Birla Institute of Technology & Science, Pilani
Hyderabad Campus

**SECOND SEMESTER 2019-2020**

Course Handout Part II

Date: 06-01-2020

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

*Course No.* : **FIN F414**
*Course Title* : ***FINANCIAL RISK ANALYTICS & MANAGEMENT***
*Instructor-in-Charge* : ***Thota Nagaraju (****nagaraju@hyderabad.bits-pilani.ac.in)*

**Scope and Objective of the Course:**

**Textbooks:**

1. John C. Hull, Risk Management & Financial Institutions, 4th Edition, Wiley

**Reference books**

1) Phillipe Jorion (2007). Value at Risk, 3rd Edition: The New Benchmark for Managing Financial Risk John C Hull (2015). Options, Futures, and Other Derivatives, 9th Edition
2) Michel Crouhy (2014). The Essentials of Risk Management, 2nd Edition. John C Hull (2012). Risk Management and Financial institutions, 3rd Edition.
3) Advanced Engineering Mathematics by Erwin Kreyszig, 10th Edition
4) A First Course in Probability by Sheldon Ross
5) Introductory econometrics for finance" by Chris Brooks 2nd Edition
6) Basic Econometrics, Damodar Gujarati , Dawn Porter , and Sangeetha Gunasekar, 5th edition.

**Course Plan:**

| Lecture No. | Learning objectives | Topics to be covered | Chapter in the Text Book |
|---|---|---|---|
| **Module 1: Preparatory Sessions (9 Sessions)** | This module reviews the basic concepts of Limits and Continuity; Differentiation (Chain, Product and Quotient Rules); Integrals (Definite and Indefinite); Sequences and series; Partial derivatives; Measures of Central Tendencies and Dispersion; Skewness, Moments, Kurtosis; Random Variables (Discrete and continuous) Expectation and Joint Distribution; Discrete probability distributions (Binomial, Poison and Multinomial); Normal Distribution; Ordinary Least Squares (Single & Multiple) & Maximum | OLS, Hetroscedasticity , Multicollinearity , Autocorrelation, AR, AM, ARIMA, GARCH, and VAR Models | **R5: Ch3, 4, 5, 6, 7, 8, 9 R6: ch 5, 6 and 8** |

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| | Likelihood Estimation; Relaxing OLS assumptions (Heteroskedasticity & Autocorrelation); Dummy and Qualitative Response Variable (Logit and Probit); AR, MA, ARIMA, VAR Models; ARCH, GARCH Models; pricing of Forwards, Futures and Options. | | |
| **Module 2: Introductio to Complete and Efficient Markets** **No. of Sessions:** 3 | Banks & Risk Management, Capital regulation of bank, Value creation through risk management, financial risk systems, In this module, we will begin with the introduction efficient and complete markets, which is the precur for pricing of financial instruments based on arbitr and risk neutral pricing. We begin with a market on c toss to demonstrate these concepts and drive home theory of arbitrage through the Arrow-Debreu securit We then move from coin tosses to actual financ instruments of forwards and options. We discuss market efficiency and completeness to understand no-arbitrage pricing and risk-neutral pricing. | No arbitrage pricing models | **Credit Suisse Material (1.1)** |
| **Module 3: Overview Financial Markets an Asset Classes** **No. of Sessions:** 6 | This module deals with different financial markets a their working to enable a better understanding of h the transactions are facilitated and also give a br overview about different asset classes like Equities a FX. We will start with different financial markets l Capital markets which comprise of both Primary a Secondary markets, Money Market, Cash or S market, Derivatives markets and finally Forex a Interbank markets. We will also discuss about differ asset classes, differences among asset classes and k features. | **Financial Markets and Asset Classes** | **Credit Suisse Material (2)** |
| **Module 4: Options and Greeks** **No. of Sessions:** 3 | In this module, we introduce a class of derivatives cal Options and risk measures associated with these opti called Greeks. We will start with definition and types Options and then move on to discuss the basic strateg and payoffs. We will learn about different pric theories for options like Binomial Option pricing a then discuss about the Greeks and how they are utiliz | Options and Greeks | **Credit Suisse Material (1.2)** |

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| | in risk management practices. We then cover about trading of Greeks before we conclude this module w brief overview of basic exotic options. | | |
| **Module 5: Introduction to Risk (Market, Credit, Operation & Enterprise) and Measures of Market Risk**<br>**No. of Sessions: 3** | This module starts with a brief introduction to Ri and highlights various types of risks like market ri credit risk, operational risk etc before going in detail Market risk. We will also describe risk and ret concepts, measurement of various risks. We w introduce the most widely used industry standard cal Value at Risk (VaR). We will then dive into the det of types of VaR and compare it with alternate r measures. We then move on to the basics of Histor Simulation model, underlying assumptions, vari return calculation methods and functions to capture market risk. We will conclude this module by learn about the Responsive VaR model, understanding Exponential Weighting and Expected Short approaches. | Value at Risk (VaR) Models | **Credit Suisse Material (3.1 &3.2)** |
| **Module 6: Advanced VaR models**<br>**No. of Sessions: 6** | This module builds on from the VaR conce introduced in the earlier model and addresses shortcomings of the basic VaR model like t distributional assumptions. We then discuss about gaps identified in VaR model in addressing behaviour of market volatility called Volati Clustering. We will introduce the remedial approac like EWMA, GARCH to address these gaps a critically assess these methods from the practical a implementation perspective. We will conclude t module by studying about the Principal Compon Analysis (PCA) which explains about the estimation VaR when there are multiple risk factors that are hig correlated. | Advanced Value at Risk (VaR) Models | **Credit Suisse Material (3.2)** |
| **Module 7: Credit Risk Modelling**<br>**No. of Sessions: 3** | In this module, we will introduce the concepts Credit risk and its modelling. We cover the aspects Credit Default risk, Counterparty credit risk a concentration risk before we move on to the vari | Probability of Default (PD) and Loss Given Default (LGD). | **Credit Suisse Material (4)** |

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| | metrics to quantify credit risk like Probability Default (PD) and Loss Given Default (LGD). W finally close this module with a discussion on meth to mitigate credit risk such as risk based prici netting, collateral, covenants, diversification etc. | | |
| **Module 8: Market Risk Regulatory Framework**<br>**No. of Sessions: 3** | This module gives the basic understanding regulatory framework from the market r perspective. We will begin with quantitative aspects Basel II market risk framework; cover various cap components like Regulatory VaR, Stressed VaR a Incremental Risk Charge (IRC). We then discuss ab different regulatory mandated processes like ba testing and associated details like definition of Trad PL and its components and also regulatory notificat and reporting exercises. We then finally close t module by having an understanding about Li Setting, Monitoring, RWA concept and R Management VaR | Regulatory VaR, Stressed VaR and Incremental Risk Charge (IRC). | **Credit Suisse Material (3.2)** |
| **Module 9: FRTB & CCAR & ERC**<br>**No. of Sessions: 3** | In this module, we cover about the evolving regulat landscape and the future of risk management with introduction of new regulations knowns as FRTB a CCAR. Having discussed the existing framework in t earlier module, we will discuss the new regulations detail and assess the scope and impact on the curr framework and also the capital implications due these regulations. Along with these external regulat requirements, we will also briefly touch upon internal capital measures like Economic Risk Cap (ERC) which will capture the exposures from t Economic perspective rather than from an account view. | FRTB, CCAR and Economic Risk Capital (ERC) | **Credit Suisse Material (7.2)** |
| **Module 10: Dynamic Hedging and CAPM (Portfolio Risk Management for Individuals)**<br>**No. of Sessions: 2** | In the final module, we will conclude the key learni of the entire course and have a working session on r management through dynamic hedging, understand hedge ratios, costs, P&L related to risk managemen The course will end with rounding of risk managem for an individual by using concepts of creating effici portfolios and maximizing risk return trade-off. | **Dynamic Hedging and CAPM** | **Credit Suisse Material (6 & 7.2)** |

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| **Module 11: Simulation** | Simulation 1,2 and 3 | 1-BSM, 2-VaR, 3-PD, LGD, and EaD | Credit Suisse Material will be supplied on the simulation day |

**Evaluation scheme:**

| Components | Duration | Weightage (%) | Date | Nature of Component |
|---|---|---|---|---|
| Surprise Quizzes* | | 20% | | CB |
| Assignments* | | 10% | Will be posted on CMS | OB |
| Mid Sem Examination | 1.5 Hours | 25% | 8/3 3.30-5 PM | CB |
| Comprehensive Exam | 3 Hour | 35% | 10/5 FN | CB |
| Simulation (s) | | 10% | Will be posted on CMS | OB |

***Note:** ***No make-ups for the quizzes & Assignments.***

All quizzes & assignments will be counted for final grade calculation.
**Chamber Consultation Hour**: K-229; Wednesday & Thursday 4:00 PM to 5:00 PM.
**Notice:** All notices will be displayed on CMS and Economics & Finance Notice Board.
**Make-up policy:** Make-up will be given only on Doctor's/Warden's recommendation and with prior (at least 01 day before the test/exam) permission of the InstructorinCharge/Instructor. Request for makeup made by phone/sms or during/after the test/exam would ***NOT*** be entertained at all.
**Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

***Instructor-in-Charge***
**FIN F414**