15.415.1x Foundations of Modern Finance I

Faculty Member(s): Prof. Leonid Kogan, Prof. Jiang Wang
Length: 12 Weeks
Related Course(s) at MIT: 15.415 and 15.401
Prerequisites: Calculus (required), Linear Algebra (required), Probability and Statistics (suggested)

This master's level course provides learners a rigorous introduction to the fundamentals of modern finance and their applications to business challenges in valuation, investment and risk management, and corporate financial decisions. This course focuses on four topics:

1. The financial challenges firms and households face and the principles of modern finance in tackling these challenges;
2. Valuation of fixed income securities and common stocks;
3. Risk analysis, the Arbitrage Pricing Theory (APT), and the Efficient Market Hypothesis (EMH);
4. Introduction to corporate finance and capital budgeting.

This class shares most of the content with the first half of MIT's Master of Finance course 15.415.

Approximate total time of lecture videos: 16 hours, including recitation videos

Grading: 10% graded problem sets, 90% proctored final exam

Course Materials

- **Recommended Textbook:** Brealey, Myers, and Allen, *Principles of Corporate Finance* (13e), Irwin/McGraw Hill. (BMA)
- **Recommended Textbook:** Bodie, Kane, and Marcus, *Investments* (11e), Irwin/McGraw Hill. (BKM)

Course Structure

This course consists of:

- A course introductory lecture (Week 0);
- 10 Lectures, 10 Problem Sets, 10 Recitations demonstrating how to solve problems similar to those contained in the problem sets (Weeks 1–10); and
- 1 proctored Final Exam (Week 11)

WEEK, INSTUCTOR	TOPIC
Week 0 Prof. Egor Matveyev	**Course Introduction and How to Take this Course**
Week 1 Prof. Jiang Wang	**Introduction to Finance** ▪ Financial decisions of households and corporations ▪ Approaches to valuing financial and real assets ▪ An overview of the financial market and its role ▪ Unifying principles of finance **Problem Set 1**
Week 2 Prof. Jiang Wang	**Market Prices and Present Value** ▪ State-space model for time and risk ▪ Arbitrage pricing ▪ Present Value (PV) and future value ▪ Nominal and real cash flows and returns **Problem Set 2**
Week 3 Prof. Jiang Wang	**Discounting and Compounding** ▪ Historic returns on asset classes: return and risk ▪ Special cash flows: Annuities and perpetuities ▪ Compounding interest ▪ Mortgage calculation **Problem Set 3**
Week 4 Prof. Leonid Kogan	**Fixed Income Securities** ▪ Fixed-income markets ▪ Term structure of interest rates ▪ Arbitrage valuation of bonds ▪ Bond duration and interest rate risk ▪ Inflation and real rates **Problem Set 4**
Week 5 Prof. Leonid Kogan	**Common Stocks** ▪ Discounted Cash Flow (DCF) model ▪ Gordon model, multi-stage growth model ▪ Forecasting dividends ▪ Valuation of growth opportunities and valuation multiples

	Problem Set 5
Week 6 Prof. Leonid Kogan	**Risk** ▪ Decision under uncertainty and expected utility theory ▪ Risk aversion ▪ Diversification and portfolio analytics ▪ Systematic and idiosyncratic risks **Problem Set 6**
Week 7 Prof. Leonid Kogan	**Factor Models and Arbitrage Pricing Theory (APT)** ▪ Factor models and diversification ▪ Derivation of APT ▪ Applications of APT **Problem Set 7**
Week 8 Prof. Leonid Kogan	**Market Efficiency** ▪ Efficient Market Hypothesis (EMH) ▪ Implications of EMH ▪ Empirical evidence on EMH **Problem Set 8**
Week 9 Prof. Jiang Wang	**Introduction to Corporate Finance** ▪ Corporate financial decisions ▪ Opportunity cost of capital and Net Present Value (NPV) ▪ Financial objective of corporate managers **Problem Set 9**
Week 10 Prof. Jiang Wang	**Capital Budgeting I** ▪ NPV rules ▪ Cash flows from capital investments ▪ Project interactions ▪ Alternative capital budgeting rules **Problem Set 10**
Week 11	**Final Exam**