Foundations of Finance (E4799)
Columbia University School of Engineering and Applied Science

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Course Description:
This core curriculum course introduces students pursuing a graduate degree in financial engineering to the key areas and concepts of modern finance. The course’s objective is to provide a broad perspective on how financial theory and practice interact in real life, preparing students for successful careers in the financial industry and facilitating in-depth studies that follow.

Week 1 (7/10/07)   Financial Institutions and Markets
- Course objectives, orientation & logistics
- Flows of funds and capital markets
- Financial institutions and regulation
- Primary and secondary markets; trading mechanisms
- Capital structure and balance sheets of corporations
- Equity markets
- Fixed income markets
- Derivatives, commodities, currencies, mutual funds, and alternative investments
- Careers in modern finance
- Value of a broad perspective on the financial industry and markets

Assignments:
Prior to the class, watch the movie “It’s a Wonderful Life” (1946)
SAB: Chapters 1-3; 13; 16.1-5; 16.9.1-2; 22.5.1-2; 22.8; 25.1-2; 21.2-21.5

Optional:
GT: Chapter 1.3

Week 2 (7/17/07)   Financial Analytics
- Cash flows, interest rates, discounting, and compounding
- Term structures of interest rates and related theories
- Bonds and fixed income mathematics
- Sneak preview: valuation of risky assets
- Equity valuation models
- Case study: the U.S. mortgage market (time permitting)

Assignments:
SAB: Chapters 5, 14.1-4; 15.2-15.6; 17.1-3; 17.9
Week 3 (7/24/07)  First Half: Portfolio Theory (I)
- Supply and demand
- Market efficiency
- Portfolio theory (part I)

- Overview of key macroeconomic concepts
- Monetary policy and inflation targeting
- Important economic indicators
- Case Study: Bear Stearns’ outlook for economy, markets, and the Fed

Assignments:
SAB: Chapters 4, 6, 7

Optional:

Week 4 (7/31/07)  CAPM and APT
- Portfolio theory (part II): risk-free borrowing and lending
- Capital asset pricing model (CAPM)
- Arbitrage pricing theory (APT)
- Case Study: Global capital flows and low return environment

Assignments:
SAB: Chapters 8; 9; 11; 16.7; 24.1-5

Optional:
Malkiel, “Irrational Complacency?” WSJ, April 30 2007
Dimson, Marsh & Staunton, “Equity Risk Premium: A Smaller Puzzle”

Week 5 (8/7/07)  Valuation of Risky Assets*
- General problem of valuing risky assets
- Trees, Monte-Carlo simulation, backward induction, Black-Scholes
- Options, futures, interest rate and credit derivatives
- Dynamic replication
- Caveats and deficiencies of financial models

Assignments:
SAB: Chapters 19-20

Optional:
Merton, “Theory of Rational Option Pricing”

* denotes a guest speaker
Week 6 (8/14/07) Modern Risk Management

- Defining risk: evolution of risk management ideas
- Parametric fixed income risk measures
- Value-at-Risk, VaR decomposition, and coherent risk measures
- Hedging
- Credit risk measurement and management
- ERM, ALM and balance sheet management
- Case study: Market behavior in times of crisis (time permitting)
- Case study: Pension ALM (time permitting)

Assignments:
- GT: Chapters: 1, 2, 4, 5.7; 6.4
- CreditMetrics Technical Document (will be distributed)

Optional
- SAB: Chapters 15.5

Week 7 (8/14/07) Final Exam (2.5 hours)

Required Texts:

Sharpe, Alexander & Bailey, Investments, 6th Ed., Prentice Hall (SAB)


Optional Texts:


Roger Lowenstein, *When Genius Failed: The Rise and Fall of Long-Term Capital Management.*

Peter Bernstein, *Against the Gods: The Remarkable Story of Risk*

Burton Malkiel, *A Random Walk Down Wall Street*


**Grading:** 90% final exam; 10% class participation
Leo M. Tilman is the Chief Institutional Strategist and Senior Managing Director at Bear Stearns, a leading global investment banking, securities trading and brokerage firm. In addition to chairing the firm’s Investment Strategy Committee, Mr. Tilman is responsible for providing the firm’s institutional clients – some of the world’s most sophisticated investors, financial institutions, and corporations – with comprehensive strategic advice and solutions, including risk management, investment strategy, debt and capital management, asset/liability management, corporate finance, and strategic decision making. Prior to joining Bear Stearns, he served as a Director at BlackRock, an investment management and risk advisory firm.


Mr. Tilman is the founding chairman of the Young Leaders Committee of Atlantic Partnership – a non-partisan not-for-profit foreign relations organization whose objective is to bring into focus and enhance the multifaceted Euro-American relationship. In 2007, was given the distinction of being named Young Global Leader of the World Economic Forum, joining 250 executives, public figures and intellectuals – all 40 or younger – recognized for “their professional accomplishments, commitment to society and potential to contribute to shaping the future of the world.”

Mr. Tilman holds B.A. and M.A. degrees from Columbia University.