Birla Institute of Technology & Science, Pilani
Hyderabad Campus

First Semester 2022-23
Course Handout (Part-II)

Date: **29/08/2022**

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 F311/ ECON F354**
Course Title : ***Derivatives and Risk Management***
Instructor-in-Charge : *Thota Nagaraju (nagaraju@hyderabad.bits-pilani.ac.in)*

Scope and Objective of the Course:

This course introduces forwards, futures & options as securities for risk management & speculation. Exposures to equity, currency, interest rate & commodity risk are examined. Pricing derivatives using analytical & numerical techniques.

The objective of this course is to familiarize the students with the various instruments available for risk management. It covers rather simpler instruments such as options, futures, swaps, and credit derivatives. Besides discussing the pricing of these instruments and hedging principles the course would also aim at introduction of some complex instruments such as options on futures and swaps etc. The course has three main objectives:

i) To understand the role of financial risk management as well as the techniques available for its measurement in financial and non-financial corporations.
ii) To review the set of financial instruments available in modern financial markets as well as the strategies that a firm or and an individual can use to optimize the management of the risks this company is faced to, and
iii) To build a framework that will help integrate financial risk management into an overall corporate strategy.

Textbooks:

1. John C. Hull & Basu Sankarshan, Options, Futures and Other Derivatives, 8th Edition, Pearson Education.

Reference books & Cases

R1. Understanding Futures Markets by Robert W. Kolb and James A. Overdahl, 6th edition, Blackwell.
R2. International Financial Management by Cheol Eun, and Bruce G. Resnick, 6th edition, McGraw-Hill.
R3. Derivatives, by Rangarajan Sundaram, Sanjiv Das, McGraw Hill, 1st edition
R4. Risk Management and Financial Institutions, John Hull.
Lecture Notes, available on the CMS

1) Cases

Four lectures include a "Case Discussion." The cases are meant to summarize and exercise the concepts studied in the lecture/s. As a way to introduce the case and structure its analysis a set of questions will precede the case. All the students are expected to read the cases with the questions in mind in order to contribute to the class discussion. This will be graded through case discussion.

Every case will be assigned to a particular student or group who will be in charge of

i) Handing in a written answer to the questions (synthesis will be rewarded)

ii) Introducing the topic during approximately the first part of the class

iii) Leading the discussion (extra material, complementary questions…)

These tasks will be graded. The average will constitute the case discussion grade for the particular student/s (in case of group work, all the students will obtain the same grade except the group unanimously decides otherwise).

Case Studies

i) Risk at Freddie Mac by J. Duffie, Erin Yurday
ii) 2012 Fuel Hedging at JetBlue Airways by Pedro Matos
iii) Currency Swaps by Scott P. Mason and William B. Allen
iv) Overview of Credit Derivatives by Sanjiv Das and Stephen Lynagh

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
Module-1: Introduction to Risk & Derivatives Markets and Futures markets **No. of Sessions: 4**	***The student should be able to:*** understanding of various risks and derivatives products, markets, participants and structure; Evolution of the futures markets. Futures contract specifications; Convergence of futures price to spot price; Regulatory role in the futures markets; Accounting and taxations methods in the futures markets and finally should be able to differentiate futures and forwards contracts.	Project Risk vs Financial Risk, Event Risk vs Price risk; various derivatives products and their classification; Different types of market participants; Function of derivatives markets; Uses and misuses of derivatives. Characteristics of futures; Trading and Settlement in the futures markets; Margins, Marking to Market and Open Interest in the futures markets.	Text Book, Ch- 1 & 2. https:// www.nseindia.com/ products/content/ derivatives/equities/ fo.htm https:// www.mcxindia.com/ About-us http://www.ncdex.com/ MarketData/ LiveFuturesQuotes.aspx#
Module-2: Interest rates	***The student should be able to:*** understand the Interest rate parity conditions. Purchasing	Measuring interest rates and zero rates; Bond pricing; Determining Treasury zero	Text Book, Ch-4 and Ch 5 and 6 of R2. https://

and exchange rate mechanism **No. of Sessions: 6**	power parity conditions; Covered interest rates and International Fisher effect; Interest rate short term dynamics; the efficient market, fundamental and technical exchange rate forecasting approaches.	rates; Duration and convexity; Theories of term structure of interest rates and yield analysis. Foreign Exchange Markets and Rates; Conditions for Interest Rate Parity (IRP); Conditions required for Purchasing Power Parity (PPP); Exchange rate forecasting methods and covered interest rate; Short run interest rate dynamics. **Case Study -1** **"Risk at Freddie Mac by J. Duffie, Erin Yurday".**	dbie.rbi.org.in/DBIE/dbie.rbi?site=home; or click on the Exchange Rate
Module-3:Determination of forward and futures prices and Interest rate Futures **(No. of Sessions: 4)**	***The student should be able to:*** Understand how the value of forward contract is determined at initiation, during life of the contract, and at expiration; Calculate and interpret the price and value of forward contract on equity stock, fixed-income security, currency and a forward rate agreement (FRA); Evaluate credit risk in a forward contract, and explain how market value is a measure of exposure to a party in a forward contract.	Forward Markets and Contracts; Pricing and Valuation of Equity; Fixed-Income and Interest Rate Forward Contracts; Evaluating credit risk in a forward contracts.	Text Book, ch 2 & 5. http://quantpedia.com/Home/About
Module-4: Hedging Strategies using Interest, Currency, Commodity, Stock and Index Futures (No. of	***The student should be able to:*** Understand why the futures price must converge to the spot price at expiration. Determine value of futures contracts; Understand as to why forward and futures price differ; understand the relation between futures prices and expected spot prices; and appreciate the difficulties in pricing short-term futures	Basic Principles, Arguments for and against hedging; Basis Risk; Cross hedging; Stack and roll; Hedging with Forwards; Non Deliverable Forwards; Currency Futures; Pricing Currency Futures; Hedging, Speculation and Arbitrage with Currency Futures; Basics of Treasury bond futures and Eurodollar futures; Short-term interest rate futures contracts; Intermediate and long-term interest rate futures contracts;	Text Book, ch 3,6, and Ch 5, 7 and 9 of R1

Sessions: 8)	contracts;	Hedging, Speculation, Arbitrage with commodity futures; Pricing of forward and futures, Normal Backwardation Convergence; Basis risk, optimal hedge ratio; Trading of Index Futures; Pricing of single and index futures, Risk Adjustment, Hedging, Speculation, and Arbitrage with Index Futures. **Case Study -2** **"2012 Fuel Hedging at JetBlue Airways by Pedro Matos".**	
Module-5: Swaps and Options (Mechanics, Properties, Trading Strategies, Binomial Tress, Wiener Process & Ito's Lemma and BSM Model) **No. of Sessions: 12**	***The student should be able to:*** Understand the distinction between pricing and valuation of swaps; Understand interest rate swaps to a series of off-market forward rate agreements (FRAs) and a plain vanilla swap to a combination of an interest rate call and a put option; Calculate and interpret the fixed rate on a plain vanilla interest rate swap and the market value of the swap during its life; Calculate and interpret the fixed rate if applicable, and the foreign notional principal for a given domestic notional principal on a currency swap, and estimate the market values of currency swaps during their lives. Explain and interpret the characteristics and use of swaptions, and calculate the payoffs and cash flows of an interest rate swaption; Understanding Option Markets and Contracts – Variants, Payoffs, Pricing and Hedging strategy; put call parity; difference between American & European options; General shape of the graph of the straddle strategy; Strips and	Currency Swaps;, Interest Rate Swaps; Forward Rate Agreement; Applications of swaps, Cancellation, Pricing of Swaps – Interest Rate & Currency Swap; Swap variant; Basics of call and put options, Their payoffs, Intrinsic value and time value, American and European options, At the money, out of money and in the money options, Bounds to option pricing, Arbitrage based price limits, Put call parity; Binomial Option Pricing model, Risk Neutral valuation, Black Scholes option pricing model and assumptions, Interpretation of Black Scholes model; Straddle, Strangle, Butterfly, Bull and Bear spread, Ratio spread, Box spread, Condor, Synthesizing with options. **Case Study -3** **"Currency Swaps by Scott P. Mason and William B. Allen".**	Text Book, ch 7, 9, 10,11 and 12 https:// www.nseindia.com/ products/content/ derivatives/equities/ fo.htm http:// www.cmegroup.com/ company/ http://www.jpx.co.jp/ english/derivatives/ index.html

	straps, strangles, the bull spread strategy; The bear spread strategy; The butterfly spread strategy; The collar strategy; One and two step binomial pricing models and BS pricing methodology		
Module-6: Credit Risk & Credit Derivatives **No. of Sessions: 8**	***The student should be able to:*** Understand structure and features (reference entity, credit events, settlement method, CDs spread) of credit default swaps (CDS); Compare CDS, total return swaps, asset swaps, and credit spread option; Identify uses of CDS (such as hedging exposure to credit risk, enabling action on a negative credit view, engaging in arbitrage between markets), and Understanding relationship between CDS spread, expected spread payments, and expected default losses.	Credit ratings; Historical default probabilities; Estimating default probabilities from bond prices; Using equity prices to estimate default probabilities; Credit risk in derivatives transactions; Credit default swaps; Valuation of credit default swaps; CDS forwards and options; Basket credit default swaps; Total return swaps; Collateralized debt obligations; and Valuation of a synthetic CDO. **Case Study -4 "Overview of Credit Derivatives by Sanjiv Das and Stephen Lynagh"**	Text Book, ch 19 & 20.

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Quizzes-1	10 Minutes each	5%	TBA one week prior to the quiz date, Time:	CB
Quizzes-2	10 Minutes each	5%	TBA one week prior to the quiz date, Time	CB
Assignment (Group)		20%	November 1st week, 2022 (exact date will be posted on CMS)	OB
Mid-Sem	1.5 Hour	30% (=100 points)	03/11 1.30 - 3.00PM	CB

Comprehensive Exam	3 Hour	40% (=100 points)	26/12 AN	CB

Note: Points will be converted into marks based on their weightage.

Consultation Hour: 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.

Assignment (Data should be downloaded using python and analysis should be done using R and Excel only). Group wise Assignment Topic, Expected Deliverables, Methodology and Data Collection process details will be posted on CMS by third week of September, 2022. **Assignment submission date: 1st week of November, 2022 (exact date will be posted on CMS). (Soft copy should be sent to bits.drm.assignment@gmail.com. Post due date submissions (both hard and soft copy) will not be considered for evaluation and you will be awarded zero marks in this component. Only 25 percent of the plagiarism is allowed and thereafter for every 10 percent of additional plagiarism, one mark (or ten points) will be deducted.**

Group Assignment requires the prior knowledge of Python, R and Excel, hence you are advised to collect the required resources from the I/C of the course.

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 F311 & ***ECON F354***