DEPARTMENT OF COMPUTING TECHNOLOGIES

Honors in Financial Technologies

Curriculum for Honors in Financial Technologies					
Course Code	*Course Title*	*Hours/ Week*			
		L	*T*	*P*	*C*
Foundation Courses					
21HCSF006	*Programming for Financial Technologies*	*2*	*1*	*0*	*3*
21HCSF007	*Financial Technologies Foundations*	*3*	*0*	*0*	*3*
21HCSF008	*Algorithmic Trading*	*3*	*0*	*0*	*3*
Professional Electives (To choose any Three)					
21HCSE024	*Artificial Intelligence in Banking and Financial Sector*	*3*	*0*	*0*	*3*
21HCSE026	*Digital Marketing for Financial Products*	*3*	*0*	*0*	*3*
21HCSE029	*Compliance and Regulatory Technologies*	*3*	*0*	*0*	*3*
21HCSE037	*Block Chain Management*	*3*	*0*	*0*	*3*
21HCSE038	*Design Thinking and Innovation*	*3*	*0*	*0*	*3*
	Total Learning Credits				***18***

Course Code	21HCSF006	Course Name	Programming for Financial Technologies	Course Category	F	Foundation Course	L	T	P	C
							2	1	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	
Course Offering Department	Computing Technologies	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	To know the fundamentals of financial technology
CLR-2 :	To work with python for financial applications
CLR-3 :	To understand the importance of linear, non-linear programming, root finding algorithms
CLR-4 :	To utilize StockOption base class for pricing and perform statistical analysis of time series data
CLR-5 :	To use machine learning techniques in python for finance
CLR-6 :	To implement deep learning techniques in python for finance

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Program Learning Outcomes (PLO)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design,	Modern Tool Usage	Society & Culture	Environment &	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	To know the evolution and understand the fundamentals of financial technology. To work with spreadsheet application in finance	3	2	-		2	-	-	-	-	-	-	-	-	-	-
CLO-2 :	To Gain introductory programming skills in finance using python platform	3	2	-		2	-	-	-	-	-	-	-	-	-	-
CLO-3 :	To perform statistical analysis for time series data and interactive financial analytics	3	2	-		2	-	-	-	-	-	-	-	-	-	-
CLO-4 :	To implement machine learning for financial applications	3	2	-		2	-	-	-	-	-	-	-	-	-	-
CLO-5 :	To design an application using deep learning techniques for finance	3	2	-		2	-	-	-	-	-	-	-	-	-	-

Unit-1 **9 Hours**

What is Financial Technology - Fin Tech Evolution 1.0: Infra structure - Fin Tech Evolution 2.0: Banks - Fin Tech Evolution 3.0, 3.5: Startups and Emerging Markets - Spreadsheet applications

Prices, Interest, Time - Algorithms and Financial Technology - Programming languages for financial technology - Why python for finance? Python for finance. - Overview of Financial Analysis with Python - Installation of Jupiter Notebook. Setting up and working with Quandl

Unit-2 **9 Hours**

Financial Concepts: The importance of Linearity in Finance, The capital Asset Pricing Model and the security market line - The Arbitrage Pricing Theory Model - Multivariate linear regression of factory models, Linear Optimization

Linear Programming, Integer Programming - Solving linear equations using matrices, The LU decomposition - The Cholesky decomposition, The QR decomposition, Nonlinearity in Finance- Nonlinearity Modeling - Root finding Algorithms

Scipy implementations in root-finding

Unit-3 **9 Hours**

Numerical Methods for Pricing Options-Introduction to options, Binomial trees in option pricing - Pricing European options, Writing the stock option base class - The Greeks for free, Trinomial trees in option pricing, Lattices in option pricing

Example using Stock Option base class - Statistical analysis of time series data – The dow jones industrial average and its components - Applying a kernel PCA, Stationary and non-stationary time series - Analyzing a time series with trends, making a time series stationary - Forecasting and predicting a time series - Interactive Financial Analytics with the VIX Volatility derivatives - Financial analytics of the S & P 500 and the VIX - Calculating VIX Index
Unit-4 **9 Hours** Machine learning for finance- Introduction to machine learning - Use of Machine learning in finance, Supervised and Unsupervised learning - Classification and regression in supervised machine learning, Overfitting and under fitting models - Featured Engineering - Scikit learn for machine learning. Predicting prices with a single-asset regression model -Linear regression by OLS, Preparing the independent and target variables. Writing the linear regression model, Risk metrics for measuring prediction performance - Ridge regression, Other regression models - Prediction of prices using Regression models - Predicting trends with classification-based machine learning -Preparing the target variables, Preparing the dataset of multiple assets as input variables - Logistic regression - Risk metrics for measuring classification-based predictions - Support Vector classifier, Other types of classifiers
Unit-5 **9 Hours** Deep Learning for Finance-A Brief Introduction to deep learning. Working with Tensorflow - A deep learning price prediction model with tensor flow – Feature engineering our model, Requirements - A deep learning price prediction model with tensor flow – Feature engineering our model, Requirements, Downloading the dataset, Scaling and splitting the dataset, Building an ANN with tensorflow - Price prediction model with tensorflow - Credit card payment default prediction with keras -Introduction, Installation, Obtaining, Splitting, and scaling the data - Designing a deep neural network with five hidden layers using keras - Measuring the performance of our model

Learning Resources	1. *Introduction to Financial Technology by Roy S. Freedman, First Edition, 2006, Elsevier* 2. *Mastering Python for Finance, James Ma Weiming, Packt Publishing*	*3.Python for finance – Analyze big Financial data, Yves Hilpisch, Oreilly*

	Bloom's Level of Thinking	Formative CLA – 1 Average of unit test (50%)		Life Long Learning CLA – 2 Practice (10%)		Summative Final Examination (40% Weightage)	
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	35%	-	35%	-	35%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	%	-
Level 6	Create	-	-	-	-	%	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Mrs. Sharon Menezes, Associate Manager, Accenture Solutions Pvt.Ltd.	*1. Dr. Srinivasa Rao Bakshi, IITM*	*1. Dr.TYJ Naga Malleswari, SRMIST*
	2. Dr. Ramesh Babu, N	
	3. Dr.Noor Mahammad, IIITDM	

Course Code	21HCSF007	Course Name	Financial Technologies Foundations	Course Category	F	Foundation Course	L	T	P	C
							3	0	0	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computing Technologies*	**Data Book / Codes/Standards**	*Nil*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	Understand how finance and technology have evolved and are transforming finance around the world
CLR-2 :	Discuss major technological trends, including cryptocurrencies, Blockchain, AI and Big Data
CLR-3 :	Know the progress of FinTech Regulations

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Program Learning Outcomes (PLO)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Engineering Knowledge	Problem Analysis	Design &	Analysis, Design, Research	Modern Tool	Society & Culture	Environment &	Ethics	Individual & Team	Communication	Project Mgt. &	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Understand how Artificial Intelligence, Big Data, Crypto currencies and Block chain is changing the Financial World.	*3*	*2*	*1*	*3*	*2*	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Explore the recent developments in digital financial services.	*3*	*2*	*1*	*3*	*2*	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Analyse the progress of FinTech Regulations	*3*	*2*	*1*	*3*	*2*	-	-	-	-	-	-	-	-	-	-

Unit-1 Introduction **9 Hours**

FinTech: Introduction– FinTech Evolution: Infrastructure, Collaboration between Financial Institutions and Start-ups –FinTech Typology – Emerging Economics: Opportunities and Challenges – Introduction to Regulation Industry

Unit-2 - Blockchain Cryptocurrency and other services **9 Hours**

Payments, Crypto currencies and Blockchain – Introduction – Individual Payments –Digital Financial Services – Mobile Money – Regulation of Mobile Money – SFMS – RTGS – NEFT –NDS Systems – Crypto currencies – Legal and Regulatory Implications of Crypto currencies –Blockchain – The Benefits from New Payment Stacks .

Unit-3 – Digital Finance and Innovation **9 Hours**

Digital Finance and Alternative Finance -Introduction – Brief History of Financial Innovation – Digitization of Financial Services – FinTech & Funds- Crowd funding– Regards, Charity and Equity – P2P and Marketplace Lending – New Models and New Products – ICO

Unit-4 – Regulations and Compliance **9 Hours**

FinTech Regulation and RegTech -Introduction – FinTech Regulations Evolution of RegTech – RegTech Ecosystem: Financial Institutions – RegTech Ecosystem Ensuring Compliance from the Start: Suitability and Funds – RegTech Startups: Challenges –RegTech Ecosystem: Regulators Industry –Use Redesigning Better Financial Infrastructure

Unit-5 – Application , Challenges and Future of Fintech **9 Hours**

Data & Tech – Introduction– Data in Financial Services –Application of Data Analytics in Finance – Methods of Data Protection – How AI is Transforming the Future of FinTech –Digital Identity – Change in mindset: Regulation 1.0 to 2.0 (KYC to KYD) – AI & Governance – New Challenges of AI and Machine Learning – Challenges of Data Regulation

Learning Resources	1. Susanne Chishti and Janos Barberis, "The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries", John Wiley, 1st Edition, 2016 2. Theo Lynn, John G. Mooney, Pierangelo Rosati, Mark Cummins, "Disrupting Finance: FinTech and Strategy in the 21st Century", Palgrave, 1st edition, 2018 *3.* Abdul Rafay, "FinTech as a Disruptive Technology for Financial Institutions", IGI Global, January, 2019	

	Bloom's Level of Thinking	Formative CLA – 1 Average of unit test (50%)		Life Long Learning CLA – 2 Practice (10%)		Summative Final Examination (40% Weightage)	
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	35%	-	35%	-	35%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Dr. Mariappan Vaithilingam, Senior Engineering Manager, Uber India Research	*Mr. Babu Monie,, CEO, Digital Analyst Team, Northwestern University*	*Dr.S.S.Sridhar, SRMIST*

Course Code	21HCSF008	Course Name	Algorithmic Trading	Course Category	F	Foundation Course	L	T	P	C
							3	0	0	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computing Technologies*	**Data Book / Codes/Standards**	*Nil*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	Understand the fundamentals of trading and markets
CLR-2 :	Learn mathematical models support trading and markets
CLR-3 :	Understand the trading data
CLR-4 :	Trading data analysis and visualization

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*
CLO-1 :	*To know the evolution and understand the fundamentals of financial technology. To work with spreadsheet application in finance*
CLO-2 :	Acquire the knowledge on the fundamentals of trading and markets
CLO-3 :	Mathematical models for trading and markets
CLO-4 :	Data storage for trading analysis

Program Learning Outcomes (PLO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
3	*2*	-	-	-	-	-	-	-	-	-	-	-	-	-
3	*2*				-	-	-	-	-	-	-	-	-	-
3	-	-			-	-	-	-	-	-	-	-	-	-
-	*2*	-			-	-	-	-	-	-	-	-	-	-

Unit-1 **9 Hours**

An Overview of Trading and Markets - Financial Modelling - High-Frequency Trading - Low Latency Trading - Background to Forex markets, chart reading, basic indicators - Tracking Funds - Tracking – Benchmarks - Algo Trading Strategy Infrastructure - Basic mathematics for timeseries - White noise and Brownian motion – Autocovariance – Autocorrelation - Cross Validation, Bootstrap - ARMA models Factor-Based Trading Strategie

Unit-2 **9 Hours**

Portfolio Optimization - Black-Litterman Model - Robust Portfolio Optimization - Robust Portfolio Management - Transaction Costs - Trade execution - Transaction Costs - Optimal Strategies - Order Placement Execution Tactics - Enhancing Trading Strategies - Pattern Recognition Models: Bayesian Networks Hidden Markov Models - Decision Trees - Random Forests - Support Vector Machine

Unit-3 **9 Hours**

Understanding Data - Data Sources - Data Storage - Importance of data cleanliness - Cleaning data (basic) - Cleaning data (Advanced) - Bad ticks inaccurate testing and market tricksters - Understanding trade Sources of trading ideas - Types of strategies - Grading ideas - Big hedge funds - Statistical significance - Math behind Indicators - Coding Arrays and Indicators

Unit-4 **9 Hours**

Playing with Time - Datetime data type - Coding rules revolving date and time manipulation - Managing Trades - Orders and Positions - Multiple order management - Modelling transaction cost Using Excel Magic to Improve our Trading - Excel trading game – Syntax - Conditional statements – Loops - Excel advanced features - Data time zone manipulation - Advanced data cleaning methodologies

Unit-5 **9 Hours**

Creating a Dashboard - Graphics and Labels - Read and write information to Excel - Build a spread logger - Global Macro High-Frequency Trading - Market Microstructure - Semi-Algorithmic Trading Paper versus Live trading - Minimum Capital Determination - Virtual Private Servers - Downtime Prevention Protocol - Understanding Trading Psychology - Design, build and test a strategy Web scrapping - Web API

Learning Resources	1. Barry Johnson, Algorithmic Trading & DMA, 4Myeloma Press London, 2010	2. Frank J. Fabozzi, Sergio M. Focardi, and Petter N. Kolm, Quantitative Equity Investing: Techniques and Strategies (Wiley, 2010).

	Bloom's Level of Thinking	Formative CLA – 1 Average of unit test (50%)		Life Long Learning CLA – 2 Practice (50%)		Summative Final Examination (40% Weightage)	
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	35%	-	35%	-	35%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mrs. Elanthedral Ramadass, Team Leader, Infosys Pvt. Ltd.	Dr. C. Vijayalakshmi, Associate Professor, Department of Statistics and Applied Mathematics, Central University of Tamil Nadu, Thiruvarur	Dr. Parthiban Natarajan, SRMIST
Mr. Jagan Gopal, Lead Software Engineer at Fidelity Investments		

Course Code	21HCE024	Course Name	ARTIFICIAL INTELLIGENCE IN BANKING AND FINANCIAL SECTOR	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computing Technologies	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understand the fundamentals of Artificial Intelligence
CLR-2 :	Learn Solving Problems by Searching Techniques
CLR-3 :	Understand the principles of Agents that Reason Logically, First-Order Logic, Building a Knowledge Base and Planning
CLR-4 :	Get introduced to basics of Natural Language processing
CLR-5:	Acquire knowledge on an Artificial Intelligence in Banking and Finance

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Program Learning Outcomes (PLO)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Describe the fundamentals of Artificial Intelligence	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Acquire the ability to apply searching techniques to Solve Problems	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Acquire the knowledge on Agents, First-Order Logic, Building a Knowledge Base and Planning	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Explain the principles of Natural Language processing	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-5:	Analyze the role of Artificial Intelligence in Banking and Finance Sector	3	-	-	2	-	-	-	-	-	-	-	-	-	-	-

Unit-1 : Introduction **9 Hours**

Introduction to Artificial Intelligence - The foundations and history of Artificial Intelligence - Structure of intelligent agents - Formulating problems - Toy and Real-world problems - Searching for solutions - Search strategies and constraint satisfaction search - Informed search Methods - Best-First Search - Heuristic functions - Iterative improvement algorithms - A knowledge-based agent - The Wumpus world environment Representation - Reasoning and Logic - Propositional logic - An agent for the Wumpus world

Unit-2 - Logic **9 Hours**

First-Order Logic – Syntax – Semantics – Extensions - Notational variations - Using first-order logic - Logical agents for the Wumpus world - A simple reflex agent - Representing change in the world - Deducing hidden properties of the world - Preferences among actions and goal-based agent - Properties of knowledge bases - Knowledge engineering and programming - Introduction to general ontology - Representing categories – Measures - Composite objects, representing change with events - Times, intervals, and actions - The grocery shopping world

Unit-3 – Planning and Problem solving **9 Hours**

Logic programming systems - Frame systems and semantic networks - Planning agent - Problem solving to planning - Planning in situation calculus - Basic representations for planning - A partial-order planning example - A partial-order planning algorithm - Planning with partially instantiated operators - Knowledge engineering for planning - Practical planners - Hierarchical decomposition - Analysis of hierarchical - decomposition - More expressive operator descriptions, resource constraints - Conditional planning - Replanning agent - Integrated planning and execution - Extensions

Unit-4 – NLP **9 Hours**

Natural Language processing - practical applications - Efficient parsing - Scaling up the lexicon - Scaling up the grammar – Ambiguity - Discourse understanding - How AI disrupting Banking & Finance - AI as a Strategy at the Top Level, Cost of investing in AI - Crucial leadership involvement, Inorganic Growth - Development status of different AI technologies - Ownership of AI journey, How to scale an AI development

program?, What data strategy required to succeed, How to manage a human - AI hybrid workforce? What is machine learning (ML), ML Types, Making of ML - Examples of ML, Business use case - Steps to build ML model for business use case - How AI is being used to enhance customer experience?, AI in emerging financial services - AI transforming lending landscape - Wealth management with AI
Unit-5 – RPA and Case study **9 Hours** Big data workflow for investment managers, Robo advisors - Impact of AI driven robot advisors on industry - AI in insurance, Management of quality portfolio with the help of AI - Case study: insurance & AI - Robotics Process Automation (RPA), Why/how RPA fits in to banking and finance industry model, RPA methodology - RPA value chain for banking domain AI powered RPA, Implementation strategy for RPA - Robotic Process automation means in practice, Best practices for RPA automation - General uses of RPA, Benefits of RPA, Myths of RPA, Examples of RPA usage across different industries - Chat bot & virtual assistants, Chat bot use cases, Strategy for launch of successful virtual assistant or chat bot - Characteristics of well-designed chat bot - AI & Fraud Detection - Fraud is the top agenda - Financial crime intelligence - Unique characteristics of fraud - What machine learning can do?, Biometric authentication - Future biometric with AI, AI blended with facial recognition - Comprehending the AI technology - Risk, Issues and Challenges with AI - Nature of risk involved, Nature of issues, Challenges - Process re-engineering, What lies in the future?

Learning Resources	1. *Stuart Russell, Peter Norvig, "Artificial Intelligence - A Modern Approach", Pearson, Fourth Edition, 2020.* 2. *Raj Singh, "Artificial Intelligence in Banking & Finance: How AI is Impacting the Dynamics of Financial Services", Adhyyan Books, 2019.* 3. *Elaine Rich, Kevin Knight, Shivashankar B. Nair, Artificial Intelligence, Tata McGraw-Hill Publishing Company Limited, Third Edition, 2019.*	4. *Parag Kulkarni, Prachi Joshi, "Artificial Intelligence – Building Intelligent Systems", PHI learning private Ltd, 2015.* 5. *Chi Chan, David Nayler, Jayant Raman, Matthew Baker, "Artificial Intelligence Applications in Financial Services - Asset Management, Banking and Insurance", Marsh & McLennan Companies, 2019*

	Bloom's Level of Thinking	Formative CLA – 1 Average of unit test (50%)		Life Long Learning CLA – 2 Practice (10%)		Summative Final Examination (40% Weightage)	
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	35%	-	35%	-	35%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. N. Mohanraj, Software Engineer 2, PayPal Inc., Chennai	*Dr. M. Vinoth Kumar, Associate Professor, Department of Information Science and Engineering, Dayananda Sagar Academy of Technology and Management, Bangalore*	*Dr. M. Prakash, SRMIST*

Course Code	21HCE026	Course Name	DIGITAL MARKETING FOR FINANCIAL PRODUCTS	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computing Technologies	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Impart knowledge required to understand digital marketing concepts for financial products
CLR-2 :	Impart different strategies adapted for digital marketing for financial products
CLR-3 :	Understand the social media impact in digital marketing of financial products
CLR-4 :	Learn various metrics and analytics of an advertisement, concept of affiliate marketing
CLR-5:	Impart knowledge to understand the customer behavior and customer retention

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Program Learning Outcomes (PLO)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Create /Build a basic website for a financial institution offering various financial products and quality content for the financial products	2	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Create the landing page (for ad of the financial product), where people end up after click the ad	2	2	2	2		-	-	-	-	-	-	-	-	-	-
CLO-3 :	Create e newsletters, auto responders and blog posts for the financial products	2	2	3	2		-	-	-	-	-	-	-	-	-	-
CLO-4 :	Understand the affiliate marketing strategy of financial institutions	2	2	3	2		-	-	-	-	-	-	-	-	-	-
CLO-5:	Analyze the key metrics involved in online digital marketing	2	2	2	2											

Unit-1 **9 Hours**

Introduction to digital transformation, Programmatic marketing - Introduction to Artificial intelligence, Virtual and augmented reality in digital marketing - Online buying behavior of digital customers, Privacy of digital customers, Digital transformation in large financial institutions - Four Ps of digital Marketing, Review of major financial services/ products - Development of a website (basic structure) for a financial institution with different services / products (word press), Viral marketing , Paid, earned, owned and Content marketing - Influencers, Attribution - Public relations and reputation management - Legal considerations, Digital marketing objectives - Implement the security modules required to protect financial transactions in the developed website , Introduction to Website development - Usability , Web presence ownership, management and development - Basic site architecture, Online presence and credibility - Content development, Global web presence - Develop the high quality content for a financial product for a developed website

Unit-2 **9 Hours**

Introduction to Search engine optimization (SEO), How search engines work, Keyword selection, On- site optimization, Off- site optimization - Strategic search engine optimization, Third- party search engine ranking - Implementation of the SEO modules in the developed website - Introduction to ecommerce, Fulfilment, The e- commerce website, Multi- channel retailing , Role of e-commerce in financial services Chatbots, New Marketing roles, Video content & advertising - Live stream & Webinars, Data-driven digital marketing for banks - Advertising Online, Pay-per-click advertising (PPC) - Programmatic advertising Objectives and management - Online ad formats, Landing pages - Search advertising , Network advertising - Create a web page (landing page) where people end up after click the ad for any one of the financial product.

Unit-3 **9 Hours**

Email marketing, Email as a medium for direct marketing - Email as a medium for marketing messages, Email newsletters - Mailchimp, HubSpot, ConvertKit, Autopilot, ActiveCampaign - Develop a multiple financial products newsletter and publish in the developed website and email the subscribers - Auto responders email fundamentals - Benefits and types - Up sell and Cross sell - Important Email metrics

Implementation of auto responders (email) for queries on financial products - Marketing on Social Media – Blogging - Consumer reviews and ratings, Social networking, Social sharing, Measure and monitor, Social media service and support - Strategic marketing on social media - Implement a blog (write about a financial product in the developed website
Unit-4 **9 Hours** Membership sites : Pros and Cons, Membership site structure and functionality - Best practices in planning and managing display ad campaign - Interactive Display advertising , Advantages and disadvantages Case study : Understanding a Bank's Social Media Strategy (ex: HDFC bank) - Implementation of interactive display advertisement in the developed website - Affiliate marketing, Advantages and disadvantages Best practice in planning affiliate marketing - Best practice in managing affiliate marketing - Case study : Affiliate marketing adopted to any one of the financial products (ex: kotak 811) - Development of minimum functional basic affiliate marketing website (ex: Click Bank) - Metrics and analytics : Basics Role of data mining in advertisement analytics - Page views, Unique page views, CPC, CPA, Bounce rate, Average time on the page, CPV, Configure the Adsense in the developed website and analysis of Adsense metrics from its dash board
Unit-5 **9 Hours** Direct traffic, referral traffic, search traffic - Task performance indicators - Customer perspective – Online customer behavior , B2C Online retail formats - Online retail strategic approaches , Omni channel retailing Advertising Analytics Management and configuration for the developed website - Types of B2B organizational marketing , B2B e market places for financial products - B2B trading environments, Inter organizational trading - Customer retention in B2B marketing - Case study : Growth analysis of Online retail business of financial products - Configuring the developed website to mobile friendly responsive website , Introduction to website intelligence and return on investment - Measuring the digital marketing success for financial products - Testing, investing, Tweaking, reinvesting , action stations - Return of Investments (ROI) - Study of Simulation tools available for Emarketing

Learning Resources	1. *Alan Charlesworth, Digital Marketing -A Practical Approach, Third Edition, Taylor and Francis group, 2018* 2. *Dave Chaffey, Fiona Ellis chandwick, Digital Marketing, Sixth edition, Pearson Education Ltd, 2016* 3. *Robert W. Bly, the Digital Marketing Handbook, Entrepreneur Press Publishers, 2018*	4. *Damian Ryan and Calvin Jones, Understanding Digital Marketing, Marketing strategies for engaging the digital generation, Replika Press Pvt Ltd, 2009* 5. *Simon Kingsnorth, Digital Marketing strategy- An integrated approach to online marketing, First Edition, Kegan Page, 2016* 6. *Will Rowan, Digital Marketing, Kogan Page Ltd, 2002.*

	Bloom's Level of Thinking	Formative CLA – 1 Average of unit test (50%)		Life Long Learning CLA – 2 Practice (10%)		Summative Final Examination (40% Weightage)	
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	35%	-	35%	-	35%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Mr. D. Karthi, Product Delivery Manager, L & T infotech		*1. Dr. R. Rajkamal, SRMIST*

Course Code	21HCSE029	Course Name	COMPLIANCE AND REGULATORY TECHNOLOGIES	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computing Technologies	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understand the fundamentals of Pattern Recognition techniques
CLR-2 :	Learn Statistical models of Pattern Recognition
CLR-3 :	Understand the principles of Clustering approaches to Pattern Recognition
CLR-4 :	Understand the Syntactic Pattern Recognition techniques
CLR-5:	Understand the Neural Network approach to Pattern Recognition

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Program Learning Outcomes (PLO)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Acquire the knowledge on the need of Compliance and its	3	3	-	-	3	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Acquire the ability to apply Statistical models in Pattern Recognition	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Utilize the principles of Clustering techniques on various problems	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Acquire the ability to apply syntactic pattern recognition techniques	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-
CLO-5:	Apply the knowledge gained on Neural pattern recognition methods	-	3	-	-	3										

Unit-1 **9 Hours**

Introduction to compliance–why comply - An Overview of Compliance in Financial Services - A brief history and evolution of compliance - Compliance in the twenty-first century-drivers of compliance - Compliance Regulations - Five basic elements of compliance-Compliance Culture - Cost-benefit analysis of active compliance - Active and passive compliance - Broad areas of Regulation in financial services - Supervision in financial services - Major bodies that define compliance boundaries for financial services - Compliance in the context of banking and financial services - Compliance Function - Role and Structure of Compliance Function - Composition and Independence of Compliance Function - Responsibilities of Compliance Function and CCO - Compliance Management System (CMS) - Compliance Audit- Compliance and Ethics

Unit-2 **9 Hours**

Compliance Management and Information Systems - Framework for Model-Based Compliance Management - Business Process Compliance-State-of-the-Art - Model-Based Business Process Compliance - analysis Approach - Evaluation Method for Business Process Compliance Analysis Approaches - Relevance and Acceptance of the Developed Compliance Checking Approach - Reporting Compliance- Challenges of Regulatory Reporting Requirements for Conceptual Modeling - Development of a Modeling Technique for Regulatory Reporting Requirements - Modeling Tool for Regulatory Reporting Requirements Application - Collaboration of IS Experts and Legal Experts - The Role of the Compliance Officer - Compliance Officer and the other stakeholders - The duties and responsibilities of the compliance officer - Compliance officer activities - The requirements of a Compliance Officer - Drafting compliance reports - Designing an Internal Compliance System - Compliance success factors

Unit-3 **9 Hours**

Compliance Framework- Managing The Compliance Maze - Compliance Maturity Matrix - The Strategy Framework - Structural Framework - Compliance Charter - Scope Setting- Compliance Functions Reporting Structures- Compliance Governance- Authority, Responsibility, and Accountability - Compliance Calendar- Reporting Requirements - Operationalizing Compliance- Operational Framework - Compliance Masters - Compliance Maps - Compliance Monitoring - Compliance Risk- Definition and Types - Compliance Risk Management- Risk Identification - Risk assessment - Example of Compliance Risk Scorecard - Risk mitigation- Risk Monitoring- Risk Remediation - Compliance risk reporting

Unit-4	**9 Hours**
Why regulate Compliance Management and Regulatory Requirements - Regulatory Environment of Banks - Regulatory Requirements Engineering- Regulatory Dialogue - Identification of the Influence of Regulation on IS Design (RQ1) - Improving the Efficiency and Effectiveness of Business Process Compliance Checking (RQ2) - Improving the Effectiveness and Efficiency of Conceptualizing Regulatory Reporting Requirements (RQ3) - Conceptualizing and Supporting the Collaboration of IS and Legal Experts (RQ4) - Regulatory frameworks - Regulatory Advisory - Significant Consequences of Regulatory Non Compliances - Regulatory Risks and Outcomes - Managing Regulatory Risk for the Benefit of Your Firm - Over-Regulated vs. Under-Regulated - Regulatory Change Management-Complaints Management - Breach Management Remediation Management - Training Management- Communication Management- Reporting Management	
Unit-5	**9 Hours**
RegTech in Financial Services-Issues and recent techniques - Regulatory and reporting requirements that would benefit from regtech - Regtech solutions- technologies improving data aggregation and management - Technology for advanced data analysis and interpretation - Technologies allowing for real-time compliance and risk management - Blockchain/ distributed ledgers in RegTech - Application Programming Interfaces (APIs) - AI in RegTech - Implementing Regtech In Financial Institutions: Barriers And Solutions - Obstacles in regulation and legislation - Data harmonization and definition issues Regulatory deadlines for IT upgrades - Outdated reporting portals and methods- Analytics for identifying suspicious transactions - Regulatory Innovation and Sandboxes - RegTech from a Regulatory Perspective Social Impact and Regulation - Regulatory Impact Assessments (RIA) - The Regtech Market: Barriers And Suggestions For Development	

Learning Resources	1. Ramakrishna, Saloni. *Enterprise compliance risk management: An essential toolkit for banks and financial services*. Vol. 641. John Wiley & Sons, 2015..	2. Eggert, Mathias. *Compliance Management in Financial Industries: A Model-based Business Process and Reporting Perspective*. Springer Science & Business Media, 2014. 3. Barberis, Janos, Douglas W. Arner, and Ross P. Buckley. *The REGTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries in Regulation*. John Wiley & Sons, 2019.

	Bloom's Level of Thinking	Formative CLA – 1 Average of unit test (50%)		Life Long Learning CLA – 2 Practice (10%)		Summative Final Examination (40% Weightage)	
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	35%	-	35%	-	35%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Dr. Mariappan Vaithilingam, Senior Engineering Manager, Uber India Research	*Mr. Babu Monie,, CEO, Digital Analyst Team, Northwestern University*	*Dr.S.S.Sridhar, SRMIST*

Course Code	21HCSE037	Course Name	BLOCKCHAIN MANAGEMENT	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computing Technologies	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understand the fundamentals of blockchain technology
CLR-2 :	Learn elements of blockchain environment
CLR-3 :	Understand the blockchain in business aspects
CLR-4 :	Understand various applications in blockchain business
CLR-5:	Understand the deployment of blockchain team

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Program Learning Outcomes (PLO)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Acquire the knowledge on the fundamentals of blockchain technology	3	3	-	-	3	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Acquire the ability to apply blockchain elements into business	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Utilize the blockchain techniques into business and financial scenarios	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Acquire the various blockchain applications	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-
CLO-5:	Apply the blockchain knowledge in deploying the blockchain team	-	3	-	-	3										

Unit-1 **9 Hours**

Introduction to blockchain - Need of blockchain - Working of Blockchain - Hashing Data - Authorization and Store Blockchain Transaction - Data Store usage and protection - Data Transaction and its History Data Integrity - Blockchain Limitations - Blockchain inventions - Distributed Systems: Blockchain - Generic elements of blockchain - Features of blockchain - Smart contracts and distributed consensus - Blockchain Technology Tiers - Types of Blockchain - Consensus in Blockchain

Unit-2 **9 Hours**

Decentralization: Blockchain - Methods and Route in decentralization concept - Decentralization Ecosystem and smart contracts - Decentralized autonomous and its applications - Decentralized platforms: A case study - Cryptography Technical Foundations - Cryptography: Confidentiality, Integrity and Authentication (CIA) - Cryptographic Primitives: AES, DES, MD, SHA and ECDSA - Blockchain: Bitcoin Blockchain Transactions - Blockchain Networks and Wallets - Smart Contracts - Ethereum 101 and its elements - Ethereum Development - Hyper ledger - Kadena Blockchain: A case study - Challenges on scalability, privacy and security in blockchain

Unit-3 **9 Hours**

Blockchain for Business - Blockchain Beliefs - Blockchain Enterprise - Benefits of blockchain Technology - Blockchain: Business and Technology Ledgers - Benefits for the Business - Implementation cost Opportunities and Challenges: Blockchain - Disruptive Elements - Blockchain: Transformative Opportunities - Blockchain Opportunities - Technical Aspects of Blockchain - Blockchain Enterprise: Technology and Business domain - Token Revolution - Fungibility and Network Extensibility - Way to blockchain enterprise Adoption - Business modeling and Design

Unit-4 **9 Hours**

Applications of blockchain technology in business - Creation and Growth of Blockchain Business - Cryptocurrencies Growth - Principles and Qualities: Blockchain - Financial Services in blockchain Market Manufacture: Supply chain Transformation - Role of Blockchain in IoT Ecosystem - Role of Blockchain in Edge Computing - Blockchain: Public Sector and Government - Blockchain: Healthcare and Life science Blockchain and Cybersecurity - Retail and Food Industry: Blockchain - Blockchain in data analytics - Growth of Blockchain in Gaming - Business Applications: Blockchain - Decentralized sharing during blockchain transaction - Deployment of blockchain in Enterprise

Unit-5 **9 Hours**

Building the blockchain Project- Enterprise structure in decentralized economy - Roles of enterprise in blockchain Networks - Building Effective Blockchain Team - Blockchain Project team: Case Study Blockchain project financial: Fundamentals - Blockchain Investment: Rubric- Proof of Concept - Risk Governance and Scaling the growth - Investment Modeling: Return - Risk Modeling - Risk Modeling: A framework - Blockchain: Future - Nexus Technology: Blockchain A Case study - Internet of Things (IoT): Blockchain A case study - Artificial Intelligence: Blockchain A case study - Quantum Computing: Blockchain A case study

Learning Resources	1. *Daniel Drescher, "Blockchain Basics: A Non-Technical Introduction in 25 Steps," Apress, 2017.* 2. *Imran Bashir, "Mastering Blockchain: Deeper insights into decentralization, cryptography, bitcoin, and popular blockchain frameworks," Packt Publications, 2017.*	3. *Jai Singh Arun, Jerry Cuomo and Nitin Gaur, "Blockchain for business," Addison Wesley, Pearson Publications, 2019.* 4. *Mohsen Attaran and Angappa Gunasekaran, "Applications of Blockchain Technology in Business: Challenges and Opportunities," Springer, 2019.*

	Bloom's Level of Thinking	Formative CLA – 1 Average of unit test (50%)		Life Long Learning CLA – 2 Practice (10%)		Summative Final Examination (40% Weightage)	
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	35%	-	35%	-	35%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. G.A. Vijayakumar, Consulting Architect, Technology Transformation, Cyber Security, CISCO, Singapore	*Dr. Gunasekaran Raja, Professor, Anna University, MIT Campus, Chennai*	*1. Dr. J. Ramkumar, SRMIST*
		2. Dr. M. Baskar, SRMIST
		3. Dr. A. Suresh, SRMIST

Course Code	21HCSE038	Course Name	DESIGN THINKING AND INNOVATION	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computing Technologies	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	To introduce the idea of Design Thinking for development
CLR-2 :	To understand the different practices of design thinking
CLR-3 :	To influence the usage of tools in design thinking process
CLR-4 :	To study about the design thinking process in Industry
CLR-5:	To develop a design based on the methodology

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Program Learning Outcomes (PLO)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Apply the design thinking ideas in the development of products	3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Identify and apply the design thinking process	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Use the different design thinking tools	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Analyze and apply the design thinking process in different Industry	3	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CLO-5:	Develop a design thinking process for the product	3	3	3	2	-										

Unit-1 **9 Hours**

Introduction of Design Thinking - Why it is Popular? Design Thinking – An Innovative Thinking - What is Design Thinking - Principles of Design Thinking - Plan Design Thinking Project - Problem Identification Understand the Problem - Problem Clarification - Understanding the Problem - Problem Analysis - Reformation of the Problem - Steep Analysis, Strategic Priorities - Shared model in team based deign Theory and Practice in design Thinking - MVP/Prototyping – Prototyping - Case Study - Activity System, opportunity mapping

Unit-2 **9 Hours**

Design Thinking Methodology - Stages of Design Thinking Pr0cess - Stage 1: Empathies with your user - Build Empathic approach in design thinking - Context mapping - User Interviews - Observations, Need Finding - Stage 2: Synthesising Information – Personas - Stakeholder Map - Stage 3: Ideation - Ideation Methods - Selection of Best Ideation Method – Ideation - Stage 4: Building a Prototype - Methods to build Prototype - Stage 5 : Test Feedback, Heuristic Evaluation - Unmoderated Remote Usability Testing Prototyping

Unit-3 **9 Hours**

Introduction about the Tools of Design Thinking - Selection of the Tools – Visualization - Applications of Visualization - Journey Mapping - Applications of Journal Mapping - Story Boarding Value Chain Analysis - Examples of Value Chain Analysis - Mind Mapping - Usage of Mind Mapping - Rapid Concept Development - Assumption Testing - Mind Mapping - Rapid Prototyping - Application of Rapid Prototyping - Customer Co-Creation - Learner Launches - Story Telling - Applications of Customer Co-creation and Story Telling - Co-Creatio

Unit-4 **9 Hours**

Design Thinking For strategic innovations- Growth – Predictability – Foresight - Strategic Change - Examples of Change - Concept Synthesis - Maintenance Relevance - Value Redefinition - Extreme Competition Experience Design – Standardization - Examples in Standardization - Strategic Requirements – Humanization - Creative Culture - Rapid Prototyping – Organization - Business Process Model - Examples of Business Process Model - Evolved Activity System

Unit-5 **9 Hours**

Case Study 1: Nike- Design Thinking influences everything NIKE does - Case Study 2: Apple - Think about Innovation through Design Thinking - Case Study 3: Google - How to Brainstorm like a googler Analysis of Case study 1 - 3 Case Study 4: Makassar, Indonesia - Using design thinking to improve Traffic congestion in city - Case Study 5: GE Health Care - Building a better MR scanner experience for children by using paintings and storytelling - Case Study 6: Deutsche Bank - Design Thinking to Achieve Customer Proximity - Analysis of Case Study 4 - 6 Case Study 7: Proctor & Gamble - Classic oil of Olay and Design Thinking Case - Case Study 8: Pepsi Co - Indra Nooyi Turned Design Thinking into Strategy - Case Study 9: Hearken - How Design Thinking is applied to Journalism - Analysis of case study 7 - 9

Learning Resources	1. Handbook_of_Design_Thinking_ebook_kindle_excerpt. 2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009 3. http://opendesignproject.weebly.com/uploads/2/9/1/6/29168267/design_thinking_-_darden.pdf 4. https://www.interaction-design.org/courses/design-thinking-the-beginner-s-guide	5. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013. (Unit IV) 6. Handbook_of_Design_Thinking_ebook_kindle_excerptt 7. https://www.rcsc.gov.bt/wp-content/uploads/2017/07/dt-guide-book-master-copy.pdf

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		Theory	Practice	Theory	Practice	Theory	Practice
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Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Dr. Mariappan Vaithilingam, Senior Engineering Manager, Uber India Research	*Mr. Babu Monie,, CEO, Digital Analyst Team, Northwestern University*	*Dr.S.S.Sridhar, SRMIST*