

## Schulich School of Business

### **MFIN5500: Analysis of Structured Products Summer Course for Graduate Students in MF Program**

#### **Instructor:**

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#### **Course Outline and Overview:**

Financial practitioners are increasingly being asked to design, structure and price complex financial products that are sold to retail investors as well as large institutional investors. On the surface, many of these products resemble fixed-income bonds in that they offer periodic coupons and promise a final face-value payment at maturity. Yet, a careful examination reveals that their underlying value is not only driven by interest rates and/or the yield curve. In fact, in many cases these products are not only influenced by equity markets, foreign currency exchange rates and commodity market, but are also linked to more exotic economic variables such as the weather, real-estate, credit ratings, and even population longevity patterns.

The common denominator of all these securities is that they can't be neatly classified into any one asset class, or into traditional silos of stocks, bonds, options or futures. In fact, the phrase structured product itself can imply different meanings and connotations depending on the context.

The MFIN5500 course will function as a hands-on research practicum in which "real live" structured products will be brought into the classroom and analyzed using the tools of financial economics. And, given the advanced (capstone) nature of the course, we will examine these structures from a variety of perspectives.

Some of the questions we will address are: Who exactly manufactures them? Why are they being created? Who buys them and how do they fit into a pre-existing investment portfolio? How should they be priced/valued? What are their regulatory and tax implications? Can they be synthesized using existing securities? How profitable are they for the issuer/underwriter?

Within the course the analytic work will be done entirely in Microsoft Excel. Thus, a substantial side-benefit of this course will be to develop a set of practical spreadsheet tools that can be used more broadly.

The actual products and instruments analyzed in any one semester will heavily depend on current events, the faculty member conducting the course as well as the availability of guest speakers from the investment banking industry who can participate in the practical aspects of the analysis.

The focus of the course will be on structured products that are linked to mortality, longevity, pensions and/or insurance. As an added bonus, students will gain an in-depth understanding of insurance, demographic and actuarial models that traditionally do not form part of the core finance curriculum but a growing part of modern financial markets.

**Audience:**

This course is intended as a required course for Master in Finance students, to be taken in the final (summer) semester of the program. The material integrates many of the ideas and concepts from the pre-requisite courses.

**Technical Level:**

Students should have a thorough understanding of financial economic theory (Expected Risk and Return, the Markowitz frontier, Sharpe Ratios, CAPM, equilibrium pricing, option valuation, etc) and more specifically the replication pricing of derivative products like simple options, swaps and forwards. Knowledge and familiarity of Excel will help, although many of the specific functions/formulas used in class will be thoroughly explained early in the semester.

**Prerequisites:**

This course will take place in the third (final) semester of the Masters in Finance program. Students must have acquired a careful understanding and working knowledge of differential and integral calculus as it relates to probably and statistical models. Note that no actuarial or insurance knowledge is needed and that any background demographic and mortality knowledge will be provided in-class.

**Lecture Style:**

The physical class will be taking place in the Schulich computer lab and will involve a mixture of classroom lectures and interactive work.

## Course Grading Scheme:

Class Participation:	10%
Individual (2) Homework:	20%
Group Project Presentation:	40%
Final Exam:	30%

Consistent with the underlying theme of the MF program to create well-rounded specialists in finance, a substantial grading component of this course will revolve around class-presentations and the requisite interpersonal skills. More information on the project will be provided as the semester evolves.

## Detailed Agenda:

### Week #1: May 6<sup>t</sup>

Background motivation and review of course objectives. Discuss the definition (or lack thereof) for structured products and what we are trying to achieve in this course. Discuss the Excel-component of the course and what is required in terms of technical knowledge.

### Week #2: May 13<sup>th</sup>

Begin formal presentation and discussion of mortality models. What is a mortality table? How does one compute mortality rates? Force of mortality. Future lifetime random variables. Conditional survival probabilities for multiple lives.

### Week #3: May 20<sup>th</sup>

Continue discussion of mortality models, introduce and work with the Gompertz-Makeham law of mortality and how it can be used to obtain closed form expressions for the price and value of structured products. Start discussion of pricing, the law of large numbers and the possible risk premium for longevity and/or mortality. Discuss: Can this be hedged? What are some of the ethical issues involved in developing a secondary market for these product? What is the optimal holding of these instruments?

### Week #4: May 27<sup>th</sup>

Introduction to VBA function-coding within Excel...more information to follow.

### Week #5: June 3<sup>rd</sup> (homework #1 is due)

Continue discussion of valuation models for mortality contingent claims and the pricing of pension annuities, life insurance and other popular products. Compare model pricing with the actual prices in the market for these products. Use Excel to analyze and examine the risk management aspects of a portfolio of these structured (mortality contingent) products.

### Week #6: June 10<sup>th</sup>

Complete the discussion of (Level #1) basic mortality-contingent claims and then move on to products that embed "optionality" and other underlying securities. Complete the discussion of basic pricing for these products. We have all the tools needed to proceed.

Week #7: June 17<sup>th</sup>

Lecture on how to build your own VB models in Excel with a variety of examples provided within the context of pricing and valuation of mortality-contingent claims.

Week #8: June 24<sup>th</sup>

Lecture on risk management for mortality-linked structured products. How does the industry cope and manage these risks? You will be asked to read and prepare questions for this session.

**Week #9: Holidays**

Week #10: July 8<sup>th</sup>, 2011

Group Class Presentation and Project #1 and #2. More information to follow.

Week #11: July 15<sup>th</sup>, 2011

Group Class Presentation and Project #2 and #3. More information to follow.

Week #12: July 22<sup>nd</sup> 2011

Final summary lecture and preparation for final exam....

**Lecture Notes:**

As this is a topics course, there is no formal textbook for the course. A series of lecture notes and readings will be provided on a week-by-week basis. They will all be posted on the CMD. No special purchase required. More to follow...