

**FACULTY OF SCIENCE AND HUMANITIES**

**ACADEMIC CURRICULA**

**UNDERGRADUATE DEGREE PROGRAMME**

**Bachelor of Computer Applications (Honors)  
in  
Data Science**

**MULTIDISCIPLINARY COURSES**

**National Education Policy**

**Learning Outcome-based Curricula Framework**

**National Credit Framework**

**Academic Year**

**2024 - 2025**



**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**(Deemed to be University u/s 3 of UGC Act, 1956)**

**Kattankulathur, Chengalpattu District 603203, Tamil Nadu, India**

**8.2 Multidisciplinary Courses offered by the Department of Computer Applications to all Departments (including Department of Computer Applications)**

| <b>Multidisciplinary Courses (M)</b> |                    |                        |                          |          |          |          |
|--------------------------------------|--------------------|------------------------|--------------------------|----------|----------|----------|
| <b>Semester</b>                      | <b>Course Code</b> | <b>Course Title</b>    | <b>Sessions Per Week</b> |          |          | <b>C</b> |
|                                      |                    |                        | <b>L</b>                 | <b>T</b> | <b>P</b> |          |
| II                                   | UDS24M01J          | Internet of Things     | 2                        | 0        | 2        | 3        |
| III                                  | UDS24M02J          | Digital Transformation | 2                        | 0        | 2        | 3        |
| V                                    | UDS24M03J          | Blockchain Technology  | 2                        | 0        | 3        | 3        |
| <b>Total Learning Credits</b>        |                    |                        |                          |          |          | <b>9</b> |

| Course Code | UDS24M01J | Course Title | Internet of Things |  |  |  | Category | M | Multidisciplinary Course | L | T | P | C |
|-------------|-----------|--------------|--------------------|--|--|--|----------|---|--------------------------|---|---|---|---|
|             |           |              |                    |  |  |  |          |   |                          | 2 | 0 | 2 | 3 |

| Course Offering Department | Computer Applications | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                                                                                                                                                                            | Depth    |        |           |         | Attainment                |                          |                         | Programme Learning Outcomes                    |                                            |                                                                                                                        |                                              |                                            |                             |       |       |   |    |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|---------------------------|--------------------------|-------------------------|------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------|-----------------------------|-------|-------|---|----|
|       |                                                                                                                                                                                                                                                                       | 1        | 2      | 3         | 4       | 1                         | 2                        | 3                       | 1                                              | 2                                          | 3                                                                                                                      | 4                                            | 5                                          | 6                           | 7     | 8     | 9 | 10 |
| CLR-1 | Demonstrate the design, communication model and enabling technologies for IoT.                                                                                                                                                                                        | Conceive | Design | Implement | Operate | Bloom's Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills | Value Incultation, Multicultural Inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |   |    |
| CLR-2 | Explore the system management and domain for various applications of IoT                                                                                                                                                                                              |          |        |           |         |                           |                          |                         |                                                |                                            |                                                                                                                        |                                              |                                            |                             |       |       |   |    |
| CLR-3 | Categorize the various protocols that are used for developing IoT applications.                                                                                                                                                                                       |          |        |           |         |                           |                          |                         |                                                |                                            |                                                                                                                        |                                              |                                            |                             |       |       |   |    |
| CLR-4 | Deploy an IoT application and connect to the cloud.                                                                                                                                                                                                                   |          |        |           |         |                           |                          |                         |                                                |                                            |                                                                                                                        |                                              |                                            |                             |       |       |   |    |
| CLR-5 | Develop IoT application for real time scenario.                                                                                                                                                                                                                       |          |        |           |         |                           |                          |                         |                                                |                                            |                                                                                                                        |                                              |                                            |                             |       |       |   |    |
| CLO   | At the end of this course, learners will be able to:                                                                                                                                                                                                                  |          |        |           |         |                           |                          |                         |                                                |                                            |                                                                                                                        |                                              |                                            |                             |       |       |   |    |
| CLO-1 | Apply the knowledge/understanding of mathematics, science, to the solution of complex problems applicable to the discipline.                                                                                                                                          | ✓        | ✓      | -         | -       | 2                         | 85                       | 75                      | 3                                              | -                                          | 1                                                                                                                      | 1                                            | 2                                          | -                           | -     | 2     | 2 | 1  |
| CLO-2 | Design, implement, and evaluate a computer-based system, process, component, or program to meet desired solutions that meet the specified needs with suitable concern for the public health and safety, and the cultural, societal, and environmental considerations. | ✓        | ✓      | ✓         | -       | 2                         | 85                       | 75                      | 3                                              | 2                                          | 1                                                                                                                      | 2                                            | 2                                          | -                           | -     | 1     | 2 | 1  |
| CLO-3 | Create, select, and apply applicable techniques, resources, and modern engineering and IT tools to complex engineering activities with an understanding of the limitations.                                                                                           | ✓        | ✓      | ✓         | ✓       | 3                         | 85                       | 75                      | 3                                              | 1                                          | 3                                                                                                                      | 1                                            | 3                                          | -                           | -     | 1     | 3 | 2  |
| CLO-4 | Function successfully as an individual, and as a member or leader in assorted teams, and in multidisciplinary settings.                                                                                                                                               | ✓        | ✓      | ✓         | ✓       | 3                         | 85                       | 75                      | 3                                              | 3                                          | 2                                                                                                                      | 3                                            | 3                                          | -                           | -     | 2     | 3 | 3  |
| CLO-5 | Prove knowledge and understanding of the engineering and management principles and apply the same to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.                                                      | ✓        | ✓      | ✓         | ✓       | 3                         | 85                       | 75                      | 3                                              | 3                                          | 2                                                                                                                      | 3                                            | 3                                          | -                           | -     | 3     | 3 | 3  |

| Sessions           | CLO - 1                                                                                                               | CLO - 2                                                                                               | CLO - 3                                                                                                                                         | CLO - 4                                                                              | CLO - 5                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|                    | Introduction                                                                                                          | Communication Models & Architecture                                                                   | Model Specification                                                                                                                             | Raspberry Pi                                                                         | Amazon Web services                                                                           |
|                    | 12                                                                                                                    | 12                                                                                                    | 12                                                                                                                                              | 12                                                                                   | 12                                                                                            |
| <b>SLO-1</b>       | Introduction, Types, Applications, Merits, Definition& Characteristics of IoT, Physical design of IoT, Things in IoT. | Communication Models in IoT, Device to Device Model, Device to Cloud Model                            | IoT Platforms Design Methodology, Purpose & Requirements, Model specification- process, domain, Information, service, IoT level specifications  | IoT Platforms, IoT Logical Design with Python, Python Data types and Data Structures | Introduction about RESTful API, Designing a RESTful Web API, Amazon Web Services              |
| <b>SLO-2</b>       | IoT protocols, logical Design of IoT, IoT Functional Blocks                                                           | Device to Gateway Model, M2M, Differences between IoT and M2M                                         | View specifications - Functional, Operational. Device & component Integration, Application development.                                         | Control Flow statements, Classes and Python Packages for IoT, JSON, XML              | Amazon Web Services for IoT, Creating an ID in Amazon, Implementation of EC2.                 |
| <b>SLO-3&amp;4</b> | <b>Lab 1: Explain working of Raspberry Pi.</b>                                                                        | <b>Lab 4: Demonstrate a smart object API gateway service reference implementation in IoT toolkit.</b> | <b>Lab 7: Explain application framework and embedded software agents for IoT toolkit.</b>                                                       | <b>Lab 10: Reading Data from Internet using sensor.</b>                              | <b>Lab 13: Smart Irrigation System</b>                                                        |
| <b>SLO-5</b>       | IoT Levels and Deployment Templates- Levels 0 to 5.                                                                   | Architecture of M2M,Software-Defined Networking (SDN)                                                 | IoT System for Weather Monitoring: Purpose & Requirements, Model specification- process, domain, Information, service, IoT level specifications | HTTP Lib, URL Lib, SMTP Lib, Introduction to IoT Physical Devices                    | Implementation of Auto scaling, S3, RDS.                                                      |
| <b>SLO-6</b>       | IoT Deployment Challenges, Domain Specific IoT.                                                                       | Architecture of SDN, Network Function Virtualization (NFV), Architecture of NFV                       | View specifications- Functional, Operational. Device & component Integration, Application development.                                          | Basic Building Blocks of IoT device, Example Device: Raspberry Pi, About the board.  | Dynamo DB, Implementation of Dynamo DB, Kinesis                                               |
| <b>SLO-7&amp;8</b> | <b>Lab 2: Controlling LED with Raspberry Pi.</b>                                                                      | <b>Lab 5: Write and explain working of an HTTP- to-CoAP semantic mapping proxy in IoT toolkit.</b>    | <b>Lab 8: Arduino with ESP8266 explanation</b>                                                                                                  | <b>Lab 11: Home Automation</b>                                                       | <b>Lab 14: Health care system</b>                                                             |
| <b>SLO-9</b>       | Home, Cities, Environment, Energy systems, Industry                                                                   | NFV for IOT, IoT System Management, Advantages and Disadvantages of IoT system management             | IoT System for Agriculture, View specifications- Functional, Operational. Introduction to Cloud Storage Models, Stages of IoT Architecture.     | Raspberry Pi Interfaces &SPI Serial, Introduction to Arduino, IoT hardware           | Implementation of Kinesis, Case studies – Environment, IoT systems for weather Reporting Bot. |

|                      |                                                           |                                                                                                                   |                                                                                                                           |                                                                                                                       |                                                                                                    |
|----------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>SLO-10</b>        | Agriculture, Health and Lifestyle, IoT components         | Need for IoT Systems Management, NETCONF, YANG and NETOPEER, IoT Systems and Device Management with NETCONF-YANG. | Sensors/Actuators, Devices, Gateway and Cloud, IoT Security and Interoperability, Risks and Attacks & Tools for Security. | Microprocessors & Microcontrollers, Resistive Sensors, Capacitive Sensors, Inductive Sensors, Electromagnetic Sensors | Renewable Energy Systems, Forest Fire Detection & Smart grid, Case studies - IoT system for Energy |
| <b>SLO-11&amp;12</b> | <b>Lab 3: Interfacing Light Sensor with Raspberry pi.</b> | <b>Lab 6: Describe gateway as a service deployment in IoT toolkit.</b>                                            | <b>Lab 9: Weather Monitoring System.</b>                                                                                  | <b>Lab 12: Remote Surveillance System.</b>                                                                            | <b>Lab 15: Air Pollution Monitoring System.</b>                                                    |

| Resources |                                                                                                         |  |  |   |                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------------|--|--|---|-----------------------------------------------------------------------------------|
| 1         | ArshdeepBahga and Vijay Madiseti, “Internet of Things - A Hands-on Approach”, Universities Press, 2015. |  |  | 4 | Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011.    |
| 2         | CunoPfister, “Getting Started with the Internet of Things”, O’Reilly, 2011.                             |  |  | 5 | Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2014. |
| 3         | HonboZhou, “The Internet of Things in the Cloud: A Middleware Perspective “, CRC Press, 2012.           |  |  |   |                                                                                   |

| Assessment                |            |                                                      |              |            |              |            |              |            |              |                                   |              |
|---------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------|--------------|
| Bloom’s Level of Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final Assessment (50 % weightage) |              |
|                           |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4 *  |              |                                   |              |
|                           |            | (10%)                                                |              | (10%)      |              | (20%)      |              | (10%)      |              |                                   |              |
|                           |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                        | Practice (%) |
| 1                         | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 2                         | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                | 15           |
| 3                         | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 4                         | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                | 25           |
| 5                         | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| 6                         | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                | 10           |
| Total (%)                 |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                               | 100          |

| Strategies                 |   |                      |   |                          |   |
|----------------------------|---|----------------------|---|--------------------------|---|
| Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
| Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
| Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education        | ✓ |
| Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
|                            |   | Debate               | ✓ |                          |   |
|                            |   | Interactive Lecture  | ✓ |                          |   |
|                            |   | Brainstorming        | ✓ |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                                              |                            |                                                                                                                          |                                    |
|----------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| Professional Experts |                                                                                                                              | Higher Institution Experts |                                                                                                                          | Internal Experts                   |
| 1                    | Mr.Jothi Periaswamy, Founder/Chief Data Scientist, DeepSphere AI, 2 Venture Drive, #13-26 Vision Exchange, Singapore, 608526 | 1                          | Dr.S.Gopinathan, Professor and Head, Department of Computer Science, University of Madras, Guindy Campus,,Chennai-600025 | 1 Dr. Nithya S, SRMIST, KTR Campus |

| Course Code                | UDS24M02J                                                                                                                                                                     | Course Title          | Digital Transformation |                      |     |                     |        |                             | Category | M                           | Multidisciplinary Courses |                         |                                                |                                            | L                                                                              | T                                                               | P                         | C                                            |                                            |                             |       |       |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------|----------------------|-----|---------------------|--------|-----------------------------|----------|-----------------------------|---------------------------|-------------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------|----------------------------------------------|--------------------------------------------|-----------------------------|-------|-------|
|                            |                                                                                                                                                                               |                       |                        |                      |     |                     |        |                             |          |                             |                           |                         |                                                |                                            | 2                                                                              | 0                                                               | 2                         | 3                                            |                                            |                             |       |       |
| Course Offering Department | Computer Applications                                                                                                                                                         | Pre-requisite Courses | Nil                    | Co-requisite Courses | Nil | Progressive Courses | Nil    | Data Book / Codes/Standards | Nil      |                             |                           |                         |                                                |                                            |                                                                                |                                                                 |                           |                                              |                                            |                             |       |       |
| CLR                        | The purpose of learning this course is to:                                                                                                                                    |                       |                        |                      |     | Depth               |        | Attainment                  |          | Programme Learning Outcomes |                           |                         |                                                |                                            |                                                                                |                                                                 |                           |                                              |                                            |                             |       |       |
| CLR-1                      | Enable the participants hone their skills, tools, and techniques to lead digital transformation in an business Organization                                                   |                       |                        |                      |     | 1                   | 2      | 3                           | 4        | 1                           | 2                         | 3                       | 1                                              | 2                                          | 3                                                                              | 4                                                               | 5                         | 6                                            | 7                                          | 8                           | 9     | 10    |
| CLR-2                      | To Inculcate the principles of digital business models, rapid innovation, and data-driven thinking.                                                                           |                       |                        |                      |     | Conceive            | Design | Implement                   | Operate  | Bloom's Level of Thinking   | Expected Proficiency (%)  | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Learning to Learn ,Research Skills | Leadership Qualities, Professionalism, Autonomy, Accountability | Digital Technology Skills | Value Inculcation, Multicultural inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |
| CLR-3                      | Get Exposed to gaining leadership skills to navigate an era of technology shifts and disruptive business models                                                               |                       |                        |                      |     |                     |        |                             |          |                             |                           |                         |                                                |                                            |                                                                                |                                                                 |                           |                                              |                                            |                             |       |       |
| CLR-4                      | Able to deliver methodologies for organizations to deconstruct their value chain to gain a competitive advantage over their competitors                                       |                       |                        |                      |     |                     |        |                             |          |                             |                           |                         |                                                |                                            |                                                                                |                                                                 |                           |                                              |                                            |                             |       |       |
| CLR-5                      | Look into the major business drivers of digital transformation, opportunities they create and opportunities they have already created, the challenges they bring to the table |                       |                        |                      |     |                     |        |                             |          |                             |                           |                         |                                                |                                            |                                                                                |                                                                 |                           |                                              |                                            |                             |       |       |
| CLO                        | At the end of this course, learners will be able to:                                                                                                                          |                       |                        |                      |     |                     |        |                             |          |                             |                           |                         |                                                |                                            |                                                                                |                                                                 |                           |                                              |                                            |                             |       |       |
| CLO-1                      | Create a system for correct data gathering and incorporating it at a higher level for business intelligence.                                                                  |                       |                        |                      |     | ✓                   | ✓      | -                           | -        | 2                           | 85                        | 75                      | 3                                              | 1                                          | 1                                                                              | -                                                               | 1                         | -                                            | -                                          | 2                           | 2     | 1     |
| CLO-2                      | Have excellent skills and knowledge to lead process innovation and efficiency across units                                                                                    |                       |                        |                      |     | ✓                   | ✓      | ✓                           | -        | 2                           | 85                        | 75                      | 3                                              | 1                                          | -                                                                              | -                                                               | 2                         | -                                            | -                                          | 1                           | 2     | 1     |
| CLO-3                      | Understand the customer needs and building impactful insights that help a great deal in drive the business growth.                                                            |                       |                        |                      |     | ✓                   | ✓      | ✓                           | ✓        | 3                           | 85                        | 75                      | 3                                              | 1                                          | -                                                                              | 1                                                               | 2                         | -                                            | -                                          | 1                           | 1     | 1     |
| CLO-4                      | Have excellent skills and knowledge for providing a great digital experience high customers expectations.                                                                     |                       |                        |                      |     | ✓                   | ✓      | ✓                           | ✓        | 3                           | 85                        | 75                      | 3                                              | -                                          | 2                                                                              | 3                                                               | 2                         | -                                            | -                                          | -                           | 3     | 2     |
| CLO-5                      | Encourage digital culture with improved collaboartaion to help move the entire organization ahead digitally.                                                                  |                       |                        |                      |     | ✓                   | ✓      | ✓                           | ✓        | 3                           | 85                        | 75                      | 3                                              | -                                          | 2                                                                              | 3                                                               | 2                         | -                                            | -                                          | -                           | 3     | 2     |

| Sessions         | CLO 1                                                                                         | CLO 2                                                                                                                | CLO 3                                                                       | CLO 4                                                                                                                                                                                                                | CLO 5                                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|                  | Digital Transformation-Introduction                                                           | AI-Digitized Supply Chains                                                                                           | Digital Transformation in Automobile                                        | Internet Of Things                                                                                                                                                                                                   | Digital Transformation Implementation Framework                                                             |
|                  | 12                                                                                            | 12                                                                                                                   | 12                                                                          | 12                                                                                                                                                                                                                   | 12                                                                                                          |
| <b>SLO-1</b>     | Digital Transformation-Introduction, Digital Transformation from academic perspective         | AI-digitized supply chains, Improved decision making and productivity                                                | Digital Transformation in Automobile, Digital Transformation Business Cases | Internet Of Things, Mobile                                                                                                                                                                                           | Building bridges between technologies, Bridging technologies and innovation                                 |
| <b>SLO-2</b>     | Digital Transformation from industry perspective, Business Benefits of Digital Transformation | Role of AI in Digital Transformation, How can AI be applied in the digital transformation process                    | Creating a Roadmap, Destination                                             | Augmented Reality, Cloud Technology                                                                                                                                                                                  | Digital Transformation Implementation Framework, What is a digital transformation implementation framework? |
| <b>SLO 3-4</b>   | <b>Lab 1: QR Code for Business card generation</b>                                            | <b>Lab 4: Website traffic Management</b>                                                                             | <b>Lab 7: Developing Customer Relationship Management</b>                   | <b>Lab 10: Health Monitoring system</b>                                                                                                                                                                              | <b>Lab 13: Surveillance system</b>                                                                          |
| <b>SLO 5</b>     | Digital Business Models, Industry Demand and Business Needs for Digital Transformation        | Enhanced Consumer engagement and insights, AI-digitized supply chains                                                | User Lifetime Value, Inbound and outbound marketing performance             | Additive Manufacturing, Security and Data Privacy                                                                                                                                                                    | Things in return, Digital Transformation Implementation Framework                                           |
| <b>SLO-6</b>     | Digital Transformation in future, Business Drivers towards digital Transformation             | Improved decision making and productivity, Role of Intelligent Automation and Data Science in Digital Transformation | Customer Experience, Use Organizational Change Management                   | Digital Transformation Strategy: Process, Model, Domain, Culture, Technology for digitally transforming business processes: Team Collaboration, CRM, Storage, Project Management, Accounting, Payroll, Communication | Amazon Business – Improving Customer experience, Netflix – On-demand Subscription based video services      |
| <b>SLO 7-8</b>   | <b>Lab 2: Generating E-Receipt for purchase order</b>                                         | <b>Lab 5: Automating Customer based demand</b>                                                                       | <b>Lab 8: Creating smart assistance in commercial websites</b>              | <b>Lab 11: Project Management system using ML Algorithm</b>                                                                                                                                                          | <b>Lab 14: Demand forecasting</b>                                                                           |
| <b>SLO-9</b>     | Digital Transformation across industries, Innovation from digital transformation              | Why are Businesses Undergoing Digital Transformations?, Future of Intelligent Automation Data Transformation         | Digital Transformation Business Cases, Destination                          | How is data security at risk from digital transformation, Mitigate data security risks                                                                                                                               | Tesla Connected Car Technology, Glassdoor Recruitment                                                       |
| <b>SLO 10</b>    | How can AI be applied in the digital transformation process, AI-driven digital transformation | Adding more values with Machine learning, Real-World Applications of Digital Transformation                          | User Lifetime Value, Inbound and outbound marketing performance             | Components for deploying your strategy, Building Bridges between IT and the Business                                                                                                                                 | Ensure a culture that allows for change, Ensure a culture that allows for change                            |
| <b>SLO 11-12</b> | <b>Lab 3: Creating Chat Bot</b>                                                               | <b>Lab 6: Prediction of Sales process</b>                                                                            | <b>Lab 9: Prediction of Stock market using AI</b>                           | <b>Lab 12: Security screening for Crime file management</b>                                                                                                                                                          | <b>Lab 15: Legacy cost management</b>                                                                       |

| Resources |                                                                                                                                                |   |                                                                                                                                                                       |  |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1         | Jyothi R. Korem, Srinivas R. Pingali, Shankar Prakash, (2021), “Digital Transformation Strategies - Theory and Practice, SAGE publishing, 2021 | 3 | Daniel R. A. Schallmo , Christopher A. Williams, (2018), “Digital Transformation Now! - Guiding the Successful Digitalization of Your Business Model”, Springer, 2018 |  |
| 2         | Alp Ustundag ,Emre Cevikcan , (2017), “Industry 4.0: Managing The Digital Transformation” , Springer Series in Advanced Manufacturing          | 4 | Alexander Borek and Nadine Prill, (2020), Driving Digital Transformation through Data and AI, Kogan Page                                                              |  |

| Assessment                      |            |                                                      |              |            |              |            |              |            |              |                                         |              |
|---------------------------------|------------|------------------------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------------------------------------|--------------|
| Bloom’s<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |              |            |              |            |              |            |              | Final<br>Assessment<br>(50 % weightage) |              |
|                                 |            | CLA – 1                                              |              | CLA – 2    |              | CLA – 3    |              | CLA – 4 *  |              |                                         |              |
|                                 |            | (10 %)                                               |              | (10 %)     |              | (20 %)     |              | (10 %)     |              |                                         |              |
|                                 |            | Theory (%)                                           | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%) | Practice (%) | Theory (%)                              | Practice (%) |
| 1                               | Remember   | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |
| 2                               | Understand | 15                                                   | 15           | 15         | 15           | 10         | 10           | 10         | 10           | 15                                      | 15           |
| 3                               | Apply      | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |
| 4                               | Analyze    | 20                                                   | 25           | 25         | 20           | 25         | 25           | 25         | 25           | 25                                      | 25           |
| 5                               | Evaluate   | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |
| 6                               | Create     | 15                                                   | 10           | 10         | 15           | 15         | 15           | 15         | 15           | 10                                      | 10           |
| Total (%)                       |            | 100                                                  | 100          | 100        | 100          | 100        | 100          | 100        | 100          | 100                                     | 100          |

| Strategies                 |   |                      |   |                            |
|----------------------------|---|----------------------|---|----------------------------|
| Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development    |
| Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being ✓ |
| Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education ✓        |
| Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality ✓          |
|                            |   | Debate               | ✓ |                            |
|                            |   | Interactive Lecture  | ✓ |                            |
|                            |   | Brainstorming        | ✓ |                            |
|                            |   |                      |   |                            |
|                            |   |                      |   |                            |
|                            |   |                      |   |                            |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                                              |                            |                                                                                                                          |                                                   |
|----------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Professional Experts |                                                                                                                              | Higher Institution Experts |                                                                                                                          | Internal Experts                                  |
| 1                    | Mr.Jothi Periaswamy, Founder/Chief Data Scientist, DeepSphere AI, 2 Venture Drive, #13-26 Vision Exchange, Singapore, 608526 | 1                          | Dr.S.Gopinathan, Professor and Head, Department of Computer Science, University of Madras, Guindy Campus,,Chennai-600025 | 1 Dr. N. Vijayalakshmi, SRM IST, Ramapuram campus |
|                      |                                                                                                                              |                            |                                                                                                                          | 2 Mrs. S. Suriya, SRM IST,Ramapuram campus        |

| Course Code | UDS24M03J | Course Title | Blockchain Technology | Category | M | Multidisciplinary Course |  |  |  | L | T | P | C |
|-------------|-----------|--------------|-----------------------|----------|---|--------------------------|--|--|--|---|---|---|---|
|             |           |              |                       |          |   |                          |  |  |  | 2 | 0 | 3 | 3 |

| Course Offering Department | Computer Applications | Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil | Data Book / Codes/Standards | Nil |
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|
|----------------------------|-----------------------|-----------------------|-----|----------------------|-----|---------------------|-----|-----------------------------|-----|

| CLR   | The purpose of learning this course is to:                                                                  | Depth    |        |           |         | Attainment                |                          |                         | Programme Learning Outcomes                    |                                            |                                                               |                                                                            |                                              |                                            |                             |       |       |    |
|-------|-------------------------------------------------------------------------------------------------------------|----------|--------|-----------|---------|---------------------------|--------------------------|-------------------------|------------------------------------------------|--------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------|-----------------------------|-------|-------|----|
| CLR-1 | State core blockchain concepts, the benefits, and the limitations of blockchain technologies.               | 1        | 2      | 3         | 4       | 1                         | 2                        | 3                       | 1                                              | 2                                          | 3                                                             | 4                                                                          | 5                                            | 6                                          | 7                           | 8     | 9     | 10 |
| CLR-2 | Acquire knowledge about cryptography and cryptocurrency fundamentals                                        | Conceive | Design | Implement | Operate | Bloom's Level of Thinking | Expected Proficiency (%) | Expected Attainment (%) | Problem Solving, Critical Thinking, Creativity | Communication Skills, Collaborating Skills | Independent Thinking, Analytical Reasoning, Learning to Learn | Leadership Qualities, Professionalism, Autonomy, Digital Technology Skills | Value Incultation, Multicultural inclusivity | Environmental Action, Community Engagement | Entrepreneurial Risk Taking | PSO-1 | PSO-2 |    |
| CLR-3 | Obtain knowledge on Consensus mechanism algorithm.                                                          |          |        |           |         |                           |                          |                         |                                                |                                            |                                                               |                                                                            |                                              |                                            |                             |       |       |    |
| CLR-4 | Acquire knowledge about open-source blockchain platform                                                     |          |        |           |         |                           |                          |                         |                                                |                                            |                                                               |                                                                            |                                              |                                            |                             |       |       |    |
| CLR-5 | Determine real world challenges that blockchain technologies and support decisions with relevant arguments. |          |        |           |         |                           |                          |                         |                                                |                                            |                                                               |                                                                            |                                              |                                            |                             |       |       |    |
| CLO   | At the end of this course, learners will be able to:                                                        |          |        |           |         |                           |                          |                         |                                                |                                            |                                                               |                                                                            |                                              |                                            |                             |       |       |    |
| CLO-1 | Contentedly discuss and describe the history, types and applications of Blockchain                          | ✓        | ✓      | -         | -       | 2                         | 85                       | 75                      | 3                                              | 1                                          | 1                                                             | -                                                                          | 1                                            | -                                          | -                           | 2     | 2     | 1  |
| CLO-2 | Gains familiarity with cryptography and Consensus algorithms.                                               | ✓        | ✓      | ✓         | -       | 2                         | 85                       | 75                      | 3                                              | -                                          | 1                                                             | 2                                                                          | 2                                            | -                                          | -                           | 1     | 2     | 1  |
| CLO-3 | Apply the tools for understanding the background of crypto currencies                                       | ✓        | ✓      | -         | ✓       | 3                         | 85                       | 75                      | 3                                              | -                                          | 3                                                             | 1                                                                          | 2                                            | -                                          | -                           | 1     | 1     | 2  |
| CLO-4 | Identify in different open-source blockchain platform                                                       | ✓        | ✓      | -         | ✓       | 3                         | 85                       | 75                      | 3                                              | 2                                          | 2                                                             | 3                                                                          | 3                                            | -                                          | -                           | 2     | 3     | 3  |
| CLO-5 | Understanding of latest advances and its applications in Block Chain Technology.                            | ✓        | ✓      | ✓         | ✓       | 3                         | 85                       | 75                      | 3                                              | 2                                          | 2                                                             | 3                                                                          | 3                                            | -                                          | -                           | 2     | 3     | 3  |

| Sessions | CLO 1                                                          | CLO 2                                            | CLO 3                                                    | CLO 4                                                  | CLO 5                                                                             |
|----------|----------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------|
|          | DBMS and Blockchain Technologies                               | Digital Keys and Cryptography                    | Database vs. Blockchain                                  | Introduction to Ethereum                               | Protocols in Blockchain                                                           |
|          | 15                                                             | 15                                               | 15                                                       | 15                                                     | 15                                                                                |
| SLO-1    | Distributed DBMS, Limitations of Distributed DBMS              | Cryptocurrency Fundamentals, Bitcoin             | Operation of Bitcoin Blockchain, Blockchain Architecture | Ethereum, Ethereum Network                             | Blockchain Implementation Challenges, Zero Knowledge proofs                       |
| SLO-2    | Introduction to Block chain, History, Definition, Applications | Digital Keys and Addresses, Transactions, Mining | Block, Hash, Distributer P2P, Structure of Blockchain    | Ethereum Virtual Machine (EVM), Components of Ethereum | Protocols in Block chain, Succinct non interactive argument for Knowledge (SNARK) |

|                  |                                                                                                                                                              |                                                                                             |                                                                                                              |                                                                                                        |                                                                                  |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>SLO-3-5</b>   | <b>Lab 1: Create a Public Ledger vs. Private Ledger with the various attributes like Access, Network Actors, Native token, Security, Speed and examples.</b> | <b>Lab 4: Bitcoin Wallet Creation and Transactions</b>                                      | <b>Lab 7: Building a Distributed Peer-to-Peer Network</b>                                                    | <b>Lab 10: Ethereum Network Setup</b>                                                                  | <b>Lab 13: Understanding Zcash , a privacy-focused cryptocurrency</b>            |
| <b>SLO 6</b>     | Physical Ledger vs Digital Ledger, Distributed Ledger                                                                                                        | Bitcoin Networks and Payments Wallets, Alternative Coins,                                   | Database vs. Blockchain Architecture, How does Blockchain Architecture works                                 | Wallets for Ethereum, Solidity                                                                         | Pairing on Elliptic curves, Zcash                                                |
| <b>SLO-7</b>     | Digital Money to Distributed Ledgers, Design Primitives: Protocols, Security, Consensus                                                                      | Name coin, Zcash, Bitcoin limitations                                                       | Consensus mechanism, Proof of Work (PoW)                                                                     | Smart Contracts, some attacks on smart contracts, Ethereum and Smart 20Contracts                       | Attacks on Blockchains, Sybil attacks, selfish mining                            |
| <b>SLO-8-10</b>  | <b>Lab 2: Peer-to-Peer Network Simulation</b>                                                                                                                | <b>Lab 5: Bitcoin Mining Simulation</b>                                                     | <b>Lab 8: Consensus Mechanism Simulation</b>                                                                 | <b>Lab 11: Solidity Smart Contract Development</b>                                                     | <b>Lab 14: Case Study about the different attacks</b>                            |
| <b>SLO-11</b>    | Blockchain Categories: Public, Private, Consortium, Blockchain Network and Nodes                                                                             | Cryptography Fundamentals, overview of Hashing, cryptographic algorithm                     | Proof of Stake (PoS), Byzantine Fault Tolerance(BFT), Proof of Authority (PoA), Proof of Elapsed Time (PoET) | The Turing Completeness of Smart Contract Languages, Verification challenges,                          | 51% attacks, Sharding based consensus algorithms                                 |
| <b>SLO 12</b>    | Peer-to-Peer Network, Decentralized networks and technology (serverless), Features of Blockchain                                                             | Introduction to Hyperledger, Hyperledger as a Protocol, Hyperledger Fabric                  | Permissioned Block chains, Design goals, Block chain network creation                                        | Comparing Bitcoin scripting vs. Ethereum Smart, Decentralized Applications (DApps), Blockchain oracles | Introduction to Web3, Contract Deployment, POST Requests, Development Frameworks |
| <b>SLO-13-15</b> | <b>Lab 3: Explore available tools for blockchain technology</b>                                                                                              | <b>Lab 6: implementation of Cryptographic hash functions used in password verification.</b> | <b>Lab 9: Building Blockchain</b>                                                                            | <b>lab 12: Explore any one Decentralized Applications (DApps)</b>                                      | <b>Lab 15: Simple application using web3</b>                                     |

#### Resources

|   |                                                                                                                                                                     |   |                                                                                                                                                                                        |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Melanie Swan, “Block Chain: Blueprint for a New Economy”, O’Reilly, first edition – 2015.                                                                           | 3 | Daniel Drescher, “Block Chain Basics”, Apress; 1st edition, 2017                                                                                                                       |
| 2 | Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained”, 2nd Edition, Packt Publishing Ltd, March 2018 | 4 | Mark Gates, “Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money”, Wise Fox Publishing and Mark Gates 2017. |

| Assessment                      |            |                                                      |                 |               |                 |               |                 |               |                 |                                            |                 |
|---------------------------------|------------|------------------------------------------------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|--------------------------------------------|-----------------|
| Bloom's<br>Level of<br>Thinking |            | Continuous Learning Assessment (CLA) (50% weightage) |                 |               |                 |               |                 |               |                 | Final<br>Assessment<br>(50 %<br>weightage) |                 |
|                                 |            | CLA – 1                                              |                 | CLA – 2       |                 | CLA – 3       |                 | CLA – 4 *     |                 |                                            |                 |
|                                 |            | (10 %)                                               |                 | (10 %)        |                 | (20 %)        |                 | (10 %)        |                 |                                            |                 |
|                                 |            | Theory<br>(%)                                        | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%) | Practice<br>(%) | Theory<br>(%)                              | Practice<br>(%) |
| 1                               | Remember   | 15                                                   | 15              | 15            | 15              | 10            | 10              | 10            | 10              | 15                                         | 15              |
| 2                               | Understand | 15                                                   | 15              | 15            | 15              | 10            | 10              | 10            | 10              | 15                                         | 15              |
| 3                               | Apply      | 20                                                   | 25              | 25            | 20              | 25            | 25              | 25            | 25              | 25                                         | 25              |
| 4                               | Analyze    | 20                                                   | 25              | 25            | 20              | 25            | 25              | 25            | 25              | 25                                         | 25              |
| 5                               | Evaluate   | 15                                                   | 10              | 10            | 15              | 15            | 15              | 15            | 15              | 10                                         | 10              |
| 6                               | Create     | 15                                                   | 10              | 10            | 15              | 15            | 15              | 15            | 15              | 10                                         | 10              |
| Total (%)                       |            | 100                                                  | 100             | 100           | 100             | 100           | 100             | 100           | 100             | 100                                        | 100             |

| Strategies                 |   |                      |   |                          |   |
|----------------------------|---|----------------------|---|--------------------------|---|
| Technology                 |   | Pedagogy / Andragogy |   | Sustainable Development  |   |
| Simulations                |   | Clarification/Pauses | ✓ | Good Health & Well Being | ✓ |
| Presentation Tools         | ✓ | Group Discussion     | ✓ | Quality Education        | ✓ |
| Learning Management System | ✓ | Hands-on Practice    | ✓ | Gender Equality          | ✓ |
|                            |   | Debate               | ✓ |                          |   |
|                            |   | Interactive Lecture  | ✓ |                          |   |
|                            |   | Brainstorming        | ✓ |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |
|                            |   |                      |   |                          |   |

\* The evaluation can be done on one or more parameters that include, (i) Seminars, (ii) Mini-Project, (iii) Case-Studies, (iv) MOOC Certification, (v) Publication of Article, (vi) Presentation of Research Work in Conferences, (vii) Assignments

| Designers            |                                                                                                                              |                                                                                                                            |                                      |
|----------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Professional Experts |                                                                                                                              | Higher Institution Experts                                                                                                 | Internal Experts                     |
| 1                    | Mr.Jothi Periaswamy, Founder/Chief Data Scientist, DeepSphere AI, 2 Venture Drive, #13-26 Vision Exchange, Singapore, 608526 | 1 Dr.S.Gopinathan, Professor and Head, Department of Computer Science, University of Madras, Guindy Campus,,Chennai-600025 | 1 Dr.P.Chanthini, SRMIST, KTR Campus |