

## ENMG 602 Introduction to Financial Engineering

Fall 2020, CRN 11687 (online)

Week Overview, Mon 4:00 - 5:15 PM (Zoom)

Q&A Session 1, Wed 4:00 - 5:15 PM (Zoom)

Q&A Session 2, Fri 4:00 - 5:15 PM (Zoom)

(Check your email for Zoom link and login info. Save these as you'll use them every time.)

### 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. (2014). *Investment Science, 2<sup>nd</sup> Edition*, 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	30%
Final Exam	30%
Homework	20%
Paper	20%

## 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 4 and read, summarize (in 6 double-spaced pages at most), and present (in 5 minutes) three papers from a top-tier accounting or finance journal. (A detailed list of journals will be provided later.) This project will be done in two phases. More detailed guidelines on the paper submission will be available on the course website.

## Attendance Policy and Class Management

The class material will be delivered fully online in an asynchronous mode via videos featuring my voice over self-contained slides. There will be three Zoom “live” sessions every week MWF (4:00 - 5:15 PM) to help you learn better. On Monday, I will quickly go over the class material covered in that week videos and discuss the class logistics (i.e. what you need to do in the week). Attendance is mandatory on Monday and will be checked via screen shots from Zoom taken at random times (technology is good). On Wednesday and Friday, I will take your questions about the course, and attendance is optional. If you have no questions, and have nothing better to do, you are welcome to attend on Wednesday and Friday and listen to the discussion (if any).

## 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 60%. 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 - Not Moodle

<https://sites.aub.edu.lb/bacel/enmg-602/>

Look for class notes, and voice-over videos, assignments and other class material there.