



Shirpur Education Society's

R. C. Patel Institute of Technology, Shirpur
(An Autonomous Institute)

Course Structure and Syllabus

Honors Degree Program in FinTech

Artificial Intelligence and Machine Learning

With effect from Year 2025-26



Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
Ph: 02563 259 802, Web: www.rcpit.ac.in

Honors Degree Program in FinTech (w.e.f. 2025-26)

Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit		
				L	T	P	Continuous Assessment (CA)				ESE				
							TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average of (TT1 & TT2)					
															[A]
Sem-III															
1	H2	RCP24AH2201	Foundation of Finance	3			25	15	15	15	60	100	3	3	
Sem-IV															
2	H2	RCP24AH2251	Quantitative Finance	3			25	15	15	15	60	100	3	3	
Sem-V															
3	H2	RCP24AH2301	Econometric Modelling and Financial Analytics	3			25	15	15	15	60	100	3	4	
	H2	RCP24AH2301L	Econometric Modelling and Financial Analytics Laboratory			2	25				25	50	1		
Sem-VI															
4	H2	RCP24AH2351	Intelligent Trading Systems & Risk Analytics	3			25	15	15	15	60	100	3	4	
	H2	RCP24AH2351L	Intelligent Trading Systems & Risk Analytics Laboratory			2	25				25	50	1		
Sem-VIII															
5	H2	RCP24AH2451	Decentralized Systems	4			25	15	15	15	60	100	4	4	
Total				16		4	175			75	350	600		18	

Prepared by:

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Checked by:

Dr. S.P. Patil

Prof. Dr. D. R. Patil

BOS Chairman

Prof. S. P. Shukla

C.O.E.

Prof. Dr. P. J. Deore

Dean Academics/Dy. Director

Prof. Dr. J. B. Patil

Director



**Honors Degree Program in FinTech
Artificial Intelligence and Machine
Learning
Semester - IV**



Program: Honors Degree Program in FinTech Artificial Intelligence and Machine Learning	S. Y. B.Tech	Semester: IV
Quantitative Finance (RCP24AH2251)		

Prerequisites: Foundation of Finance

Course Objective(s):

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, the learner will be able to:

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyse risk and return metrics, and evaluate asset pricing using CAPM, APT, and multi-factor models.	L2	Understand
CO2	Calculate and interpret the prices of derivatives (options and swaps) using analytical and numerical methods such as the Black–Scholes model and numerical integration.	L3	Apply
CO3	Design and evaluate option trading strategies such as spreads, straddles, and condors, and interpret their payoff profiles.	L2	Understand
CO4	Assess alternative investment options and structured products, and estimate their values using appropriate quantitative techniques (DCF, NPV, cost of carry).	L5	Evaluate



Quantitative Finance (RCP24AH2251)

Course Contents

Unit-I 07 Hrs.

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

Unit-II 08 Hrs.

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.

Unit-III 10 Hrs.

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.

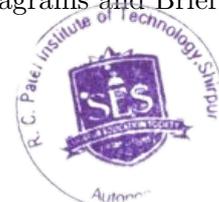
Unit-IV 09 Hrs.

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.

Unit-V 08 Hrs.

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.

Text Books:

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/>

