

## **MTH222e Foundations of Asset Pricing Models**

**Level:** 2

**Credit Units:** 5 Credit Units

**Language:** ENGLISH

**Presentation Pattern:** EVERY JULY

**E-Learning:** BLENDED - Learning is done MAINLY online using interactive study materials in Canvas. Students receive guidance and support from online instructors via discussion forums and emails. This is supplemented with SOME face-to-face sessions. If the course has an exam component, this will be administered on-campus.

### **Synopsis:**

MTH222 will mainly study investments which comprise a single period: money is invested at the initial time, and payoff is attained at the end of the period. Examples are investments in zero-coupon bonds that will be held to maturity, investments in a physical project that will not provide payment until it is completed, etc. Obviously, many common investments such as publicly traded stocks are not of such type, since they can be liquidated at will and may return dividends periodically. Why then do we need to study single-period investments? Because it is sometimes a good approximation, and usually makes our analysis on such a single-period investment much more simplified without losing much generality.

### **Topics:**

- Probability theory.
- Statistical estimation.
- Random return.
- Portfolio mean, variance and diagram.
- Markowitz model.
- Non-negativity constraints.
- Mean-variance portfolio theory.
- Inclusion of a risk-free asset.
- Capital asset pricing models.
- CAPM pricing model.
- Security market line.
- Performance evaluation, and pricing form of CAPM.

### **Textbooks:**

: Mastering Financial Calculations: A step-by-step guide to the mathematics of financial market instruments (eTextbook) 3rd Edition Pearson  
ISBN-13: 978027370604-AA

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**Learning Outcome:**

- Analyze the fundamental principles of Markowitz mean-variance portfolio theory.
- Interpret the expected return, variance, and standard deviation for an individual investment and a portfolio.
- Explain the covariance of rates of return, and show how it is related to the correlation coefficient
- Discuss the efficient frontier, and explain the implications for incremental returns as an investor assumes more risk
- Outline the concept of an optimal portfolio, and how each investor may have a different optimal portfolio.
- Explain the capital market theory and the effect on expected returns, the standard deviation of returns, and possible risk/return combinations when a risk-free asset is combined with a portfolio of risky assets.
- Interpret the market portfolio, and the role of the market portfolio in the formation of the capital market line (CML).
- Apply systematic and unsystematic risk, and discuss why an investor should not expect to receive additional return for assuming unsystematic risk.
- Identify the Capital Asset Pricing Model, including the security market line (SML) and beta, and examine the effects of relaxing its underlying assumptions.
- Solve, using the SML, the expected return on a security, and evaluate whether the security is overvalued, undervalued, or properly valued.
- Apply a range of mathematical techniques to solve a variety of quantitative problems.
- Analyze and solve problems individually and/or as part of a team.
- Solve a number of problem sets within strict deadlines.
- Solve problems related to asset pricing using IT.

**Assessment Strategies:**

<b>Continuous Assessment Component</b>	<b>Weightage (%)</b>
COMPUTER MARKED ASSIGNMENT	8
COMPUTER MARKED ASSIGNMENT	8
COMPUTER MARKED ASSIGNMENT	8
PRE-CLASS QUIZ	2
PRE-CLASS QUIZ	2
PRE-CLASS QUIZ	2
<b>Sub-Total</b>	<b>30</b>

<b>Examinable Component</b>	<b>Weightage (%)</b>
Written Exam	70
<b>Sub-Total</b>	<b>70</b>

**Weightage Total** **100**