

# Financial Securities and Innovation

## FINA 7354 (20859)

**Time:** Wednesdays, 6.00 – 9.00 p. m.  
**Location:** Room MH 113

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The last forty years has seen an explosion in the different types of financial instruments used in equity, foreign exchange, commodity and fixed income markets. These financial innovations have had a tremendous impact on the world economy. For example, some of these innovations, such as the design of customized hedging securities or the securitization of mortgage and consumer credit risk, lowered the cost of borrowing and facilitated higher economic growth worldwide. But some of these same innovations, such as credit default swaps and mortgage securitization have also become controversial and have been blamed for the credit crisis and even the recent global recession.

Yet the reality is more complex. Credit default swaps provide a mechanism for investors to transfer the risk of default to other investors in the economy. For example, you could be a manufacture producing car parts. You are concerned that your main customer might default. If default occurs then, you may incur losses on any bills outstanding and future revenues may be affected. A credit default swap provides a way to partially hedge this type of risk. Securitization started in the mid 1980s and provides a mechanism for financial institutions to transfer assets off their balance sheet, releasing capital. Typical examples of the assets used in securitization are credit cards, auto loans and leases, commercial property leases and mortgages.

The ability to analyze new securities is critical for high-performing finance professionals in areas as diverse as investment banking, security analysis, risk management, and corporate finance. The aim of this course is therefore to develop a framework for analyzing new types of securities. We will focus on some new instruments in debt markets, which has been one of the main arenas for financial innovations. We will study the benefits and risks of these securities, and study the most widely used approaches for their pricing. The basic concepts that underlie many of these innovations are not unique to credit markets.

### Key Concepts and Areas Covered

- Corporate bonds and credit default swaps
- Incentives
- Structural and reduced form models
- Correlation products
- Securitization

## Why Take This Course?

For any innovation, whether it is associated with equities, fixed income or commodities, what are the risks associated with the instrument? How do we price the innovation? What incentives does the innovation generate to the different parties associated in its pricing and marketing? One of the many lessons from the credit crisis is the need to understand incentives.

This course is essential for any student who wants to enter the securities industry whether it is in the role of a trader or risk manager. This course is also essential for people wanting to go into corporate finance. As a manager you need to understand the limitations of the models and the types of risk inherent in these instruments.

Financial professionals and managers operate in a quantitative world where understanding financial and valuation models is critical for effective performance. This course, which is designed as a required capstone course for Master of Finance students, will therefore necessarily be quantitatively oriented. In particular, the course requires some basic knowledge of statistics and the ability to program, so that you can perform simulations. (See below more details.)

## Required Text Book

O’Kane, D. “Modelling Single Name and Multi-name Credit Derivatives”, Wiley, New Jersey, ISBN 978-0-470-51928-8.

This book is written by a practitioner and provides a practical introduction to the pricing of credit derivatives without getting too wrapped in mathematics. We will not have the time to cover all the material in the book. By the end of the course you should be able to read and understand the chapters we have not covered.

Material for this course can be located at [www.uh.edu/webct](http://www.uh.edu/webct) (to be loaded).

There are many other excellent books available. Below is a short list of the books I would recommend.

Bielecki, T. R. and M. Rutkowski, “Credit Risk: Modeling”, Valuation and Hedging (2002), Springer-Verlag, Berlin, ISBN 3-540-67593-0.

Lando, D., “Credit Risk Modeling”, (2004), Princeton University Press, New Jersey, ISBN 0-691-08929-9.

Schönbucher, P. J. “Credit Derivatives Pricing Models” (2003), Wiley, New Jersey, ISBN 0-470-84291-1.

The last two books are a good compromise between intuition and mathematical rigor. The Bielecki and Rutkowski book is far more mathematical.

More descriptive books are

Meissner, G., “Credit Derivatives”, (2005), Blackwell publishing, ISBN 1-4051-2670-0.

Chaplin, G. “Credit Derivatives”, (2005), John Wiley, ISBN 13 078-0-470-02416-4.

## **Important Dates**

**First Class**                      **Wednesday January 20, 2016**

**Last day of class is**        **April 27, 2016.**

### **Assignments**

There will be eight assignments.

The first seven assignments carry a grade of 11% per assignment and the last assignment 23%.

Some of the assignments involve Monte Carlo simulations, so knowledge of a programming language such as MatLab or equivalent is essential. The university has a site license for MatLab. I will give a short introduction to this simple computer language.

A short introduction to MatLab that covers the basic essentials is given in

**Amos Gilatt “MatLab: An Introduction with Applications”, Wiley, ISBN 0-471-43997-5**

### **TA for Course**

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## Outline of Course

### **Introduction:**

An introduction to the different issues that will be addressed in the course.

A review of some basic results from statistics that we will use in the course. We will review the standard distributions used in finance: the normal distribution and lognormal being the most common.

Chapters 1 and 2 in O’Kane and PP “Introduction”.

### **Review of Statistics**

PP “Review of Statistics”.

### **Review of Simulation**

PP “Review of Simulation”.

### **Credit Sensitive Instruments**

This is an introduction to different types of credit instruments. The lecture will focus on the use and design of the different instruments.

How do we measure the risk of a corporate bond? The risk of default and the loss given default affects the pricing of bonds. We will consider some of the practical issues associated with credit default swaps.

Chapters 4 and 5 in O’Kane and PP “Credit Sensitive Instruments”.

### **Modeling Credit Risk: Structural and Reduced Form Models**

We start with a general approach to valuing the different cash flows. For actual pricing we do need to make explicit assumptions about the type of pricing model we want to employ to evaluate the different cash flows. We start with the structural model of Merton (1974) model; a simple model that is used extensively. We will also talk about barrier models and simple reduced form models.

Chapter 3 in O’Kane and PP “Structural and Reduced Form Models”.

### **Introduction to Pricing Credit Default Swaps**

We will discuss actual models next. Price we talk about pricing by replication. While the argument is based on some strong assumptions, the end result is surprisingly accurate. We develop general expressions for the present value of the different cash flows. For actual valuation, we need to show how to use any model. We will demonstrate some of the issues.

Chapters 5, 6 and 7 in O’Kane and PP “Introduction to Pricing CDS”.

### **Using a Pricing Model for Credit Default Swaps**

For actual valuation of a CDS, we need to show how to use any model. That is the model needs to be calibrated. We will demonstrate some of the issues.

Chapter 6 and 7 in O’Kane and PP “Pricing CDS”.

**Credit Indices**

Why are indices popular? Do indices help price discovery?  
Chapter 10 in O’Kane and PP “Index Pricing”.

**Introduction to Correlation Products**

Here the problem of default dependency arises.  
First to default, second to default  
Synthetic Collateralized Debt Obligations  
Chapter 12 in O’Kane and PP “Modeling Default Dependence”.

**Gaussian Latent Models**

Chapters 13 in O’Kane and PP “Gaussian Latent Models”.

**Modeling Default Products Using Copulas**

Chapters 14 in O’Kane and PP “Introduction to Copula Models”.

**Pricing Tranches Using the Gaussian Copula Model**

We will show how to use the Gaussian copula model for pricing tranches. This is a very simple model.  
We define base correlation. If time permits, we will talk about other copula models.  
Note the failure to model default dependence was one of the drivers behind the credit crisis.

Chapters 16 and 20 in O’Kane and PP “Pricing Tranches”.

**Academic Honesty:**

The University of Houston Academic Honesty Policy is strictly enforced by the C. T. Bauer College of Business. No violations of this policy will be tolerated in this course. A discussion of the policy is included in the University of Houston Student Handbook, <http://www.uh.edu/dos/hdbk/acad/achonpol.html>. Students are expected to be familiar with this policy.

**Accommodations for Students with Disabilities:**

The C. T. Bauer College of Business would like to help students who have disabilities achieve their highest potential. To this end, in order to receive academic accommodations, students must register with the Center for Students with Disabilities (CSD) (telephone 713-743-5400), and present approved accommodation documentation to their instructors in a timely manner.