Syllabus for **FRE-6103 Valuation for Financial Engineering**

Instructor and Grading Assistant Contact Info and Preliminary Schedule

Instructor: Brian R Lessing (917) 417-7317 (mobile)

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Teaching Assistant: Information will be added shortly

Course Structure:

Anticipated class sessions for lectures, discussions of homework assignments, midterm exam and final exam are as follows:

THE FOLLOWING SCHEDULE IS TENTATIVE, AND MAY BE ADJUSTED IF NECESSARY, INCLUDING TO BE CONSISTENT WITH THE FINAL SPRING 2021 ACADEMIC CALENDAR

Tues 2/2 regular class	Tues 3/16 midterm exam	Tues 4/27 regular class
Tues 2/9 regular class	Tues 3/23 regular class	Tues 5/4 regular class
Tues 2/16 regular class*	Tues 3/30 regular class	Tues 5/11 reading day
Tues 2/23 regular class	Tues 4/6 regular class	Tues, 5/18 final exam
Tues 3/2 regular class	Tues, 4/13 regular class	
Tues, 3/9 regular class	Tues 4/20 regular class	

*This class may be rescheduled.

Classes will meet from 6 to 8:30 p.m. and include a 15-minute break.

Course Requirements:

Students will be expected to master all material from the assigned chapters of the text book, the class lecture slides, and the homework. Class lectures will touch on many of the topics from the text book and slides, but will not cover everything; independent study of the text book and class lecture slides will be necessary and expected.

Course grades will be based upon the final exam, the midterm exam, and class participation including homework. Homework may include special projects and/or case studies (TBD). Homework assignments for each chapter will generally be due by the next class session after the lecture for that chapter has been completed. However, please review the course requirements online in NYU Classes on a weekly basis, as they are likely to change as the term progresses.

Students are encouraged to participate fully in class discussions. It's anticipated that the midterm exam, final exam, and class participation including homework will count for

approximately 30%, 30%, and 40% of the final course grade. Although the exact weightings will depend on performance, it is anticipated that final scores will be ranked, with approximately the top 50% of the students receiving A or A- and approximately the bottom 50% receiving B+, B or lower, so that the average target grade is 3.67.

The midterm and final exams will be "open book" in the sense that reference to specified written materials (to be provided) will be permitted. Reference to any other notes or written materials, or any other electronic source, will not be allowed.

Missed class policy: If you miss a class, it is your responsibility to cover the session with notes from your fellow students, study of the textbook, review of the lecture slides, and watching available class recordings. Missing classes will impact your class participation grade regardless of the reason.

It is expected that each student will have the necessary equipment in their possession to do numerical calculations by hand, via handheld calculators or via personal computers to do homework assignments, participate in class sessions, and to take the mid-term and final exams. Please plan on having Excel available during each class. A financial calculator will be needed for the exams. You must have access to Excel (including VBA) to complete your assignments. You are also welcome to use Python or R for technical work, **but your final results need to be presented fully in Excel**.

Learning Objective

Course Description: FRE 6103 introduces financial engineers to robust risk-based valuation methods in discrete and continuous time. This includes four major applications: cash flows, traded derivative contracts, nontraded and embedded derivatives, and corporate assets & liabilities.

- "Cash flows" refers to risk-free and risky payments or expenditures.
- "Traded derivatives" include a high-level treatment of forward contracts and the most commonly traded option contracts.
- "Nontraded and embedded derivatives" refer to contingent cash flows created in the normal processes of contracting and asset management
- "Corporate assets" refer to claims to cash flows owned and managed by corporations
- "Corporate liabilities" refers to corporate-issued securities or other payment obligations incurred by corporations

This is not a generalist MBA finance course. Being designed for engineers, it focuses on deep analytical methods, is computational in nature, and is driven by practical problems encountered by finance professionals. Being an introductory core course, it does not go into depth into all subject areas but provides a suitable and broad foundation for advanced elective courses in advanced valuation, corporate finance, investment, derivatives, and trading.

Course Prerequisites: Students will be assumed to have a basic understanding of calculus, linear algebra, probability, statistics, and the theory of interest. A few actuarial models requiring life contingency mathematics will also be encountered. However, this material will be briefly summarized as it is utilized.

Course Objectives: To gain a basic understanding and familiarity with risk-based valuation methods, primarily in discrete time. To understand the concepts, be able to explain and use

the concepts to solve problems and be able to apply the models and techniques of calculation developed in class to arrive at correct numerical results.

Readings: Subject to class participation and topic mastery, we'll cover chapters 1-11 of the required text book (see below for text particulars) during the regular class sessions, devoting 1-1 ½ sessions (see above for session schedule) to each chapter with catch-up and review as needed. If there is any additional time, we will cover additional topics from other sources such as the corporate finance supplemental text.

The chapter topics are as follows:

Chapter One: Valuation Methods for Financial Engineers
Chapter Two: Annuities and Perpetuities, Basic and Complex
Chapter Three: Complications and Resolutions
Chapter Four: Bonds
Chapter Five: Simulation
Chapter Six: Stochastic Processes in Finance
Chapter Seven: Risk, Capital and Valuation
Chapter Eight: Portfolio-based Benchmarks
Chapter Nine: Forwards & Futures Valuation
Chapter Ten: Option Principles
Chapter Eleven: Benchmarking

Required Materials

We will use the following textbook:

Valuation for Financial Engineering, by David C. Shimko. The latest draft of this textbook will be provided free of charge on NYU Classes. Corporate Finance, 4th Edition (MFE Version) by Ivo Welch is recommended for those needing more background or depth in traditional corporate finance. The Welch text is available free online, or a print copy may be purchased from Lulu.com. Other readings may be used as supplements and will be provided to students as needed.

Moses Center Statement of Disability

If you are student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor.

Inclusion Statement

The NYU Tandon School values an inclusive and equitable environment for all our students. I hope to foster a sense of community in this class and consider it a place where individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations, and abilities will be treated with respect. It is my intent that all students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. If this standard is not being upheld, please feel free to speak with me.