

EPFL
Master in Financial Engineering
Investments
Spring 2010

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1 Essentials

1.1 Contact Information

Instructor

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1.2 Schedule

The course will take place on Mondays from 9h15 to 12h00. Exercise sessions will take place on Tuesdays from 13h15 to 15h00.

1.3 Exams

There is a midterm and a final exam. Documentation is allowed during both the midterm and the exam. You can use a calculator.

Midterm date: TBA

Exam date: TBA

1.4 Grading

Every week you will have a homework. You are expected to solve the homework problems before the Tuesday session of the following week, but DO NOT NEED to hand them in. The Tuesday exercise sessions are organized as follows:

- I will solve some of the exercises for you,

- Each Tuesday I will call some of you at the blackboard to help me. Providing the right solution will increase your participation bonus (PB). If you do not know how to solve the problem, you will not have any PB. If you are absent when I am calling you, you will not have any PB. Your PB can go from 0% to 20%. Everybody starts at $PB = 0\%$.

The final grade will be

$$GRADE = \min \left[6, \frac{MID + FE}{2} (1 + PB) \right]$$

2 Objectives

The course offers the financial theory and quantitative tools necessary for investment decisions. The class is divided in two parts. Topics covered during the first part include modeling the relation between risk and return, portfolio theory, the capital asset pricing model and the arbitrage pricing theory, practical asset allocation, and more. Topics covered during the second part focus on interest rates, interest rates related contracts, credit risk and derivatives contracts.

3 Pedagogical Material

3.1 Class notes

All of the material presented in class is included in periodical handouts. The handouts are self-contained and they try to summarize well the chapters that are discussed in class.

3.2 Textbooks

The course will closely follow Bodie *et al.* (2002), (“BKM”). Many exercises will be inspired from this book.

The book by Hull (2008), (“HULL”) provides an extensive review of derivatives contracts and valuation methods.

One book which covers the key tools of modern investment practice, and does a serious introduction to the concepts and tools of quantitative financial analysis, is Kritzmann (2003), (“KRZ”).

3.3 Journal Articles

There are some journal articles which I strongly recommend you to read. They will surely increase your understanding of the concepts covered in class.

4 Program

Lecture 1

Introduction: Securities, random walk, return and risk.

Required readings: BKM chapters 1,2,3 and 5 and KRZ chapters 4 and 5.

Recommended readings: Fama (1965), Sharpe (1995).

Lecture 2

Asset Allocation I: Setting up the problem.

Required readings: BKM chapters 6 and 7, KRZ chapter 3.

Recommended readings: Elton & Gruber (2000), Solnik (1974), Bernstein (1992).

Lecture 3

Asset Allocation II: Multiple Risky Assets.

Required readings: BKM chapter 8, KRZ chapter 20.

Recommended readings: KRZ chapters 2 and 10, Black (1993), Brinson *et al.* (1986), Ibbotson & Kaplan (2001).

Lecture 4

The Capital Asset Pricing Model: Intuitive and formal derivation, interpretation.

Required readings: BKM chapter 9, KRZ chapter 1.

Recommended readings: BKM chapter 10, Jagannathan & McGrattan (1995).

Lecture 5

Arbitrage Pricing Theory: Derivation, interpretation, CAPM versus APT.

Required readings: BKM chapter 11, KRZ chapter 12.

Recommended readings: Roll & Ross (1995).

Lecture 6

Applications and Practical Issues in portfolio management: Risk management, portfolio insurance, constraints on admissible portfolios.

Required readings: BKM chapters 24, 25 and 27.

Recommended readings: Perold & Sharpe (1988).

Lecture 7

Security Analysis.

Required readings: BKM chapters 17, 18 and 19.

Recommended readings: “The Ins and Outs of Cash Flow”, BusinessWeek, 2001.

Lecture 8

Interest Rates and Related Contracts.

Required readings: BKM chapter 14.

Recommended readings: HULL chapter 4.

Lecture 9

The Term Structure of Interest Rates.

Required readings: BKM chapter 15.

Lecture 10

Managing Bond Portfolios.

Required readings: BKM chapter 16.

Lecture 11

Interest Rate Derivatives.

Required readings: HULL chapters 28, 30, and 31.

Lecture 12

Credit Risk.

Required readings: HULL chapter 22.

Lecture 13

Credit Derivatives.

Required readings: HULL chapter 23.

Lecture 14

Alternative Investments.

Required readings: BKM chapter 26.

References

- Bernstein, Peter. 1992. *Capital Ideas: The Improbable Origins of Modern Wall Street*. John Wiley & Sons Inc.
- Black, Fischer. 1993. Estimating Expected Return. *Financial Analysts Journal*, 55–59.
- Bodie, Z., Kane, A., & Marcus, A. 2002. *Investments*.
- Brinson, Gary, Hood, Randolph, & Beebower, Gilbert. 1986. Determinants of Portfolio Performance. *Financial Analysts Journal*.
- Elton, Edwin J., & Gruber, Martin J. 2000. The Rationality of Asset Allocation Recommendations. *The Journal of Financial and Quantitative Analysis*, **35**(1), 27–41.
- Fama, F. 1965. Random walks in stock market prices. *Financial Analysts Journal*, **21**, 55–59.
- Hull, J. 2008. *Options, Futures, and Other Derivatives*.
- Ibbotson, Roger G., & Kaplan, Paul D. 2001. Does Asset Allocation Policy Explain 40, 90, 100 Percent of Performance? Oct.
- Jagannathan, Ravi, & McGrattan, Ellen R. 1995. The CAPM debate. *Quarterly Review*, 2–17.

- Kritzmann, M. 2003, Second Edition. *The Portable Financial Analyst: What Practitioners need to know.*
- Perold, André F., & Sharpe, William F. 1988. Dynamic Strategies for Asset Allocation. *Financial Analysts Journal.*
- Roll, Richard, & Ross, Stephen A. 1995. The Arbitrage Pricing Theory Approach to Strategic Portfolio Planning. *Financial Analysts Journal.*
- Sharpe, W. 1995. Risk, Market Sensitivity and Diversification. *Financial Analysts Journal.*
- Solnik, Bruno. 1974. Why Not Diversify Internationally Rather Than Domestically? *Financial Analysts Journal.*