The George Washington University  
School of Business  
FINA 6223, Investment Analysis and Portfolio Management, Spring 2013

Alexandre M. Baptista  
Office: 2201 G Street, NW, Funger Hall, Room 501S (turn right as you enter Suite 501)  
Phone: 202-994-3309  
E-mail: alexbapt@gwu.edu (unless I am teaching or in a meeting, I generally reply quickly)  
Office hours: Tuesdays, 5:45-6:45pm; Thursdays, 6:00-7:00pm; and by appointment.

Course description  
FINA 6223 covers: (1) institutional details of the U.S. stock market; (2) modern portfolio theory; (3) risk management tools; (4) market efficiency and portfolio performance evaluation; (5) the valuation of stocks and bonds; and (6) applications of options and their valuation. A detailed course outline appears in pp. 5-9.

Learning objectives  
Our main learning objectives are:

1. To learn the institutional details of the U.S. stock market. For example, what was the average annual return on the U.S. stock market over the past 100 years? What are the implications and motivation for short selling shares of a given stock?

2. To gain an in-depth understanding of modern portfolio theory. For example, how do we find an investor’s ‘optimal’ portfolio? What is the expected annual return on a given stock?

3. To obtain a solid understanding of risk management tools such as value-at-risk and stress testing. For example, is the use of such tools related to the recent crisis? What is the maximum loss that a portfolio might suffer tomorrow under ‘normal’ market conditions?

4. To learn the implications of market efficiency and how to evaluate the performance of portfolio managers. For example, assuming that markets are efficient, can investors consistently ‘lose’ to the market (on a risk-adjusted basis)? How do we assess whether a given manager ‘beat’ the market (on a risk-adjusted basis) over the last five years?

5. To learn how to assess the value and riskiness of stocks and bonds. For example, what is the ‘fair’ P/E ratio of the U.S. stock market? Are U.S. Treasury bonds risky?

6. To develop an understanding of the motives for using options and option valuation. For example, what are the benefits of using a put option? What is the value of a call option?
Course materials

FINA 6223 uses the following materials:

1. In Blackboard:
   - Under ‘Slides for lectures,’ there are PowerPoint slides, class handouts, and optional readings. For each lecture, please print the corresponding slides (see the tentative class schedule in p. 4) and bring them to class.
   - Under ‘Projects,’ there are problem sets.
   - Under ‘Testing,’ there are sample exams. Detailed solutions to sample exams are also provided under ‘Testing.’

2. If you have time, please read pertinent articles from *The Wall Street Journal* (or *The Financial Times*) and *The Economist*. If time permits, we will discuss a few articles in class.

3. The recommended book is: *Investments* by Zvi Bodie, Alex Kane, and Alan J. Marcus, 2011, 9th edition, McGraw-Hill Irwin. Since course materials are self-contained, it is not required. Nevertheless, suggested readings are provided in the tentative class schedule of p. 4 (see the last column). Due to the technical nature of the book, it might be easier (and more effective) to read the book after the lectures. Of course, feel free to read it before the lectures.

Coursework

There are three critical elements in your coursework:

1. **Class attendance.** For most students, FINA 6223 is a challenging course. Hence, class attendance is very important for you. For example, it will help you develop intuition and absorb the most technical topics in the course. Also, lectures often build upon the materials covered earlier in the course. If you miss a lecture, please get the lecture notes (e.g., notes on handouts and additional examples) from a colleague and review them before the next lecture.

2. **Problem sets.** There are four team problem sets. Each team should have four or five students. While typed answers are preferred, legible handwritten answers are acceptable. Please print your (complete) answers and submit them in class (please do not e-mail your answers). Materials that are not submitted by the due date will not be graded.

3. **Exams.** There are two exams: Midterm Exam and Final Exam. A formula sheet will be provided during the class immediately before an exam (or earlier). You *cannot* write notes on this sheet and bring it to an exam. An identical formula sheet will be attached to the exam. A calculator is required during the exams, but you *cannot* use smartphones (e.g., iPhones), tablets (e.g., iPads), or computers. Importantly, there are no make-up exams. If you miss the Midterm Exam, then its weight will be transferred to the Final Exam. You cannot get credit for this course if you miss the Final Exam.
Academic integrity
Problem sets and exams are to be completed in conformance with The George Washington University Code of Academic Integrity (see: www.gwu.edu/~ntegrity/code.html). Examples of academically dishonest behavior include, but are not limited to:

1. Representing material prepared by another as one’s own work; and

2. Intentionally or knowingly helping or attempting to help another to commit an act of academic dishonesty.

I require that all team members actively participate in preparing the answers to the problem sets. If you do not actively participate in a problem set, your team is responsible for noting it in the first page of the answers that the team submits. A student who does not actively participate in a problem set will get no credit for it.

Course letter grade
Final letter grades in FINA 6223 are based on student performance in problem sets and exams. Their weights in the final grade are as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Sets</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50%</td>
</tr>
</tbody>
</table>

Tentative schedule
As noted earlier, a tentative schedule is provided in p. 4. It contains: (1) the topics that each class covers; (2) suggested readings for each class; (3) dates when problem sets are assigned and due; and (4) exam dates.
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Suggested readings from textbook</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-15</td>
<td>Introduction</td>
<td>Section 1.2, 1.5, and 2.1-2.3</td>
</tr>
<tr>
<td></td>
<td>Common stocks</td>
<td>Sections 5.1, 5.3, 5.8, and 11.4 (pp. 360-362)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Problem set 1 assigned</strong></td>
</tr>
<tr>
<td>Jan-22</td>
<td>Investment companies</td>
<td>Sections 4.1-4.5 and 4.7</td>
</tr>
<tr>
<td></td>
<td>Buying and selling individual stocks</td>
<td>Sections 3.2 and 3.5</td>
</tr>
<tr>
<td></td>
<td>Buying on margin and short selling</td>
<td>Sections 3.6 and 3.7</td>
</tr>
<tr>
<td>Jan-29</td>
<td>Portfolio expected returns and standard deviations</td>
<td>Section 7.4</td>
</tr>
<tr>
<td></td>
<td>VaR and CVaR – An introduction</td>
<td>Sections 5.7 and 5.10 (pp. 148-149)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Problem set 1 due</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Problem set 2 assigned</strong></td>
</tr>
<tr>
<td>Feb-5</td>
<td>Market Indices and ETFs</td>
<td>Sections 2.4 and 4.6</td>
</tr>
<tr>
<td></td>
<td>Diversification – An introduction</td>
<td>Section 7.2</td>
</tr>
<tr>
<td></td>
<td>The mean-variance frontier</td>
<td>Section 7.4</td>
</tr>
<tr>
<td>Feb-12</td>
<td>The mean-variance frontier (cont.)</td>
<td>Section 7.4</td>
</tr>
<tr>
<td></td>
<td>Diversification – Market and unique risk</td>
<td>Section 7.1</td>
</tr>
<tr>
<td></td>
<td>Risk-free borrowing and lending</td>
<td>Sections 6.2-6.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Problem set 2 due</strong></td>
</tr>
<tr>
<td>Feb-19</td>
<td>Risk-free borrowing and lending (cont.)</td>
<td>Sections 6.2-6.4</td>
</tr>
<tr>
<td></td>
<td>CAPM</td>
<td>Sections 9.1-9.3</td>
</tr>
<tr>
<td></td>
<td>Factor models and APT (if time permits)</td>
<td>Chapter 10</td>
</tr>
<tr>
<td>Feb-26</td>
<td>MIDTERM EXAM</td>
<td><strong>On materials through CAPM</strong></td>
</tr>
<tr>
<td>Mar-5</td>
<td>Factor models and APT (cont.)</td>
<td>Chapter 10</td>
</tr>
<tr>
<td></td>
<td>Market efficiency</td>
<td>Chapters 11 and 26; Section 5.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Problem set 3 assigned</strong></td>
</tr>
<tr>
<td>Mar-12</td>
<td>SPRING BREAK</td>
<td></td>
</tr>
<tr>
<td>Mar-19</td>
<td>Market efficiency (cont.)</td>
<td>Chapters 11 and 26; Section 5.7</td>
</tr>
<tr>
<td></td>
<td>Portfolio performance evaluation</td>
<td>Section 24.1</td>
</tr>
<tr>
<td></td>
<td>Dividend discount models</td>
<td>Section 18.3</td>
</tr>
<tr>
<td>Mar-26</td>
<td>Dividend discount models (cont.)</td>
<td>Section 18.3</td>
</tr>
<tr>
<td></td>
<td>Fixed income securities – An introduction</td>
<td>Sections 14.1-14.4</td>
</tr>
<tr>
<td></td>
<td>Duration and convexity</td>
<td>Sections 16.1-16.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Problem set 3 due</strong></td>
</tr>
<tr>
<td>Apr-2</td>
<td>Duration and convexity (cont.)</td>
<td>Sections 16.1-16.2</td>
</tr>
<tr>
<td></td>
<td>Options – An introduction</td>
<td>Sections 2.5 (pp. 51-52) and 20.1-20.4</td>
</tr>
<tr>
<td>Apr-9</td>
<td>The Binomial model</td>
<td>Section 21.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Problem set 4 assigned</strong></td>
</tr>
<tr>
<td>Apr-16</td>
<td>The Black-Scholes model</td>
<td>Sections 21.1 and 21.4</td>
</tr>
<tr>
<td>Apr-23</td>
<td>The Black-Scholes model (cont.)</td>
<td>Sections 21.1 and 21.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Problem set 4 due</strong></td>
</tr>
<tr>
<td>May-7</td>
<td>FINAL EXAM</td>
<td>Cumulative with a focus on the materials covered after the Midterm Exam</td>
</tr>
</tbody>
</table>
Detailed outline of course

1. Introduction
   - Characteristics and relative riskiness of various asset classes;
   - A first look at the historical returns on various asset classes;
   - Definition of return;
   - Definition of risk;
   - Estimating historical returns using the average return;
   - Estimating historical risk using standard deviation;
   - Intuition for the meaning of standard deviation: a two-stock example;
   - Average and expected returns;
   - Past and future risk;
   - A five-step investment process;
   - Step 1: investment policy;
   - Step 2: security analysis;
   - Step 3: portfolio construction;
   - Step 4: portfolio revision;
   - Step 5: portfolio performance evaluation.

2. Common stocks
   - Nominal and real returns;
   - Historical returns on U.S. stocks and Treasury bills;
   - The equity premium puzzle;
   - A horse race between U.S. stocks and Treasury bills;
   - Examples of large declines in the U.S. and Japanese stock markets;
   - The equity premium around the world;
   - Growth and value stocks;
   - Small and large stocks;
   - Empirical evidence on the returns on growth, value, small, and large stocks;
   - The January effect;
   - The Monday effect.

3. Investment companies
   - Definition of an investment company;
   - Benefits of investment companies;
   - Net asset value;
   - Types of investment companies;
   - Assets under management by U.S. investment companies;
   - Unit investment trusts;
   - Closed-end investment companies;
   - Open-end investment companies;
   - A first look at the relation between performance and expense ratios (index funds);
   - The effect of expenses on long-term returns;
   - Average fees and expenses in stock and bond mutual funds;
   - Other fees;
   - The survivorship bias in assessing mutual fund performance;
   - Performance persistence (or lack thereof).
4. Buying and selling individual stocks
   - Cash and margin accounts;
   - Order size;
   - Market order;
   - Limit order;
   - Stop order;
   - Stop-limit order;
   - Further remarks.

5. Buying on margin and short selling
   - Intuition;
   - Initial margin requirement;
   - Balance sheet;
   - Actual and maintenance margins;
   - Financial leverage.

6. Calculating expected returns and standard deviations for portfolios
   - What is a portfolio?
   - How do investors evaluate different portfolios?
   - Calculating the expected return on a portfolio;
   - The covariance between security returns;
   - The correlation coefficient;
   - Special cases;
   - Calculating the standard deviation of a portfolio.

7. An introduction to Value-at-Risk (VaR) and Conditional-Value-at-Risk (CVaR)
   - What is VaR?
   - Estimating VaR: the variance-covariance approach;
   - Estimating VaR: the historical simulation approach;
   - An undesirable feature of VaR;
   - An alternative to VaR: CVaR;
   - Stress testing;
   - Comparison of VaR, CVaR, and stress testing;
   - Risk management and the 2007-09 crisis.

8. Market indices and Exchange-Traded Funds (ETFs)
   - Motivation for using indices;
   - Price-weighted indices;
   - Value-weighted indices;
   - ETFs;
   - Comparison between ETFs and mutual funds.
9. Diversification: An introduction
   - What is diversification?
   - Types of diversification;
   - Diversification and correlation coefficient;
   - Limits on the benefits of diversification.

10. The mean-variance frontier
    - The mean-variance frontier with two risky securities;
    - The minimum variance portfolio;
    - The efficient frontier;
    - Risk aversion and optimal portfolios;
    - Diversification and correlation coefficient.

11. Diversification: Market and unique risk
    - Motivation;
    - The market model;
    - Alpha;
    - Beta;
    - Epsilon;
    - Decomposing total risk into market risk and specific risk;
    - Diversification.

12. Risk-free borrowing and lending
    - Risk-free security;
    - The mean-variance frontier with one risk-free security and one risky security;
    - The mean-variance frontier with one risk-free security and two risky securities;
    - Risk aversion and optimal portfolios;
    - An example.

13. The Capital Asset Pricing Model (CAPM)
    - Normative models;
    - Positive models;
    - Result I: The tangency portfolio is the market portfolio;
    - Result II: The Capital Market Line (CML);
    - Result III: The Security Market Line (SML);
    - An example.

14. Factor models and Arbitrage Pricing Theory (APT)
    - Motivation;
    - What are factor models?
    - One- and two-factor models;
    - APT.
15. Market efficiency
   - The efficient market hypothesis;
   - Forms of market efficiency;
   - Question 1: Market efficiency and over- and under-performance;
   - Question 2: Unpredictability, skill, and luck;
   - Question 3: Experts, darts, performance, skill, and luck;
   - Question 4: Market efficiency and mutual fund performance;
   - Market efficiency and merger announcements: An example;
   - Question 1: Assessing whether a merger announcement represents bad/good news;
   - Question 2: Risk arbitrage opportunities in merger announcements;
   - Question 3: What if the merger is not completed?
   - An example where stock prices reveal information about the merger completion probability;
   - An example of close to unit correlation between the returns on two stocks;
   - Hedge funds: An introduction;
   - Examples of kinds of hedge funds;
   - Skewness;
   - Kurtosis;
   - Attrition rate;
   - Fees.

16. Portfolio performance evaluation
   - Why evaluate portfolio performance?
   - Traditional portfolio performance measures;
   - Comparing portfolio performance measures;
   - Performance evaluation using the Fama-French model.

17. Dividend discount models
   - The value of a security;
   - The zero-growth model;
   - The constant-growth model;
   - The U.S. equity premium implied by the constant-growth model;
   - The fair P/E ratio for the U.S. stock market;
   - Two observations regarding the constant-growth model;
   - Estimating the value of a stock using the P/E ratio;
   - Further notes on the P/E ratio of an individual stock;
   - The multiple-growth model.

18. Fixed-income securities: An introduction
   - The valuation of a bond;
   - The return on a bond;
   - Yield to maturity (YTM);
   - Application of the annuity formula in the valuation of a bond;
   - Example;
   - Valuation of zero-coupon bonds;
   - STRIPS;
   - Example;
   - Relation between the prices of bonds and STRIPS.
19. Duration and convexity
   • The bond price-YTM relation;
   • Duration;
   • Example;
   • Estimating bond price changes using duration;
   • Example;
   • Duration of a zero-coupon bond;
   • Duration, maturity, coupon rate, and YTM;
   • Duration of selected bond mutual funds.

20. Options: An introduction
   • Motivation;
   • What is an option?
   • Payoff and profit diagrams;
   • Examples.

21. The Binomial model
   • Continuous-time compounding;
   • Single-period binomial option pricing model;
   • Put-call parity;
   • Two-period binomial option pricing model.

22. The Black-Scholes model
   • The cumulative standard normal distribution function;
   • The Black-Scholes formula;
   • Implied volatility;
   • Volatility smiles and smirks;
   • Dividends;
   • Intuition on $N(d_1)$;
   • Sensitivity of option prices to several factors;
   • Reasons for the existence of volatility smiles and smirks;
   • Is it optimal to exercise an American call option before its expiration date?
Outline of problem sets

Problem Set 1
- The (past) rewards and risks of U.S. stocks, bonds, and bills;
- Rewards and risks of U.S. stocks across different holding periods;
- Value and size effects in U.S. stocks;
- The January effect;
- The relation between the number of shares traded and returns with transaction costs.

Problem Set 2
- Buying on margin: initial margin requirement, margin call, and return;
- Short selling: short sales proceeds, initial margin requirement, margin call, and return;
- Diversification benefits in a two-stock portfolio;
- Estimation of the expected return and standard deviation of a five-asset portfolio;
- Estimation of VaR and CVaR for individual stocks and portfolios;
- Determining the Dow Jones Industrial Average (DJIA).

Problem Set 3
- Estimation of betas, adjusted betas, and expected returns for individual stocks;
- The benefits of international diversification;
- Estimation of ‘optimal’ portfolios using the mean-variance model;
- An assessment of mutual fund performance using factor models.

Problem Set 4
- Estimation of duration and the changes in bond prices when interest rates change;
- Estimation of the value of an option using the Black-Scholes model;
- Estimation of implied volatility.