FIN-341 Investments and Portfolio Management

Cr Hrs: 3.0

Course Description

This course discusses at length the philosophy of investment and its particle aspects such as, different classes of assets, pricing of assets and portfolio management. The theme of the course is that why different assets have different prices/returns and then how this difference can be rationalize within the ambit of investment theory and address through proper portfolio mathematics. We will analyze the theoretical aspect of this query and elaborate upon the statement “higher the risk higher the gains”. We will cover the portfolio mathematics, capital asset pricing model (CAPM) and arbitrage pricing theory (APT) etc. We will also discuss then the strategies like size, value, liquidity and momentum and then based upon them the excess returns using the zero-investment strategies. Then we will elaborate that these returns are not without associated risks, lastly it will be analyzed that how well the financial models perform to explain these returns. This course requires extensive study as literature is vast and to fulfill its purpose active participation is demanded.

Course Objectives

Financial liberalization has opened a gate for creation of different types of assets. Knowing them is an important aspect of this course; however the main objective of this course is to understand the pricing mechanism underneath all asset classes.

- The course will discuss at great length the philosophy of investment and investor’s lifelong motives.
- To elaborate upon the institutional mechanism available which facilitate the investments, such as financial markets and financial instruments in detail.
- To theoretically understand that why the different assets are traded at different prices and what determine their prices.
- To discuss a relationship between the risk and return, and how this relationship is gauged in different models which are derived under some set of assumptions.
- To analyze the empirical success of the financial models which have been surfaced so, far in the literature and to discuss the famous investment strategies.
- The interesting way to understand the subject of investments and portfolio is to involve in class discussion, read in advance the relevant material among colleagues, and analyze some good papers on the topic assigned. The more you read the more you understand.
- It will also be endeavored that we do not restrict ourselves with reading material only, rather practically execute few models by playing with the data.
- This course also delves with imparting the knowledge to the students that what investors want from investment managers. Therefore it is essential to learn the requisite skills that are implied by many investment managers.

Learning Outcomes

Learning outcomes of the course are as follows:

- To understand the theory of the investment and portfolio management.
- To drive the main theoretical asset pricing equation, which links the expected prices with a notion of risk and to elaborate its meaning.
- The portfolio theory is the main underpinning of this course, therefore it is expected that students become abreast with risk and return relationship, can demonstrate what diversification implies, and able to describe and empirically implement the CAPM model, lastly they must be able to explain the failure of the CAPM.
- To understand the zero-investment based strategies, like that of, size, liquidity, value and momentum. For that students are advised to read at least one top finance paper on such topics and reflect their ideas in the intended project and they have to write and present by the end of the course.
- To understand the different proxy of risk that are implied in financial models and then able to explain that how such risk may affect the returns.
- A general view of bond markets, forex markets and derivative markets.
- It is also desirable that by writing the project the students become more aware about the state and conduct of the scientific research in financial markets and instruments.

Required Course Material

The required text(s) for the course include:

Essentials of Investments (7th Edition)

Z. **Bodie**, A. **Kane** and A. **Marcus**, McGraw-Hill (**BKM**)

Additional required readings may also be used from academic and business journals.

Reading financial sections of newspapers and/or periodicals is encouraged.

A basic calculator is required, however a financial calculator is recommended.

Course Content (Weekly)

Weekly breakdown is given below

Week	Lecture Topic
1	**INTRODUCTION.** i) General Overview of the subject. ii) Introduction to the Investments . iii) Importance of subject of finance. iv) Discussion of financial theory. v) Recent advancement in the financial research. vi) Assignment of the topic for the project.
2	**READING (BKM): Ch 1.** i) Real assets versus financial assets. ii) Financial assets

	iii) Financial markets and the economy. a) The informational role of the financial markets b) Consumptions timing c) Allocation of the risk d) separation of ownership and management. iv) The Investment process. v) Competitive markets. a) The risk-return trade off b) Efficient markets. vii) The Players. Financial intermediaries and investment bankers.
3	**READING (BKM): Ch. 1 & 2.** i) The financial crises. a) Antecedents of the crises b) changes in housing finance c) Mortgage derivatives d) Credit default swapse) The rise in systematic risk f) The shoe drops f) Systematic risk and the real economy. ii) Asset classes and financial instruments. The Money Market. a) Treasury Bills b) Certificate of deposit c) Commercial paper d) Bankers' Acceptances e) Eurodollars f) Repos and reserves g) Federal funds h) Brokers' calls i) The LIBOR market j) Yields on money market instruments. iii) The Bond Market. a) Treasury notes and bonds b) Inflation-protected treasury bonds c) Federal agency debt d) International bonds e) Municipal bonds f) Corporate bonds g) Mortgages and mortgage-backed securities. iv) Equity Market. a) Common stock as ownership shares b) Characteristics of common stock c) Stock market listings d) Preferred stock e) Depository receipts.
4	**READING (BKM): Ch. 2 & 3.** ***i)*** *Stock market indices.* a) Stock market indexes b) Dow Jones averages c) Standard & Poor's indexes d) Other U.S. market-value indexes f) Equally weighted indexes. ii) How firms issue securities. a) Investment banking b) Shelf registration c) Private placement d) Initial Public offerings. iii) How securities are traded. Types of the markets. a) Direct search markets b) Brokered markets c) Dealer markets d) Auction markets. Types of orders. a) Market orders b) Price-contingent orders Trading mechanism. a) Dealer markets b) Electronic communication network (ECNs) c) Specialist markets.
5	**READING (BKM): Ch. 3.** ***i)*** *U.S. Securities Markets.* a) NASDAQ b) The New York Stock Exchange c) The Block sales d) Electronic Trading on the NYSE f) The national market system. ii) Trading costs. iii) Buying on margins.

	iv) Short sales. v) Numerical exercises.
6	**READING (BKM): Ch. 4.** ***i)*** *Investment companies* Types of Investment companies. a) Units investment trusts b) Managed investment companies c) Other investment organizations d) Commingled funds f) Real state trusts (REITS) g) Hedge funds. ii) Mutual Funds Investment Policies. a) Money market funds b) Equity funds c) Sector funds d) Bond funds e) International funds. f) Balanced funds g) Asset allocation and flexible funds g) index funds. iii) Cost of investing in mutual funds. Fee Structure. a) Operational expenses b) Front-end load c) Back-end load d) 12b-1 charges e) Fee and mutual funds returns. f) Late trading and market timings iv) Taxation of mutual funds v) Exchange-traded funds. vi) Mutual fund investment performance. vii) Numerical exercises.
7	**READING (BKM): Ch. 5.** i) Risk-free rate and its determination. ii) Compounding technique (EAR, APR) . iii) Expected return on a risky asset = Real risk-free rate + Expected inflation + Risk premium. iv) Arithmetic vs geometric average returns. v) Computing E[r]and Variance and standard deviation (population, sample). vi) Reward-to-volatility ratio = "Sharpe ratio" $(E[r_p]-r_f) / \sigma_p$ vii) Distributions: Normal (symmetric), Non-normal = have skewness (tiltedness) and/or kurtosis (fat tails). viii) Alternative risk measures if returns non-normal: ix) VAR, ES, Lower partial standard deviation (LPSD) =>Sortino ratio x) Long term returns: remember multi-period returns are a multiplicative process with a limiting terminal wealth approaching a log-normal distribution (a positively skewed distribution)
8	**READING (BKM): Ch. 5 and Ch. 6** i) Numerical exercises of Ch. 5. ii) Risk and risk aversion iii) Risk aversion = how you feel about exposing yourself to a risk iv) Classic utility function used in portfolio choice: $U = E[r] - 0.5*A*\sigma^2$. v) Indifference curve = really the utility function; points on the curve depict equally enjoyable choices. vi) "Optimal portfolio" = within a certain standard deviation (expected return) the highest (lowest) returning (standard deviation). vii) Portfolios of 1 riskfree asset and 1 risky asset (P) – forms the CAL Everyone invests in the risk free asset and the optimal portfolio (the

	passive portfolio), then their choice of the complete portfolio depends on the percent invested in rf and the optimal portfolio. *viii)* The percent in optimal portfolio when creating the complete portfolio: $w = (E[r_M]-r_f)/(A*\sigma_M^2)$
9	**READING (BKM): Ch. 6 and Ch. 7** i) Numerical exercises for Ch. 6. (Power of) Diversification. 2 risky asset portfolios. Covariance, correlation matters! Asset allocation with 2 risky assets (Stocks and long bonds) + 1 risk-free asset ("cash"). Again, we can estimate the complete portfolio, now the optimal portfolio is an active portfolio we have created from our security selection, rather than simply a passive portfolio. Markowitz portfolio selection model. 2-fund separation property
10	**Mid-term.**
11	**READING (BKM): Ch. 7 and Ch. 8** i) Numerical exercises of Ch. 7. Why index model? = to reduce portfolio problem input parameters (especially #covariance's) Single index model inputs: expected market (=index) excess return and volatility, n asset alphas, betas and residual standard deviations = only n+2 parameters! Single index vs multiple ("multi-factor") index models Allows us to distinguish between an asset's market (non-diversifiable) and idiosyncratic (diversifiable) risk (total risk = asset volatility (or variance) is the sum of the two). Co-variances are especially driven by beta, a measure of systematic risk exposure in a single index model Estimating betas with time series regressions (simple OLS): measuring beta, alpha and residual standard error (AKA: "tracking error" = idiosyncratic standard deviation).
12	**READING (BKM): Ch. 8 and Ch. 9** i) Numerical exercises of Ch. 8. If single index model would explain returns and all alphas would be zero, what kind of portfolio would investors hold? Investors diversify and in the process build efficient portfolios but will notice that the market (weighted) portfolio offers the highest reward per unit of risk. Hence it is

	optimal for all to allocate between a) the risk free rate and b) the market portfolio. Investors use eq. 9.1. to determine their optimal passive allocations. CAPM also says expected returns line up linearly with beta, the asset-specific measure of its systematic risk =The SML (fig 9.2). High beta assets have high expected returns (=low current price w.r.t. expected cash flows offered) and vice versa. Testability of CAPM: how do we know whether the model is useful in practice? Some "classic" adjustments to CAPM are discussed: especially important are taking into account liquidity differences and human capital separately. Thus, CAPM may look bad because of inadequate index used in the tests (or practical applications) , and/r because of betas not fully capturing liquidity differences. In practice, Fama-French 3-factor model is used most frequently these days.
13	**READING (BKM): Ch. 9 and Ch. 10** i) Numerical exercises of Chapter 9. Factor models: If *multiple* index models would explain returns and all alphas would be zero, what kind of portfolio would investors hold? Some of the indexes could be "priced" factors, i.e. different dimensions of systematic risk. Hence, systematic risk might be multi-dimensional. Factor models say SML could consist of several (K) risk premia capturing the relevant dimensions of systematic risk. Investors might also differ in their willingness to expose themselves to the various risk factors; they might want to avoid some of them and enjoy the premia of others (exposing themselves more than average for that risk factor). Thus, model gives much more flexibility. But at a cost: you need to estimate K "betas" (or "factor exposures") for an asset plus figure out K expected factor returns. APT is a factor model that uses arbitrage arguments rather than CAPM assumptions for equilibrium. It requires portfolios and might not be valid for every individual

	security. The Merton ICAPM is a factor model reserving the special role of the market portfolio as its first factor.
14	**READING (BKM): Ch. 10 and Ch. 11** i) Numerical exercises of Chapter 10. "Prices are always right" because investors respond very quickly to news by their trades and information is instantaneously reflected in the price. No single investor will be able to systematically react first and capture a profit. => Hence, there are "no free lunches", no arbitrage profits in the market. By holding a security you can expect to get its fair expected return which according to theory is dictated by an asset pricing model (CAPM, ICAPM or APT), no more, no less. But that is something anyone can enjoy, not a special privilege! Really the EMH says there are likely to be very small (if any) benefits to *trading*! (which, some argue, is at odds with the world we observe) Three forms of EMH: weak, weaker and the weakest (weak, semi-string, strong) to classify "information" we are dealing with into three broad buckets. Event studies =methodology where we isolate market wide moves from an information event to gage the specific information-content from adjusted returns ("abnormal returns"). In practice, you run the single-index model before the event to have estimate of stock alpha and beta and compute the unexpected returns (=deviations from single index model) around the event days (or hours, weeks…). For EMH to hold true, cumulative abnormal returns (these are "CARs") should be flat after the announcement! No drift- otherwise it suggests market is not efficiently pricing the information. Another possibility is you have used the wrong model to risk-adjust the returns. (E.Fama: In tests of EMH market efficiency and the asset pricing model assumed are "joined at the hip". You always need both – hence it is a case of "joint hypothesis": H0: The market is efficient and the correct asset pricing model is

	X, H1: Either the market is inefficient, or APM X is mis-specified). Unfortunately, we do not know the true asset pricing model. But FF3 is a good place to start. Chapter ends running through some historical EMH tests to summarize the evidence. Verdict? Security markets are quite efficient. Strongest piece of evidence: professional, active mutual fund managers do not beat the market, i.e. even pros cannot seem to be able to sustain an edge. But there are puzzles like the post-earnings announcement drift, momentum etc.
15	**READING (BKM): Ch. 11 and Ch. 12** i) Numerical exercises of Chapter 11. Behavior Finance says "Prices may not always be right" – there could be pricing errors/"bubbles"/"over- and under-reactions to news. But most of the time there will still be no free lunches because investors have a hard time knowing which way a particular behavioral bias will take mis-pricings. It could only get worse for a long time. Mis-pricings could be due to "limits of arbitrage" (market forces are not able to press prices back to fundamentals (i.e. alphas to zero). For example, "everybody" can see that prices are way too high compared to fundamentals but very few are willing to sell because the "sentiment is strong") or investors behaving irrationally in such a way that when aggregated over all traders the total effect distorts prices away from fundamentals. Hence, "investor psychology" (sometimes vaguely called just "sentiment") may not "cancel out" in aggregate but lead to even persistent pricing errors. Psychological "biases" (as compared to the theoretical notion of a fully rational, utility maximizing investor) can be related to a) information processing (forecasting errors, overconfidence, conservatism, sample size neglect) or b) behavioral (framing, mental accounting, regret avoidance, prospect theory) Chapter closes with some examples of technical analysis tools that may be successful in practice to capture "behavioral waves". Beware: much of what you see in a price series is pure randomness showing a pattern in a small, realized sample

	that you see! Empirical evidence strongly suggests active trading from e.g. technical signals is almost always inferior to buy and hold because of high turnover and hence trading costs. It is when the technical tool somehow happens to pick up a known anomaly, like momentum, that it may show some results. Usually technicians do not risk-adjust their strategies properly so it is one thing what they say they have achieved and what they actually have achieved. (Same criticism applies to much of active management, though The simple reason is risk-benchmarking is hard statistical work that few are paid to do. And besides the odds are the results are not flattering either.)
16	**READING (BKM): Ch. 12 and Ch. 13** i) Numerical exercises of Chapter 12. Test of CAPM Fama and French Model. Carhart Model :Momentum: a fourth factor (but "risk-story" for this priced factor seems "stretchy") Equity Premium Puzzle: Why have stocks been <u>*so*</u> much better than (risk free) bonds? (say 5-8% p.a.) 1. Perhaps just a lucky sample period for stocks, 2. CCAPM suggests risk but consumption variability is miniscule and correlation to stock returns low. The puzzle then arises from the fact that average risk aversion in CCAPM needs to be abnormally high in order to explain realized equity premium). 3. Survivorship bias 4. Liquidity improvements over time. 5. BF stories.
17	Topic Presentations. **Exam Review**
18	Final Examination.