative security valuation
  - You will be introduced derivative security pricing including option payoffs, the Black-Scholes-Merton and binomial option pricing models, no arbitrage and the law of one price, risk-neutral valuation, Arrow-DeBrue state prices, a primer on linear algebra, and option valuation via Monte-Carlo simulation.
- Coding using Excel's Visual BASIC for applications (VBA)
  - You will learn fundamental coding skills that are needed to solve financial problems and build models.

    This course will not cover all aspects of coding, but rather just enough to translate financial models into the VBA language. Since we only have 14 sessions the emphasis will be placed on practicality and getting the computer code up and running.
  - You will become familiar enough with coding so that you can learn other languages such as MATLAB, Python, R or STATA if your job demands it.
  - You will acquire the skill set to implement advanced financial models in VBA that you will encounter in your internship and later in your career.

Prerequisites

Fall ICE and the math prerequisites for the McIntire School of Commerce.

Workload

This course will require a lot of work. The workload through the first half of this course will be moderate, but will increase dramatically when we get to Monte Carlo simulation in the middle of the semester. You will have trouble with the course if:

- You fail to keep up with the work. Each lecture builds on the previous week's material. If you get behind, you are in trouble.
- You do not adjust for the increased workload in the second half of the course. This will be a stressful time since you may be looking for internships and dealing with exams and projects in other courses.

Advice

- Do not fall behind.
- Do all the assigned homework.
- Review what we did from the last class the evening before the next class.
- Read ahead in the notes.
- Get help from other classmates or the TA.
- Do not skip class because you are afraid of a cold call.

Recommended Texts and Readings

- The core material for the course is available in a coursepack on Collab. These are copies of the PowerPoint slides I'll be using. We will "fill in" these as we progress through the semester, so you should either print them to mark them up by hand or be able to mark up the pdf on an iPad, Microsoft surface, etc.
- An optional VBA book for the course is:

  Excel VBA Programming For Dummies, 3rd edition,

  (Buy on Amazon, free on VIRGO)

  http://proquest.safaribooksonline.com/book/programming/vba/9781118490389

  I have put a link to this book on the COLLAB site, but you may have to be on UVA's network to access this.
- I will also refer to chapters in the text that you are using for ICE, *Corporate Finance*, 11th edition, by Ross, Westerfield and Jaffe.

Honor Code

- It is incumbent upon you to make the honor code work.
- It's what makes UVA special.
- Needless to say the Honor Code applies throughout your life, not just while you are at UVA.

Honor Code & Assignments

In addition to the obvious (no cheating on exams), I consider copying homework assignments to be a honor code violation. You are free to discuss the issues behind the problem in groups, but you MUST arrive at the solution yourself.

Attendance Policy

You must attend the section that you are registered for

- You are required to attend all classes.
- If you have to miss a class for a valid reason (interview or illness), please send me an e-mail and you may attend another session.
- It is not OK to switch sections to study/prepare for another class or exam.
- If you can't make any of the 4 classes due to a legitimate reason, then please e-mail me I will mark you absent excused.

  In this case, you are required to get the class notes and homework assignment from a friend and you are expected to be prepared for the next class.

Class Format

- We will be using the "flipped classroom" approach. Specifically, I will post videos for each topic, then we will meet live in the virtual classroom for questions and answers.

  The "flipped classroom" model has several advantages:

  - I can break the material at more natural points. Some weeks the workload will be little lighter, and some weeks a little heavier, but I will still get through all the material by the end of the semester.
  - You can pause the videos and try out the concepts in Excel.

- For each live class I will

  - Briefly summarize the take-aways from the videos that you have already watched.
  - Answer any questions that you have about the material
  - I will assign weekly homework problems that you should complete for the next class meeting. I will cold-call students to present their solution via the "share screen" feature of Zoom. You should be prepared to explain your solution.

- Since you have already seen the lectures, we will usually not use the entire classtime. After all questions have been answered and homework problems covered, the Zoom class will end.
- All class sessions will be recorded so if you want to watch it again you may do so.
- Please keep your cameras on if possible. This will hopefully make us feel more connected.
- If you have a question, just raise your hand in chat. I will not be able to see the whole class if I have my screen shared, so if I don't see you right away, please feel free to speak up to get my attention ..."hey professor" should do it.
- Instead of spring break, we have several reading days. Since this is a weekly class, if we cancel class on those days the Monday students will be out-of-sync with the Wednesday students. Instead of canceling class, we will do the following:
  - For the reading day Wednesday, 2/17, the Wednesday students should just attend the Monday lecture on Monday, 2/15.
  - For the reading day Monday, 3/29, the Monday students should just attend the Wednesday lecture on Wednesday, 3/31.
  - Since reading days are technically a "day off" I will not require attendance for those students who have a reading day.

    i.e. students registered for Wednesday, 2/17 will not be penalized or cold-called if they do not show up on Monday, 2/15.

    You are still responsible for the material, however, so if you can't make a live class, please watch the recorded version.

Grade Determination

- Problems will be assigned for most topics and you are expected to do all assigned problems. We will typically go over the problems in class. I will randomly cold call on students the day the assignment is due and have the lucky student explain the solution to the class. Not being prepared to explain the solution will result in a zero that day for class participation.
- The following weights will be employed in grade determination:

Description	Weight
Take-home exam I, Friday, 3/12 (2 hour block from 9 a.m. to 11:59 p.m.)	15%
Take-home exam II, Friday, 4/16 (3 hour block from 9 a.m. to 11:59 p.m.)	35%
Final Exam, Friday, 5/7, 7-9 p.m.	45%
Participation, homeworks & attitude	5%
Total:	100%

- While you may choose any block of time for the midterms, the block you choose must be contiguous.

Rescheduling of Midterm Exams

- The date for the final exam is fixed.
- If you currently have a conflict with one of the two midterm exams (sports schedule, etc.) let me know in writing (or e-mail) no later than Friday, February 12, 2021. If you do not notify me of a conflict by then, I will expect you to take the midterm as scheduled. Failure to take a scheduled midterm will result in a zero for that exam.

Instructor and Availability

- E-mail: pjd9v@virginia.edu.
- Office hours: Monday and Wednesday from 11-Noon and by appointment via the Zoom link on Collab.

  Zoom is weird.

  - So that I'm not staring into an empty Zoom room for an hour, if nobody shows up in the first 10 minutes or so I will close the Zoom session.
  - If you can't make it in the first 10 minutes, just e-mail me and I'll make sure I'm available at a time that works for you.
  - If office hours get really crowded, I'll ask some of you to come back in 15 minutes or so.
  - I only have a single screen, so I might be doing something in the foreground like answering e-mails. The audio channel will be on, so if I don't pop up right away just announce that you are in the Zoom room.
- Ish Singham will be my teaching assistant.

  Office hours: Sunday and Wednesday from 5 - 6 p.m. via the Zoom link on Collab.

  The TA hours may be expanded when we get to more difficult material.

Schedule & Readings

- We will cover the finance and VBA topics below. As we move through the semester, we will use VBA to implement the option pricing models that we have covered in the finance part of the course.

  While we may deviate slightly from this schedule, it provides the structure for the course.

- The readings in the third column refer to your corporate finance text from ICE by Ross, Westerfield and Jaffe. I recommend that you read these chapters since these concepts are central not only to your coursework this year and next but also to your career.
- The readings in the last column refer to the online version of *Excel VBA Programming For Dummies, 3rd edition*, available for free on-grounds. The URL is on page 2 of the syllabus and also on COLLAB.
  - You should read those sections listed below as we cover each topic, especially if you are new to coding.
  - The sections labeled (skim) don't have to be read word-for-word, just skim them to get an idea of what is going on. right-hand column.
  - There are many topics that we will not cover in class due to time constraints; I encourage you to read and go beyond what we cover in class.

Readings

- "CP" refers to the coursepack from the bookstore.
- " RW & J" refers to chapters your ICE finance text, *Corporate Finance*, 12th edition, by Ross, Westerfield and Jaffe.

Topic	CP	Chapters in RW & J	VBA Programming for Dummies
Introduction	1		Ch1: Okay, So What Is VBA?
			Ch1: What Can You Do with VBA?
			Ch1: Advantages and Disadvantages of VBA
			Ch1: VBA in a Nutshell
Writing functions in VBA	2		Ch5: Subs versus Functions
			Ch9: What Is a Function?
			Ch9: Using Built-In VBA Functions (skim)
			Ch9: Using Worksheet Functions in VBA (skim)
			Ch9: Using Custom Functions
Option fundamentals	3	22.1 to 22.7	
VBA & the Black-Scholes-Merton model	4	22.8	
Expectation and variance operators	5		
If-statements, printing and loops	6		Ch10: Decisions, Decisions
			Ch10: Knocking Your Code for a Loop
Some useful functions	7		
Arrays in VBA	8		Ch7: Working with Arrays
Binomial option pricing	9	22.8	
Coding the binomial model (optional)	10		
Subroutine macros	11		Ch8: A Quick Review
			Ch8: Other Ways to Refer to a Range
			Ch8: Some Useful Range Object Properties
			Ch8: Some Useful Range Object Methods
Monte Carlo simulation	12		
Basic linear algebra	13		
Discounting for time	14		
Discounting for risk	15		
VBA Function and Keyword Reference	16		