

The Wharton School
Financial Engineering(399/890)

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Financial Engineering

FNCE 399-401, 890-401: Meets Tu-Th 10:30a-12n

Note: Even though this course shows an Independent Study/Advanced Study Project designation for the UGs/MBAs respectively, it is run as a lecture and discussion course. Instructor permission is *not* required to pre-register — but please do read through items 1-5 of the PRE-REQUISITES listed below.

1. Course Description

DERIVATIVES are now used by a variety of institutions, and investment banks routinely structure them. Innovations in these markets are rapidly imitated because these contracts are (complex) combinations of existing securities or they are seen as equivalent to dynamically-adjusted positions in other securities.

The objectives in this course are twofold.

- First, to provide the student with the necessary skills to design (and reverse-engineer), value, and hedge these contracts. While the transfer of risk is often the prime motive in designing these contracts, the accounting, regulatory, and tax treatments accorded to these contracts make them attractive to a particular clientele of end-users.
- Second, to enable the student to absorb the analytical arguments in the (increasingly) technical publications that deal with innovations in these contracts — now in the in-house research notes of financial institutions and in practitioner-oriented journals — and to apply them.

The following topics (not a complete list, and not necessarily in this order!) will be covered: dynamic hedging and valuation with transactions costs; equity swaps and structures; interest-rate models; swaps and complicated swap structures in interest rates and currencies; credit derivatives; commodity-linked securities and swaps. We'll use case studies as quick examples whenever possible, but our coverage will be deeper than is expected in a case-oriented course.

This is an advanced course, where knowledge of the pricing of futures and options (especially backward-recursion with binomial trees, as well as the institutional setting of exchange-traded futures and options — covered in Finance 206 or 717) will be taken for granted, but will be very briefly reviewed in one early lecture. Basic ideas from probability and statistics, as well from the calculus (especially partial derivatives) will be assumed. Grades will be based on class participation, problem sets, case-writeups, and a group project report.

2. Pre-requisites

1. A strong motivation and a willingness to work hard — essential in this course — can easily substitute for prerequisites. A background knowledge of financial markets is useful, though, so it is desirable but not essential that you've taken the Core finance classes.
2. *For Undergrads:* Stat 101 & 102; Finance 206 (Spec Markets) required.
3. *For MBAs:* Core Statistics or higher. Finance 717 (Spec Markets) can be a co-requisite but see item 5 below.
4. Knowledge of spread-sheet programming, eg Excel, is expected; the ability to program in Visual Basic or use software like Crystal Ball is desirable but easily picked up, and will serve you well later.
5. If you need more information, or if you are unsure about your readiness to take the course, or if you haven't taken Spec Markets but feel you have a background from your work-experience, please either come by my office (3259 SHDH), or send e-mail (krishna@wharton.upenn.edu).