

Course Syllabus – Valuation for Financial Engineering FRE-6103

David C. Shimko, Industry Full Professor of Financial Engineering
Fall 2021

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Office: 1 Metrotech, 10th Floor
Office hours: By appointment,
or by chance on Weds & Thurs – Stop
by!
Grading assistants: TBD

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.

Instructor information:



Prof David C. Shimko

Resume in brief:

- Assistant Professor, Marshall School, USC
- Adjunct Professor, Harvard Business School
- Adjunct Professor, NYU Courant
- Head of Commodity Derivatives Research, JPMorgan
- Head of Credit Research, JPMorgan
- Head of Risk Management Advisory, Bankers Trust
- CEO and co-founder of Risk Capital, an independent risk advisory firm
- CEO and co-founder of CreditCircle, a marketplace lending platform
- Director of public, private and non-profit entities including GARP
- Widely published in derivatives valuation, risk management, commodities and credit

Class organization:

Required texts: Valuation for Financial Engineers, class notes to be provided by Prof Shimko. This will be provided free of charge on Brightspace. Corporate Finance, 4th Edition (MFE Version) by Ivo Welch is recommended for those who need more background or debt in traditional corporate finance. The Welch text is available free online or a print copy may be purchased. Other readings may be used as supplements and will be provided to students as needed.

NYU Classes: Please follow the course requirements and announcements online weekly, as they are likely to change as the term progresses.

Recommended calculators: You may use any calculator. I personally prefer the traditional HP 12C, and will use it in class. This does not mean you have to use it. It requires “reverse Polish sequences” for which I will provide an instruction note. You may also use the Texas Instrument BA II PLUS (Professional) calculator (or TI 83, TI 83 Plus). You may also use a smart phone app or simply use Excel in class.

Recommended analytic software: I prefer Excel, not for its elegance or ease of use, but for the ease of collaboration and visualization with colleagues, supervisors and clients. **You must have access to Excel to complete your assignments.** You are also expected to use Python for completing more complex projects.

Course grading: This will be a combination of individual homework (20%), mini projects (20%), class participation (20%) and exams (a midterm and final, 20% each). Each mini-project team will consist of two people, and the pairing must be different for each project. There are four sections of this class, which will be combined for grading purposes.

Missed class policy: I do not take responsibility for your missed classes, since all lectures and recitations will be recorded. You can expect missed recitations to affect your class participation grade.

Office hours: GA hours TBD. Prof Shimko by appointment, or by chance Weds-Thurs.

NYU Class Prerequisites: Summer bootcamps

Functional prerequisites: Calculus, Linear algebra
Analytical skills taught: Basic stochastic calculus, simulation, financial reasoning

CLASS FORMATS

Classes will be taught in an inverted style, meaning that you must watch each recorded lecture prior to the recitation. You must also prepare to present problem solutions and answer questions in recitation sessions. While I encourage volunteers, I will also call on students by name to solve problems.

In each recitation, you will earn class participation points. In each session, you will have a positive (+1), neutral (0) or negative assessment (-1). The sum of these assessments is the basis for 20% of your final grade in the class.

Class topics (approx. two per week), subject to minor revisions:

Lecture	Title
1	Valuation in Finance
2	Using the GVE to value cash flows
3	Amortization, bonds and financial decisions in Excel
4	Bootstrapping, ZCBs and the Term Structure
5	Floating rate bonds, variable interest rates and interest rate risk
6	Inflation, TIPS, and foreign currency (incl gold and Bitcoin)
7	Corporate bonds and default
8	Basics of simulation
9	Multivariate simulations and copulae
10	Stochastic processes used in finance
11	Advanced stochastic processes
12	CDO Mini Project and Securitization
	MIDTERM EXAM
13	Equities – The Single Period CAPM
14	The Multiperiod CAPM
15	Futures valuation
16	Futures in practice
17	Option valuation
18	Options in practice
19	Valuing simulated cash flows
20	Real option mini project
21	Introduction to corporate reporting
22	Introduction to corporate financial decisions
23	Corporate capital budgeting
24	Corporate capital structure
25	Corporate risk management

26	Final corporate mini project
	FINAL EXAM

Disability Disclosure Statement

Academic accommodations are available for students with disabilities. Please contact the Moses Center for Students with Disabilities (212-998-4980 or mosescsd@nyu.edu) for further information. Students who are requesting academic accommodations are advised to reach out to the Moses Center as early as possible in the semester for assistance.

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.