



2014 FRM EXAM TRAINING SYLLABUS

PART I

Introduction to Financial Mathematics

1. Introduction to Financial Calculus
 - a. Variables – Discrete and Continuous
 - b. Univariate and Multivariate Functions – Dependent variable and Independent variable
 - c. Physical representation of a function
 - d. Linear and Non-Linear functions
 - e. Limits of a function
 - f. The number e and Natural Logarithm
 - g. Differential Calculus – Differentiation, Interpretation - Slope of a tangent, using derivatives to calculate function values and deltas. Linear functions - 1st order derivative. Non-linear functions – 1st and higher order derivatives, interpretations and usage. Rules of derivatives.
 - h. Functions – Differentiation and Taylor Series Expansion
 - i. Introduction to Partial Derivatives
 - j. Introduction to Integral Calculus
2. Introduction to Bond Mathematics
 - a. Finance and the Time Value of Money
 - b. Concept of Zero Coupon (Discount) Bonds and Coupon Bonds.
 - c. Bond Characteristics
 - d. Bond Types – Fixed Rate, Floating Rate, Inverse Floater Rate, etc.
 - e. Interest Rates – Discrete and Continuous Compounding
 - f. Bond Pricing – using ZCYC or YTM with discrete compounding or continuous compounding
 - g. Difference between bond coupon rate and bond yield
 - h. Calculating Bond Yield (YTM, CY, MMY, ZCY/Spot, Par Yield, etc.)
 - i. Price Yield Relationship

Introduction to Financial Statistics

1. Introduction to Financial Statistics
 - a. Frequency distributions
 - b. Measures of Central Tendency/Location (Mean/Mode/Median)
 - c. Dispersion, Measures of Dispersion (Variance/SD/Quartiles/Percentiles/Ranges) and its relevance to Risk Management
 - d. Correlations
 2. Introduction to Probability Theory
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- a. Random variables
- b. Probability and its uses
- c. Probability Rules
- d. Conditional Probabilities
- e. Probability Distributions (Single Variable)
 - i. Continuous Time/Discrete Time; Continuous Value/ Discrete Value
 - ii. Probability Mass Function
 - iii. Probability Density Function
 - iv. Cumulative Distribution Function
 - v. Applications and relevance in Risk Management
- f. Mathematical Expectation
- g. Moments of Distribution (Mean, Variance, Skewness, Kurtosis), Central Moments, Standardized Moments

Quantitative Analysis

1. Discrete and continuous probability distributions
 2. Population and sample statistics
 3. Statistical inference and hypothesis testing
 4. Estimating the parameters of distributions
 5. Graphical representation of statistical relationships
 6. Linear regression with single and multiple regressors
 - a. The Ordinary Least Squares (OLS) method
 - b. Interpreting and using regression coefficients, the t-statistic, and other output
 - c. Hypothesis testing and confidence intervals
 - d. Heteroskedasticity and multicollinearity
 7. Simulation Methods
 8. Estimating correlation and volatility using EWMA and GARCH models
 9. Volatility term structures
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Foundations of Risk Management

1. The role of risk management in corporate governance
2. Basic risk types, measurement and management tools
3. Creating value with risk management
4. The Capital Asset Pricing Model (CAPM)
5. Multi-factor models
6. Risk-adjusted performance measurement
7. Enterprise Risk Management (ERM)
8. Information risk and data quality management
9. Financial disasters and risk management failures
10. Ethics and the GARP Code of Conduct

Financial Markets and Products

1. Mechanics of OTC and exchange markets
2. Forwards, futures, swaps and options
 - a. Mechanics
 - b. Pricing and factors that affect it
 - c. Uses in hedging and hedging strategies
 - d. Delivery options
3. Interest rates and measures of interest rate sensitivity
4. Derivatives on fixed income securities, interest rates, foreign exchange, futures, commodities, and equities
5. Foreign exchange risk
6. Corporate bonds
7. Rating agencies

Valuation and Risk Modeling

1. Value-at-Risk (VaR)
 - a. Applied to stock, currencies, and commodities
 - b. Applied to linear and non-linear derivatives, and securities with embedded options
 - c. Structured Monte Carlo, stress testing, and scenario analysis
 - d. Limitations as a risk measure
 - e. Coherent risk measures
 - f. Volatility Models
 2. Option valuation
 - a. Pricing options using binomial trees
 - b. The Black-Scholes-Merton Model
 - c. The "Greeks"
 3. Fixed income valuation
 - a. Discount factors, spot rates, forward rates, and yield to maturity
 - b. Arbitrage and the Law of One Price
 - c. One factor measures of price sensitivity
 - d. Key rate exposures and multi-factor measures of price sensitivity
 - e. Hedging and immunization
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4. Country and sovereign risk models and management
5. External and internal credit ratings
6. Expected and unexpected losses
7. Operational risk
8. Stress testing and scenario analysis

PART II

Market Risk Measurement and Management

1. VaR and other risk measures
 - a. Parametric and non-parametric methods of estimation
 - b. VaR mapping
 - c. Backtesting VaR
 - d. Expected shortfall (ES) and other coherent risk measures
 - e. Modeling dependence: correlations and copulas
 - f. Extreme value theory (EVT)
2. Term structure models of interest rates
3. Volatility: smiles and term structures
4. Discount rate selection
5. Exotic options
6. Mortgages and mortgage-backed securities (MBS)
 - a. Structure, markets, and valuation

Credit Risk Measurement and Management

1. Credit analysis
 2. Default risk: Quantitative methodologies and risk neutral valuations
 3. Expected and unexpected losses
 4. Credit VaR
 5. Counterparty risk
 - a. Mitigation techniques
 - b. Credit exposure profiles
 - c. Collateralization and netting effects
 - d. Pricing credit value adjustments (CVA)
 6. Credit derivatives
 - a. Mechanics and structure
 - b. Valuation and spreads
 7. Structured finance and securitization
 - a. The structuring and securitization process
 - b. Agency problems and moral hazard in the securitization process
 - c. Subprime mortgages and securitization
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Operational and Integrated Risk Management

1. Calculating and applying risk-adjusted return on capital (RAROC)
2. Liquidity Risk
3. Model risk
 - a. Model validation
4. Evaluating the performance of risk management systems
5. Validating VaR models
6. Enterprise risk management (ERM)
7. Economic capital
8. Operational loss data
 - a. Frequency and severity distributions
 - b. Modeling and fitting distributions
9. Failure mechanics of dealer banks
10. Risk appetite frameworks
11. Data aggregation and risk reporting
12. Regulation and the Basel Accords
 - a. Minimum capital requirements
 - b. Methods for calculating credit, market, and operational risk
 - c. Liquidity risk management
 - d. Modeling risk aggregation
 - e. Stress testing
 - f. Revisions to the Basel II Accord
 - g. The Basel III framework
 - h. Comparing Basel II/III to Solvency II

Risk Management and Investment Management

1. Portfolio construction
2. Portfolio risk measures
3. Risk budgeting
4. Risk monitoring and performance measurement
5. Portfolio-based performance analysis
6. Hedge funds
 - a. Hedge fund strategies
 - b. Due diligence and fraud detection
 - c. Liquidity
 - d. Risk management of hedge funds

Current Issues In Financial Markets

1. Risk management case studies
 2. Reference interest rates
 3. Comparative regulations for OTC derivatives
 4. Sovereign credit default swaps: roles and regulations
 5. Capital planning at large banks
 6. The European credit crisis and transmission of sovereign risks
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