



Proposed Scheme for Second Year Undergraduate Program in Artificial Intelligence and Machine Learning: Semester IV (Autonomous)
Academic Year(2025-26)

Sr. No	Course Code	Course	Teaching Scheme			Continuous Assessment (A)						Semester End Examination (B)						Aggregate (A+B)	Credits
			Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Term Test 1(TT1) -a	Term Test 2(TT2) -b	Assg/CP/GD/Presentation/Quiz) -c	Total (a+b+c)	Term work	CA Total	Duration	Theory	Oral	Pract	Oral & Pract	SEE Total		
Sem III																			
1	DJS23AH2201	Foundation of FinTech	3	--	--	15	15	10	40	--	40	2	60	--	--	--	60	100	3
Sem IV																			
2	DJS23AH2251	Quantitative Finance	3	--	--	15	15	10	40	--	40	2	60	--	--	--	60	100	3
Sem V																			
3	DJS23AH2301	Econometric Modelling and Financial Analytics	3	--	--	15	15	10	40	--	40	2	60	--	--	--	60	100	3
4	DJS23AH2301L	Econometric Modelling and Financial Analytics Laboratory	--	2	--	--	--	--	--	25	25	2	--	25	--	--	25	50	1
Sem VI																			
5	DJS23AH2351	Intelligent Trading Systems & Risk Analytics	3	--	--	15	15	10	40	--	40	2	60	--	--	--	60	100	3
6	DJS23AH2351L	Intelligent Trading Systems & Risk Analytics Laboratory	--	2	--	--	--	--	--	25	25	2	--	25	--	--	25	50	1
Sem VII																			
7	DJS23AH2451	Decentralized Systems	4	--	--	15	15	10	40	--	40	2	60	--	--	--	60	100	4
Total			16	4	--	75	75	50	200	50	250	14	300	50	--	--	350	600	18
Prepared by: Name and Signatures (with date)			Head of Department					Vice-Principal						Principal					
			Dr. Aruna Gawde					Dr. Narendra Shekogar						Dr. Hari Vasudevan					
Checked By Name and Signatures (with date)																			



Continuous Assessment (A):

Course	Assessment Tools	Marks	Time (mins)
Theory	a. Term Test 1 (based on 40 % syllabus)	15	45
	b. Term Test 2 (on next 40 % syllabus)	15	45
	c. Assignment / course project / group discussion / presentation / quiz/ any other.	10	--
	Total marks (a + b + c)	40	--
Audit course	Performance in the assignments / quiz / power point presentation / poster presentation/group project / any other tool.	--	As applicable
Laboratory	Performance in the laboratory and documentation.	25	
Tutorial	Performance in each tutorial & / assignment.	--	
Laboratory & Tutorial	Performance in the laboratory and tutorial.	--	

Continuous Assessment (B):

Course	Assessment Tools	Marks	Time (hrs.)
Theory / * Computer based	Written paper based on the entire syllabus.	60	02
	* Computer based assessment in the college premises.	--	
Oral	Questions based on the entire syllabus.	--	--
Practical	Performance of the practical assigned during the examination and the output / results obtained.	--	--
Oral & Practical	Project-based courses - Performance of the practical assigned during the examination and the output/results obtained. Based on the practical performed during the examination and on the entire syllabus.	25	As applicable



Program: Artificial Intelligence & Machine Learning	B.Tech.	Semester: IV
Course: Quantitative Finance (DJS23AH2251)		

Prerequisite: Foundation of Finance

Course Objectives:

By the end of this course, students will be able to:

1. Develop understanding of asset pricing theories and their empirical applications for evaluating risk and return.
2. Explain the functioning, valuation, and pricing models of derivative instruments such as options and swaps.
3. Enable learners to design and interpret option trading strategies and payoff profiles for various market conditions.
4. Equip students with quantitative and analytical skills to apply financial models in FinTech applications such as portfolio optimization, robo-advisory, and risk management.

Course Outcomes: On completion of the course, learner will be able to:

1. Analyse risk and return metrics, and evaluate asset pricing using CAPM, APT, and multi-factor models.
2. Calculate and interpret the prices of derivatives (options and swaps) using analytical and numerical methods such as the Black–Scholes model and numerical integration
3. Design and evaluate option trading strategies such as spreads, straddles, and condors, and interpret their payoff profiles.
4. Assess alternative investment options and structured products, and estimate their values using appropriate quantitative techniques (DCF, NPV, cost of carry).

Detailed Syllabus: Quantitative Finance (DJS23AH2251)

Unit	Description	Duration
1	Probability and Statistics for Finance: Random variables, probability distributions, Expected value, variance, covariance, correlation, Common distributions: Normal, Lognormal, t-distribution, Poisson, Exponential, Sampling, estimation, and hypothesis testing, Law of Large Numbers and Central Limit Theorem, Correlation vs. Causation in financial data	07



2	Asset Pricing Models: Risk and Return Measurement: Measures of return: arithmetic, geometric, log returns, Measures of risk: variance, standard deviation, beta, Value at Risk (VaR), Sharpe ratio, Treynor ratio, Jensen's alpha Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT), Fama–French multi-factor models, Empirical testing of asset pricing models, Factor-based investing in FinTech platforms.	08
3	Swaps, Options and their Pricing: Introduction to Options and the Option Market, Key Terminologies in Options Trading: European options and American options, strike pricing, Option Intrinsic Value Status: ITM, ATM, OTM. Types of Options: Vanilla Options (Call and Put), Exotic Options (Barrier, Asian, Lookback, etc.), Introduction to Option Pricing, Introduction to analytical method in option pricing, The need for numerical methods in option pricing. Black-Scholes Model: Introduction, Assumptions and Limitations of the Black-Scholes model, Swaps: Fixed-to floating interest rate swaps and their pricing. Introduction to Numerical Integration: Trapezoidal and Simpson's Rule.	10
4	Options Strategies and Their Payoff Profiles: Introduction to Option Strategies: Basics and Objectives, Single-Leg Strategies: Long Call, Long Put, Covered Call, and Protective Put. Vertical Spreads: Bull Call Spreads and Bear Put Spreads. Volatility Strategies: Straddles, Strangles, and Their Payoff Profiles. Introduction to Neutral Market Strategies: Butterfly Spreads and Iron Condors. Interpreting Payoff Diagrams and Brief Overview of Portfolio Applications.	09
5	Alternative Investments and Structured Products: Introduction to Alternative Investments ((real estate, commodities, private equity, hedge funds), Real Estate Valuation Techniques (Net Present Value (NPV), Discounted Cash Flow (DCF)), Commodities Pricing (Cost of Carry model). Introduction to private equity and venture capital investments, its valuation techniques, Overview of common hedge fund strategies (long/short equity, market-neutral, and arbitrage). Introduction to statistical arbitrage concepts.	08
TOTAL		42

Books Recommended:**Textbooks:**

1. Prassanna Chandra, Financial Management, Tata McGraw Hill education pvt. Ltd., 7th edition.
2. John C. Hull, Options, Futures, and Other Derivatives" Pearson Education, Inc, 9th edition.



3. Don M. Chance and Robert Brooks. An Introduction to Derivatives and Risk Management. Joe Sabatino. 8th edition, 2010.
4. M.Y. Khan, P.K. Jain, Financial Management Text, Problems and Cases, McGraw-Hill Education, 8th Edition, 2019.

Reference Books:

1. Achdou, Yves, and Olivier Pironneau. Computational methods for option pricing. Society for Industrial and Applied Mathematics, 2005.
2. Steve Bell, Quantitative Finance for Dummies, Wiley, 1st Edition, 2016.
3. Mark S. Joshi, The Concepts and Practice of Mathematical Finance, Cambridge University Press, 2nd Edition, 2008.
4. Yves Hilpisch, Python for Finance: Mastering Data-Driven Finance, O'Reilly Media, 2nd Edition, 2018.
5. Tavella, Domingo. Quantitative methods in derivatives pricing: an introduction to computational finance. John Wiley & Sons, 2003.
6. Marcos López de Prado, Machine Learning for Asset Managers, Cambridge University Press, 1st Edition, 2020.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc24_mg19/preview
2. <https://www.quantstart.com/articles/>
3. <https://www.cqf.com/about-cqf/program-structure/what-is-cqf>
4. <https://www.edx.org/learn/finance/massachusetts-institute-of-technology-mathematical-methods-for-quantitative-finance>
5. <https://ecornell.cornell.edu/certificates/engineering/quantitative-finance/>
6. <https://coursebrowser.dce.harvard.edu/course/applied-quantitative-finance-and-machine-learning/>