DERIVATIVES

FINANCIAL DERIVATIVES

Learning Outcome Statements

- Gain a firm foundation of the underlying concepts behind derivatives
- Gain a detailed understanding of the main characteristics of financial derivatives and their relationships with the underlying assets
- Gain a detailed understanding of the valuation principles and models for derivatives
- Be able to use derivatives for a wide range of hedging, trading and arbitrage purposes

Key Contents

- Cash Markets
  - The foreign exchange market
  - The money markets
  - The bond markets
  - The equities markets
  - Cash instrument vs derivatives

- Financial Derivatives
  - What are derivative products
  - General risks in these products
  - Gearing and leverage
  - Reasons for existence and proliferation of derivatives
  - General concepts behind derivative transactions

- Forward Transactions
  - Forward exchange rates
  - Forward interest rates
  - Spot and Forward rates in practice
  - General principles for trading and hedging
  - Pricing

- Forward Rate Agreement (FRAs)
  - What is an FRA?
  - The settlement process
  - Hedging with FRAs
  - Pricing FRAs
  - Behaviour of FRA rates

- Financial Futures
  - What is a financial future?
  - The clearing mechanism
  - Futures margins
  - Physical delivery vs cash settlement
  - The advantages of futures

- Currency Futures
  - Creating FX hedges & their evaluation

- Bond Futures
  - Definition of bond futures
  - Cash and carry pricing for bond futures
  - The implied repo rate
  - The delivery mechanism
  - Basic hedging with bond futures

- Currency and Interest Rate Swaps
  - Definition of interest rate and cross currency swaps
  - Development of the swap market
  - Interest Rate swaps
  - Non-standard interest rate swaps
  - Cross currency swaps
  - Basic applications for swaps
  - Zero-coupon swap pricing
  - Discount factors and the discount function
  - Relationship between zero, par, swap, and forward rates
  - Valuation and pricing of interest rate swaps
  - Valuation and pricing of currency swaps

FINANCIAL DERIVATIVES

Key Contents

• Financial Options
  o Why options are different
  o Options terminology
  o Understanding greeks
  o Value and profit profiles at maturity
  o Pricing options
  o Black Scholes model
  o Binomial approach
  o Hedging
  o Using Greeks to manage risks

• Currency Options
  o Using options to manage currency risk
  o Premium reduction strategies

• Interest Rate Options
  o The decision making process
  o Setting up strategies
  o Premium reduction strategies

• Other types of options
  o Caps, floors and collars
  o Swaptions
  o Exotic options
  o Pricing exotic options
  o Embedded options

BOND OPTIONS

Learning Outcome Statements

- Acquire the foundation knowledge necessary to price and value bonds and fixed income derivate products such as swaps, futures, options, structured notes
- Evaluate the risk and profitable investment opportunities associated fixed income holdings and portfolios
- Position your bond/market skills to take advantage of opportunities

Key Contents

- Key features and conventions
  - Bond specification, bond types

- Bond market conventions
  - Yield quotations, price quotations

- Review of fixed income mathematics
  - Present value, future value and rates of interest
  - Discount factors
  - Capital sums
  - Valuation of annuities

- Fixed rate bonds
  - Pricing fixed coupon bonds
  - Price vs. Yield quotations
  - American (and other) price markets
  - Implied yield

- Floating rate bonds
  - Pricing floating rate bonds
  - Treatment of floating rate margins
  - Fixed vs. Floating rate bonds

- Zero coupon pricing methodology
  - Representing bonds as portfolios of zero coupon bonds
  - Additive valuation of cash flows using zero coupon bonds
  - Determining price and yield of coupon bonds using zero coupon yields

- Zero coupon yield curve construction
  - Par rates to zero coupon rates
  - Cheap/dear analysis
  - Credit spread term structure

- Bond yield curves
  - Term structure of interest rates
  - Monetary policy, interest rates and central banks
  - Inflation and yields

- Alternative measures of return
  - Current yield
  - Yield to maturity
  - Total return
  - Scenario analysis
  - Comparison of bonds using total return analysis

- Bond price sensitivity
  - Price risk
  - Duration
  - Dollar sensitivity
  - Basis point value

- Managing portfolio risk

- Convexity

- Bond portfolio management models
  - Bond portfolio characteristics
  - Constructing targeted portfolios

- Bond trading and portfolio management
  - Interest rate expectations
  - Relative value trading: Curve plays
  - Flattering/steepening trades
  - Butterfly trades
  - Economic and technical analysis of yield curve trades
  - Bond portfolio management strategies

BOND OPTIONS

Key Contents

- Foreign denominated bonds
  - The foreign bond market
  - FX market operations and conventions
  - FX vs. Yield risk
  - Option embedded bonds
  - Characteristics of callable bonds
  - Valuation of callable bonds
  - Yield to call (put) vs. Yield to maturity
  - Price sensitivity characteristics of callable bonds
  - Convertible notes

- Spot-forward interest rate relationship
  - Spot to forward
  - Forward to spot
  - Yield curve from futures prices

- Interest rate swaps
  - Swap market background
  - Rationale for swap transactions
  - Basic features
  - Computing the fair swap fixed rate
  - The swap fixed rate as the equaliser of value
  - A swap as two bond transactions
  - Value of an open swap
  - Credit risk and swap pricing
  - Swap variations

- Fixed interest futures markets
  - Forward yields and futures prices
  - Speculating using interest rate futures
  - Hedging using interest rate futures
  - BPV values and hedging
  - Covariance approach
  - Historical simulation
  - Monte Carlo simulation

- Interest rate options
  - Rates vs. Prices
  - Bond options
  - Eurodollar futures options

- Caps, floors and collars
  - Option value inequalities
  - Pricing floors and floorlets
  - Collars

FINANCIAL MATHEMATICS

Learning Outcome Statements

- Acquire the foundation knowledge necessary to price and value bonds and fixed income derivate products such as swaps, futures, options, structured notes
- Evaluate the risk and profitable investment opportunities associated fixed income holdings and portfolios
- Position your bond/market skills to take advantage of opportunities

Key Contents

- Basic Mathematics
  - Simple powers
  - Square roots and higher order roots
  - Summation and products
  - Maxima and minima
  - Exponential and logarithmic functions
  - Continuous compounding equation
  - Discrete and continuous compounding
  - Geometric mean

- Basic Statistics
  - Arithmetic mean, mode, median
  - Weighted average
  - Variance and standard deviation
  - Skewness and kurtosis
  - Covariance, variance, covariance matrix
  - Correlation coefficient, variance of two variables, correlation matrix
  - Volatility, arithmetic of volatility, calculation of volatility (using historical data)

- Basic Calculus
  - Differential calculus
  - Integral calculus

- Basic Probability Theory
  - Normal distribution
  - Confidence interval
  - Standard normal distribution
  - Lognormal distribution

- Money Markets
  - Simple money market calculations
  - Time value of money
  - Simple interest, compound interest
  - Present value, discount factor, annuity, future values, sinking fund

- Discount Rate and Interest Rate

- Capital Market Mathematics

- Bond Mathematics
  - Yield to maturity
  - Present value of bond
  - Bond price and its calculations
  - Bond duration and maturity
  - Risk measurement of a bond
  - Bond convexity

- Yield Curve- Mathematics, Construction and Analysis
  - Yield curve- basics, shapes, risk and return
  - Compounding and discounting, spot rate, zero coupon rates
  - Forward rate- basics, annual time period swap rate
  - Yield curve using money market rates
  - Zero coupon and yield to maturity
  - Bootstrapping
  - Yield curve from bond data
  - Zero coupon yield from coupon paying bonds
  - Yield from price, present value of cash flow
  - Calculation of forward rates from discount factors
  - Concept of factor sensitivity

- Financial Derivatives- Stock and Currency Options Markets
  - Mathematics as applied to derivatives
  - Diffusion process
  - Asset price model
  - Financial options
  - Black Scholes pricing
  - Garman Kohlhagen pricing equation
  - Options hedging, option greeks, mathematics of risk variables

FINANCIAL ENGINEERING

Learning Outcome Statements

• Understand the basics in derivatives theory, and to apply them to a multitude of financial securities and structured products with a special emphasis on recent products in the derivative worlds.
• To gain a better understanding of derivatives use through case studies
• To implement models numerically in Excel, VBA or Matlab

Key Contents

• Recapitulation of important Derivatives concept
  o FX Swaps, FRAs, Futures
  o Interest rate and cross currency swaps
  o Interest Rate swaps
  o Non-standard interest rate swaps
  o Cross currency swaps
  o Basic applications for swaps
  o Zero-coupon swap pricing

• Discount factors and the discount function
  o Relationship b/w zero, par, swap, & forward rates
  o Valuation and pricing of interest rate swaps
  o Valuation and pricing of currency swaps

• Financial Options
  o Definitions, Options terminology
  o Understanding Greeks
  o Value and profit profiles at maturity
  o Pricing options
  o Black Scholes model
  o Binomial approach
  o Volatility
  o Value profiles prior to maturity
  o Hedging

• Applications of financial engineering
  o Sources of financial risk
  o Accounting and economic risk
  o Defining hedging objectives
  o Measuring hedge efficiency

• Managing Currency Risk
  o Forwards & futures solutions
  o Comparing hedging strategies
  o Basic option hedges
  o Selling options within a hedging program
    Collars, range- forwards, forward-bands, cylinders

  o Corridors
  o Participating forwards
  o Ratio forwards
  o Break-forwards, FOXs, forward-reversing options
  o Using exotic options
  o Dynamic hedging

• Managing Interest-Rate Risk using FRAs, Futures and Swaps
  o Using FRAs
  o Using short-term interest rate futures
  o Calculating the hedge ratio
  o Stack vs strip hedges
  o Managing the convergence basis
  o Interpolated hedges
  o Combining the techniques
  o FRA vs futures
  o Using swaps
  o Hedging bond and swap portfolios
  o Hedging bond portfolios with bond futures

• Managing Interest-Rate Risk
  o Interest rate guarantees
  o Using caps, floors, and collars
  o Collars, participating caps, corridors, & variations
  o Using captions and swaptions
  o Comparison of interest risk management tools

• Managing Equity Risk
  o Bull and bear strategies
  o Return enhancements
  o Value protection strategies
  o Vertical, horizontal, and diagonal spreads
  o Using stock index futures and options
  o Portfolio insurance
  o Guaranteed equity funds
  o Exotic equity derivatives

EQUITY STRUCTURED PRODUCTS

Learning Outcome Statements

- Delta 1 equity derivatives; vanilla and exotic options
- Volatility and correlation products
- Investment rationale for structured products
- Understand mechanics, pricing and risk characteristics of options, warrants and exotics
- Principal protected and non-protected structured products
- Engineering and reverse engineering structured products
- Vanilla and exotic equity derivatives: pricing and risk characteristics
- Fund linked structured products
- Constant Proportion Portfolio Insurance (CPPI)

Key Contents

Equity Derivatives - Synthetic Equity

- Synthetic Equity
  - Futures and forwards
  - Equity swaps
  - Exchange traded funds
  - Underlying assets
  - Single stocks
  - Baskets / indices

- Pricing and Risk Characteristics
  - Cash vs. futures fair value
  - Covered vs. uncovered structures
  - Dividend impact and risks
  - Impact of interest rates (issuer funding costs)
  - Dilution
  - Stock scarcity; lending risks
  - Risks: delta and basis risks
  - Key Drivers for Structured

- Equity Products
  - Accounting treatment
  - Regulatory / tax arbitrage
  - Access
  - Funding
  - Leverage
  - Synthetic lending
  - Dividend capture strategies
  - Synthetic shorting
  - "Portable Alpha"

- Equity Structured Products – Access Products
  - Equity linked notes
  - Discount certificates
  - Trackers and synthetics

Equity Derivatives – Volatility

- Equity Volatility
  - Definition of standard deviation, volatility & variance
  - Common applications of volatility
  - Realized volatility – measurement issues
  - GARCH, Risk metrics calculations

- Implied Volatility
  - Volatility forecasts embedded in option prices
  - Volatility surfaces – "skews" and "smiles"
  - Term structure of volatility
  - Interpretation of implied volatility
  - Implied correlation within equity index volatility

- Variance Swaps
  - Volatility forecasts embedded in option prices
  - Pricing and valuation
  - Impact of volatility skew on pricing
  - Convexity adjustments
  - Benefits and applications

- Listed Volatility Products

- Applications of Volatility Products

EQUITY STRUCTURED PRODUCTS

Key Contents

Equity Derivatives – Options, Warrants and Exotics

- Equity Options
- Applications of Equity Options
- Exotic Options

Equity Linked Structured Products

- Overview of Structured Products
- Capital Guaranteed Equity Linked Notes
- Equity Linked Coupon Notes
- Volatility Products
- Volatility and Correlation Products: Capital

Fund Linked Structured Products

- Fund Linked Structured Products
  - o Portfolio insurance
  - o Guaranteed equity funds
- Exotic equity derivatives

OPTIONS

Learning Outcome Statements

- Comprehensive and practical analysis of options – pricing, risk characteristics and risk management.
- Practical focus on the varied applications of options in corporate exposure management, portfolio hedging and tactical asset allocation, trading and investment applications, and in the engineering of structured products
- Evaluate options from a number of different perspectives
- Gain understanding of the many strategies in which options are used to efficiently manage risk.
- Learn about – FX, equity, rates and commodities – variance swaps and listed volatility futures

Key Contents

- Option valuation – principles and option pricing models
  - Fundamental concepts
  - Continuous stochastic processes; Brownian motion
  - Black-Scholes pricing model
  - Numerical methods: Binomial and trinomial lattice models
  - Valuing American and other path dependent options
  - Monte Carlo simulation

- Volatility
  - Volatility in option pricing
  - Volatility as an 'asset class'
  - Historic, implied and realised volatility measures
  - Volatility surfaces
  - Volatility analysis
  - Local volatility models
  - Stochastic volatility modeling
  - Option risks; hedging and risk management of option positions

- Option strategies – hedging and risk management
  - Risk reduction strategies
  - Using options in risk exposure management
  - Option based hedging strategies
  - Simple hedging strategies
  - Structuring tailored hedges with options
  - Rationale for using non-linear (options) vs. linear hedges

- Option strategies
    Trading applications of options
  - Distinguishing vega from gamma trading strategies
  - Higher order volatility trading
  - Limited vs. unlimited risk strategies
  - Put-Call parity and arbitrage strategies
  - Directional trading: vertical spreads
  - Risk characteristics (Delta hedging, Gamma, Skew risk)
  - Straddles and strangles
  - Risk reversals
  - Butterflies
  - Yield enhancement strategies
  - Dispersion trading

- Embedded option strategies
  - Embedding options into structured products
  - Long and short volatility structured products
  - Yield enhancement structured products
  - Capital guaranteed notes Interest rate options
  - Generic European style interest rate caps and floors
  - Conventional pricing methods: Black (1976) model
  - Pricing and hedging caps and floors
  - Asset and liability risk management
  - Embedded caps and floors; capped FRNs, minimax FRNs
  - Swaptions

OPTIONS

Key Contents

- Equity options
  - European and American styles
  - Single stock and index options
  - Incorporating dividend assumptions into pricing models
  - Correlation dependency of basket and index options
  - Analysing relative value of index options
  - Dispersion trading
  - Practical implementation of dispersion trading strategies

- Commodity options
  - Pricing of commodity derivatives
  - Pricing models for commodities
  - Commodity linked structured products

- Barrier options
  - Numerical (tree) methods of barrier option pricing
  - Pricing double barrier options and other variants
  - Impact of varying barrier parameters on performance, cost
  - Pricing using volatility surface
  - Hedging barrier options

- Path dependent options - average rate options
  - AROs (Average Rate Options) and ASOs (Average Strike Options)
  - Mechanics of average rate options
  - Geometric vs. arithmetic averages
  - Pricing of the Asian options
  - Hedging Asian options

- Path dependent options - lookback, cliquet and reverse cliquet options
  - Definitions
  - Pay-off types: Fixed and floating strike
  - Pricing and valuation issues: Numerical (tree) methods
  - Motivations for use – applications and examples