

The Wharton School
FNCE404 Capstone

Mr Krishna Ramaswamy
Financial Engg

Seminar in Financial Engineering

A CAPSTONE CLASS

1 Introduction

All Wharton UGs (esp sophomores and juniors) know that there's now a requirement in place for them to take a capstone class. That course designation has two essential requirements – (a) it must count for *at least* 0.5CU and (b) it must incorporate a project requirement that is wide in scope and that encompasses the practical multidisciplinary learning that the curriculum provides.

The course *FNCE404 Seminar in Financial Engineering* described below is a 1 CU capstone class that requires students working in groups of at most four (4!) on a complex financial structure, to

- **Assess** the suitability, benefits and costs to each of the several and separate counterparties that will engage themselves contractual arrangements within the structure;
- **To describe the actions** to be taken by each counterparty in regards to any cashflows, collateral, foreign exchange requirements, and their economic impact on the counterparty's balance sheet/income statements and its capital requirements as imposed by relevant regulatory agencies, both at the start and the periodic settlement dates that apply;
- **To model and value** the transaction, including all the clauses and contingencies in the structure – this implies assessing the cost of hedging of the central counterparty that we'll call the *arranger*, typically an Investment Bank.

There are many examples of such structures, most will involve the use of derivatives (currency & interest rate swaps, futures, options; credit enhancement arrangements, and equity and even commodity derivatives). The distinguishing feature of this capstone course is that it will require the use of derivatives in the project, and require the student group to build the comprehensive model that the arranger must use.

The course schedule is designed to help your group work on the Project: its report due at the middle of Spring 2021 – so it has an unusual time table! The course will begin in the third week of October 2020 (beginning of Quarter 2, 23 Oct 2020) with weekly Lectures & Guest Lectures on topics related to Financial Structuring and your project interests, and continue into Spring 2021; the course will end by 3 March 2021, when the final group projects and presentations are due. The proposal for the group project structure will be agreed *before* the winter break. In Q1/2021 the student group will meet with me at least once per week to discuss their progress.

Course Meetings: From 23 Oct to 9 Dec, the course meets **Tuesdays from 3pm to 5:50pm**, with a break; some guest lectures will begin at 4:40pm. In the Spring of 2021, Group Meetings with me will be arranged each week for 30 to 35 mins, until the week before presentations and project submission.

Deliverables: Class attendance, a brief written project proposal describing the structure and the anticipated tasks due by 9 Dec 2020, and the Project Report and Presentation to be scheduled by 3 March 2021.

2 Who Should Take This Course

Students with exposure to options, futures and swaps might have focused on the exchange-traded (hence fully collateralised) versions of these products and learned to value (or price) them with the help of models and monte-carlo methods. The vast majority of derivatives and financial structures that use them are done off-exchange! These structures are typically partially or only periodically collateralised or never collateralised (if the counterparty is a corporate, for example) hence involve credit risk; they might involve interest rate dependencies or reference rates, currency exposures and various optionalities, typically included to meet the client or counterparty's needs. Building a model with a price (or a spread or fee adjustment) for the contracts within such complicated¹ structures is a interesting, challenging and non-trivial task. Every large institution (corporate or financial, buy or sell-side, insurance company, hedge fund) that is motivated to use these structures must assess the costs and benefits, and that's what a financial engineering task entails. Managing interest rate, FX, credit risk and collateral – these are the tricky pieces in every structure. To price them, and to hedge and manage a book of them – that's the challenge, and developing those skills early will take you far in your careers.

Those UGs/Grad Students in the college with a strong Maths & Comp Sci background and an interest in financial engineering are also encouraged to apply – but please see the Pre-requisites section below – this course will be a 1 CU credit to them. NB

If you have further Qs, please call me on 215 898 6206, or better yet send email to krishna@upenn.edu.

3 Pre-requisites

Do read Items 1 & 2 through!

1. The two courses, *FNCE206 Fin Derivatives* and *FNCE235 Fixed Income* are essential building blocks for this capstone.
 - *If you're currently a junior* and will have taken both FNCE206 FINANCIAL DERIVATIVES OR FNCE235 FIXED INCOME before taking this capstone class, and have a keen interest in financial engineering, do fill out an application and email it to me!
 - *If you're currently a sophomore or a junior* who will have taken one of the two by 1 Sep 2020, you should consider taking the other in Fall 2020 and taking this Financial Engg capstone beginning Oct 2020. It may sound like a heavy load – it's not! – it will be skill-building, career-enhancing and fun!
 - If you're a sophomore and wish to consider taking this capstone in Financial Engg as a senior in the Fall of 2021, you might consider taking the FNCE206 and FNCE235 next year as a junior.
2. *Programming skills and an exposure to numerical methods are an important part* of the project in this course. If you have a strong interest in finance and have taken another Derivatives course elsewhere, AND a strong Maths/Comp Sci background, please fill in an application and send it to me.

¹I have met with several structurers on the Street in preparation for this class. One of them said, "Students might think that the plain vanilla interest rate swap is an uncomplicated structure – but it can soon turn into the most complicated beast they'll see!"

4 Applying to take this Course

Advance Registration for the Fall 2020 semester begins on **25 March 2020**. I am broadcasting this email to all Wharton sophomores and juniors, and to the students in SEAS.

- I will be available in my office 3259 Steinberg-Dietrich Hall every day from Monday 17 Mar to Tue 31 Mar, from 11am to Noon and again from 1:15 to 4pm to answer your Qs re this capstone class – but to ensure I am in, please send me an email to krishna@wharton.upenn.edu by 10am that day. I encourage you to come in groups of possible team members w project ideas.
- I have assembled some project ideas, but I'd like your group to take ownership of a project that is of interest to you! That's why it's best to come by and chat with me as indicated above: to save time and hurt feelings, do send me your application or bring it along to that meeting!
- An application form is attached. Pretty soon after you fill it out and email it to me, I will respond and let you know if you're approved – or else, I'll ask to meet to chat with you.

Application

Please type and attach, or print legibly before scanning and sending! Email it to me at krishna@upenn.edu **with a subject line** that says **FNCE404 APP**.

Your Info

Name	Student ID	CURRENTLY Soph/Junior/Declared Major?
------	------------	---------------------------------------

Email Address:

Phone (Optional)

List Courses Taken in Finance Dept, with Grade if completed

List Courses Taken in Math or Stat, with the Grade if completed

Briefly indicate any work experience that's relevant, and why you want to take this capstone course!