Course Description:

In this course you will comprehensively study the theory and practice of investment management. I will be focusing on the following topics:

- Understanding the risk-return tradeoff in financial markets
- Trading equity, buying on margin, and selling short
- Investing in interest bearing securities, bills, notes, and bonds
- Investing in common stocks
- Understanding derivatives: buying and selling put and call options as well as forwards and futures contracts
- Forming optimal portfolios
- Investing in mutual funds, hedge funds, and hedged mutual funds
- Evaluating active investment management
- Conducting equity valuation
- Understanding market efficiency and the behavior of security prices
- Examining evidence on apparently profitable trading strategies in the US and elsewhere

Familiarity with statistics should extend through concepts of mean, standard deviation, covariance, and correlation. A good grounding in Excel is useful as well.

Resources:

- **Textbook**: The recommended textbook for this course is *Fundamentals of Investments Valuation and Management* (Fifth Edition) by Jordan & Miller.

- **Instructor**: I welcome students to see me during office hours to discuss any aspect of the course. I welcome your feedbacks regarding any aspect of the teaching process.

- **Class notes**: Notes will be posted at my web site. I highly recommend printing out the notes and browsing through their content prior to class.

Grades:

- **Case Study**: We will work out the case study: *The Harvard Management Company (2001)*. To order the case directly from www.hbsp.harvard.edu enter the number (9-201-129) on the search box and then follow the instructions. You can choose your own study groups of up to four students to
prepare the case. The case deals with optimal portfolio selection from various security classes in the presence of constraints.

- **Problem Sets**: There will be two problem sets to be solved on an individual basis

- **Final Exam**: You can bring a financial or graphical calculator and a single two-sided 8.5” by 11” sheet of paper to each exam. Anything may be hand-written or typed on the sheet.

**Class Participation**: It is mandatory to attend all sessions. If you miss a session for good reason, make sure that you catch up on all missed material. In general, you are responsible for class lectures as well as any announcements, discussions, or remarks. It is also recommended that you read domestic or international financial newspapers. I welcome students to initiate class discussions of “hot topics” from the financial press.

You will design an excel spreadsheet that allows you to answer the following questions:

i) Given figures in Exhibits 4 and 11 what is the expected return and volatility of the policy portfolio?

ii) Find an efficient portfolio having the same expected return as the policy portfolio but lower volatility.

iii) Find an efficient portfolio having the same volatility as the policy portfolio but higher expected return.

iv) Repeat question ii using the constraints in Exhibit 13.

v) Repeat question iii using the constraints in Exhibit 13.

vi) Consider the following seven asset classes: Domestic Equity, Foreign Equity, Emerging Markets, Private Equity, Commodities, Inflation-Indexed Bonds, and Cash. Using HMC’s input assumptions (see Exhibit 11, and also using the constraints shown on Page 22), what would be the allocation across these seven security classes if HMC was looking for optimal portfolios that would have expected real returns of 4, 5, 6, 7, and 8%. For each of these cases, also show the resulting standard deviation of the portfolio, and the Sharpe (efficiency) ratio (see footnote a in Exhibit 12).

vii) Redo part (vi) but now constrain the minimum and maximum weights on the seven different asset classes using the constraints shown in Exhibit 13. It may not be possible to achieve some of the expected real returns you were getting earlier. If that is the case, use five expected real return levels that you can attain.

viii) Compare the investment opportunities implied by part (vi) to those in part (vii).

ix) Explain the pros of the mean variance paradigm.

x) Explain the cons.

I will describe how to perform portfolio optimization in class. Excel is equipped with an optimizer (Solver) that requires you to specify what you are trying to maximize or minimize, the variables (weights) that may be adjusted in order to maximize portfolio efficiency, and the constraints imposed on those variables.
Problem Set 1: Strictly on an individual basis!

1. You buy stocks on margin as much as you possibly can. The initial margin is 50%. The stock price rises by 3%. What is the percentage change in your net investment?
2. The standard deviation of stocks A and B are 18% and 16%, respectively. The coefficient of correlation is 0.5. What is the covariance of the stocks?
3. The standard deviation of stocks A and B are 20% and 16%, respectively. The coefficient of correlation is 0.2. You want to form the lowest volatility portfolio. How much would you invest in security A?
4. You wrote twenty Call contracts on AOL Inc. The strike price is 40 and the option premium is $2. What is your profit if the stock price at expiration is $41?
5. The spot price of gold is $400 per ounce and the risk free rate is 5%. What is the future price of a gold future contract if the time to delivery is one year?
6. You plan to buy $100 face value government bond with a coupon rate of 8% and hold it for six months. You expect to receive $102 from the sale of the bond at the end of six months after an interest payment is made, and you expect to earn 5% return. What is the maximal price you would be willing to pay for purchasing the bond today?
7. You buy a stock of Amazon.com. You hold the stock for four years. The annual rates of return are 5%, 10%, -6%, and -2%. What is the annual geometric average of these rates of return?
8. The returns on the Dow Jones index on October 28 1929 and October 29 1929 are -12.8% and -11.7%, respectively. What is the two-day rate of return?
9. You plan to buy a stock and sell it one year later. You expect to sell the stock for $105 and you don't expect any dividend payment. Suppose you want to earn at least 7%, what is the maximum price you would be willing to pay for the stock today?

Answer the next two questions using the following table

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Invest in stocks</th>
<th>Invest in bonds</th>
<th>Expected Return</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.00</td>
<td>0.00</td>
<td>0.12</td>
<td>0.1500</td>
</tr>
<tr>
<td>B</td>
<td>0.30</td>
<td>0.70</td>
<td>?</td>
<td>0.0869</td>
</tr>
<tr>
<td>C</td>
<td>0.00</td>
<td>1.00</td>
<td>0.06</td>
<td>0.1000</td>
</tr>
</tbody>
</table>

10. What is the expected return of portfolio B?
11. What is the coefficient of correlation between stock and bond returns?

12. UMD Inc. stock had a return of 10% last year, return on a T-bill was 6%, and return on the S&P500 index was 8%. What is the risk premium for UMD Inc.?
13. You short sell $200,000 worth of stocks and deposit the proceeds as well $100,000 cash in a brokerage account. The value of stocks sold short rises to $270,000. What is the margin following the stock price increase?
14. You buy one put option contract. The premium is $5, the strike price is $25, and the price of the underlying security is $25. What is your largest potential net profit?
15. You write one call option contract on AOL. The premium is $6, the strike price is $24, and the price of AOL stock is $30. What is your potential maximum profit?
16. A municipal bond is paying an annual coupon interest of 5%. Your tax rate is 20%. What is your equivalent taxable yield?
17. What is the price of a STRIPS maturing in 10 years with a face value of $100,000 and a semiannual YTM of 8%?
Problem Set 2: Strictly on an individual basis!

1. A stock has a required return of 15%, a constant perpetual growth rate of 10%, and a dividend payout ratio of 40%. What is the P/E ratio?
2. A stock will pay a dividend of $2.80 next year and the dividends will grow at a 5% rate. If the required return is 8%, what is the capital gain for this stock over the next year?
3. A share of stock will pay a dividend of $1.00 one year from now, $1.10 two years from now, and $1.20 three year from now. The stock price at the end of the three years will be $200. The required return is 10%. What is the current stock price?

Answer the following two questions using the following information.

An open-end mutual fund holds the following four stocks:

<table>
<thead>
<tr>
<th>Stock</th>
<th>Shares</th>
<th>Stock Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3,000</td>
<td>40</td>
</tr>
<tr>
<td>B</td>
<td>8,000</td>
<td>25</td>
</tr>
<tr>
<td>C</td>
<td>5,000</td>
<td>50</td>
</tr>
<tr>
<td>D</td>
<td>9,000</td>
<td>45</td>
</tr>
</tbody>
</table>

In addition, the fund has liabilities of $100,000, there are 60,000 shares of the fund, and the fund is sold with a 3 percent front-end-load.

4. What is the NAV of the fund?
5. What is the offering price of the fund?

6. The Alpha and MM measures of five actively managed mutual funds and the S&P 500 index are given by

<table>
<thead>
<tr>
<th>Fund</th>
<th>Alpha</th>
<th>MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.40</td>
<td>0.01</td>
</tr>
<tr>
<td>B</td>
<td>-0.50</td>
<td>0.02</td>
</tr>
<tr>
<td>C</td>
<td>0.20</td>
<td>0.01</td>
</tr>
<tr>
<td>D</td>
<td>-0.05</td>
<td>-0.02</td>
</tr>
<tr>
<td>E</td>
<td>1.00</td>
<td>-0.01</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

You apply the following decision rule: an outperforming fund is one that dominates along both the alpha and MM criteria. Based upon that decision rule, which of the funds (either one or more) outperform the S&P index? Explain your answer.
Use the following information to answer the next two questions

A managed portfolio earns an average payoff of 16% and it has a beta of 1.20. The average return on the market portfolio is 14% and that the risk-free rate is 4%.

7. What is the TR?
8. What is alpha?

9. A closed-end fund has total assets of $270 million and liabilities of $640,000. There are 25 million shares outstanding. What is the premium or discount on the fund if the shares are currently selling for $9.80 each?

10. Currently, Major Industries of Ohio has sales of $3.4 million, net profit of $268 thousand, and 400 thousand shares of stock outstanding. The sales and net profit are each expected to grow by 7.5 percent annually. The historical P/S ratio is 8.5. What is the expected price of this stock one year from now?

11. The last dividend paid by Lynwood Properties was an annual dividend of $1.20 a share. Dividends for the following 4 years will be increased at an annual rate of 12 percent. After that, dividends are expected to increase by 2 percent each year. The discount rate is 14 percent. What is the current value of this stock?

12. A portfolio consists of the following two funds.

<table>
<thead>
<tr>
<th></th>
<th>Fund A</th>
<th>Fund B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected return</td>
<td>16%</td>
<td>9%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>26%</td>
<td>11%</td>
</tr>
<tr>
<td>Portfolio market value</td>
<td>$24,000</td>
<td>$16,000</td>
</tr>
<tr>
<td>Correlation (R_{A,B})</td>
<td>.28</td>
<td></td>
</tr>
<tr>
<td>Risk-free rate</td>
<td></td>
<td>4%</td>
</tr>
</tbody>
</table>

What is the Sharpe ratio of the portfolio?