

American University of Beirut
Maroun Semaan Faculty of Engineering and Architecture
Department of Industrial Engineering and Management

ENMG 602 Introduction to Financial Engineering

Fall 2016, CRN 12276: MW 4:00 - 5:15 PM - Bechtal 202

Instructor

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Course Description and Objectives

Financial Engineering (FE) is the tailoring of cash flows over time to be as desirable as possible. This involves the scientific design of “financial products” which are traded in the financial markets. Examples of financial products (also known as financial instruments or securities) include bonds, stocks, futures, and options. This course aims to (i) introduce the student to financial accounting, the investment process and financial markets; and (ii) to give the student a flavor of FE applications. The course is divided to two parts. The first part covers the basics of financial accounting. It provides the student with a working knowledge of the accounting process and its usage in assessing the financial performance of organizations. This also enhances the understanding of the “big picture” (i.e., the business environment where FE is implemented). The second part is on FE applications to “fixed-income” securities involving deterministic cash flow streams. These applications include pricing and portfolio structuring of bonds, capital budgeting, cash matching, dynamic investment management and firm valuation. This course will prepare the students to handle more complex financial instruments with uncertain cash flows such as stocks, options and futures (which are covered in ENMG 624 and 625).

Course Prerequisites

Basic concepts of engineering economy. A training equivalent to ENMG 400 is required.

Textbooks

1. Antle, R. and S. J. Gartska (2004). *Financial Accounting*, Thomson.
2. Antle, R. and S. J. Gartska (2004). *Financial Accounting: Questions, Exercises, Problems and Cases, Masters Edition*, Thomson. (out of print)
3. Luenberger, D. G. (1998). *Investment Science*, Oxford University Press.

Additional References

1. Derman, E. (2004). *My Life as a Quant*, Wiley.
2. Bernstein, P. (2007). *Capital Ideas Evolving*, Wiley.
3. Kimmel, P. D., J. J. Weygandt and D. E. Kieso (2004). *Financial Accounting: Tools for Business Decision Making*, Wiley.

4. Malkiel, B. (2007). *A Random Walk down Wall Street*, Norton.
5. Sharpe, W. F., G. J. Alexander and J. V. Bailey (1999). *Investments*, Prentice-Hall.
6. Sullivan, W. G., E. Wicks and J. Luxhoj (2003). *Engineering Economy*, Prentice-Hall.
7. Taleb, N. N. (2007). *The Black Swan: The Impact of the Highly Improbable*, Random House.
8. Wild, J. J (2008). *Financial Accounting: Information for Decisions*, McGraw-Hill.

Topics Covered

We will cover Chapters 1 to 7 of Antle's book and Chapters 2 to 5 of Luenberger's book.

1. Introduction to financial accounting. Financial statements, decision making, economic concepts: Value, wealth, income, generally accepted accounting principals (GAAP), institutional context (Chapter 1, Antle).
2. Balance sheet concepts. Assets, liabilities, equities, accounting identity, balance sheet construction, analysis and ratios (Chapter 2, Antle).
3. Income statement concepts. Income, revenues, expenses, adjustments, accrual accounting, income statement construction, analysis and ratios (Chapter 3, Antle).
4. Statement of cash flows. Cash and cash flow concepts, operations, investing and financing activities, construction of cash flow statement, articulation of statements, analysis and ratios (Chapter 4, Antle).
5. Utilizing the accounting framework. Analyzing AOL financial statements (Chapter 5, Antle).
6. Economic concepts. Present and future value of cash flow streams, internal rate of return, uncertain flows, expected value (Chapter 2, Luenberger and Chapter 6, Antle).
7. Financial statement analysis. GAAP valuation vs. economic valuation, analysis framework, ratios (Chapter 7, Antle).
8. Fixed-income securities. Bonds detail, yield, duration, immunization, convexity (Chapter 3, Luenberger).
9. Term structure of interest rates. Term structures, forward rates, term structure explanations, expectation dynamics, duration, immunization. (Chapter 4, Luenberger).
10. Applied interest rate analysis. Capital budgeting, optimal portfolios, dynamic cash flow processes, the Harmony theorem, valuation of a firm (Chapter 5, Luenberger).

Grading

Midterm Exam	40%
Final Exam	40%
Homework	10%
Paper	10%

Homework

Homework problems will be assigned and graded frequently. Students are encouraged to spend plenty of time working on the homework problems and to discuss their solution with each other and the instructor. However, each student should write and submit the homework individually. Do *not* type the homework. But *do* staple it. *Doing the homework is the best way to excel in this course.*

Paper

This aims at introducing you to serious academic research. You will work in groups of two and read, summarize (in 4 double-spaces pages at most), and present (in 5 minutes) a paper from a respectful accounting or finance journal. (A detailed list of journals will be provided later.) This “small” project will be done in two phases. More detailed guidelines on the paper submission are available on the course website.

Attendance Policy and Class Management

Attendance will be noted utilizing random sampling.¹ A student is allowed **two** unexcused absences at most. Each additional unexcused absence will lead to losing five points from the final grade. No student will be admitted to class after 15 minutes from the beginning of the lecture. f Cell phones, laptops and other gadgets are not allowed in class.

Examination Policy

A student is not allowed to miss an exam except for a valid medical excuse. However, no make-up exam will be given for the midterm exam. Instead, for students who miss the midterm exam, with a valid excuse, the weight of the final exam will be changed to 50%. Students who miss the final exam will be given an incomplete grade and will have to take a make-up exam at the beginning of the following semester. **The make-up exam is expected to be more challenging than the regular final exam.**

Course Website

<http://www.aub.edu.lb/~bm05/ENMG602/>

Look for class notes, assignments and other class related material there.

University Rules and Regulations

Students are advised to review all relevant university rules and regulations including those related to attendance, cheating, plagiarism, misconduct, and academic integrity, among many others. It shall be expected that strict enforcement of these rules and regulations will be exercised.

¹I'll call on one quarter of the students at random in every session. There is a 25% chance that your name is called in a given session. With approximately 28 sessions in the semester, there is a 98.3% chance that your name will be called more than two times in the whole semester. So, the probability of missing all sessions and not getting penalized is 1.7%.