Course Code	21CSE373T	Course Name	STREAMING ANALYTICS	Course Category	E	PROFESSIONAL ELECTIVE	L	T	P	C
							2	1	0	3

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

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Program Outcomes (PO)												Program Specific Outcomes		
CLR-1:	understand the basic building blocks of stream processing	1	2	3	4	5	6	7	8	9	10	11	12			
CLR-2:	relate streaming data in real time	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
CLR-3:	explore the data ingestion options into stream processing engines															
CLR-4:	extend stream processing results to end users															
CLR-5:	explore NOSQL storage options to store real time data															
Course Outcomes (CO):	At the end of this course, learners will be able to:															
CO-1:	illustrate the concepts and terminologies in stream processing	2	3	-	2	2	-	-	-	-	-	-	-	2	-	-
CO-2:	interpret stream processing applications using Apache Spark Streaming	2	2	-	2	2	-	-	-	-	-	-	-	-	3	-
CO-3:	summarize real-time streaming data pipelines and applications that adapt to the data streams using Kafka	2	2	-	2	2	-	-	-	-	-	-	-	-	3	-
CO-4:	interpret stream processing applications using Apache Storm Streaming	2	2	-	2	2	-	-	-	-	-	-	-	-	3	-
CO-5:	inquire real time data using NoSQL databases & MongoDB	2	2	-	2	2	-	-	-	-	-	-	-	-	-	3

Unit-1 - Fundamentals of Stream Processing	**9 Hour**

Introducing Stream Processing, Stream Processing, Examples of Stream Processing, Scaling Up Data Processing, Distributed Stream Processing, Stream-Processing Model, Sources and Sinks, Immutable Streams Defined from One Another, Transformations and Aggregations, Window Aggregations, Stateless and Stateful Processing, Stateful Streams, An Example: Local Stateful Computation in Scala, Stateless or Stateful Streaming, Streaming Architectures, Components of a Data Platform, Architectural Models, The Use of a Batch-Processing Component in a Streaming Application, Referential Streaming Architectures, Streaming Versus Batch Algorithms

Unit-2 - Apache Spark and Structured Streaming	**9 Hour**

Apache Spark as a Stream-Processing Engine, Spark's Distributed Processing Model, Spark's Resilience Model, Introducing Structured Streaming, The Structured Streaming Programming Model

Unit-3 - Kafka-A Realtime Data and Stream Processing	**9 Hour**

Getting Started with Kafka, Kafka, Publish Subscribe messaging model, Kafka Architecture, Messages and Batches, Schemas, Topics and Partitions, Producers and consumers, Brokers and Clusters, Multiple Clusters, Data Ecosystem, Kafka Producers: Writing messages to Kafka, Kafka Consumers - Reading data from Kafka, Stream Processing- Stream Processing Design Patterns-Kafka Streams by Examples- Kafka Streams: Architecture Overview

Unit-4 - Apache Storm	**9 Hour**

che Storm – Introduction, Real-Time Processing and Storm Introduction, Storm Deployment, Topology Development, and Topology Options, Storm Parallelism and Data Partitioning, Integration of Storm, and Kafka

Unit-5 - NoSQL Databases in Cloud and MongoDB	**9 Hour**

NoSQL Data Bases, AWS Cloud Dynamo Database: Amazon DynamoDB features, Serverless, Introduction to MongoDB, MongoDB Data Model, MongoDB Architecture - Core Processes, MongoDB Tools, Standalone Deployment, Replication, Sharding, MongoDB Use Cases- Performance Monitoring, and Social Networking.

Learning Resources	1. Garillot F and Mass. G., Stream Processing with Apache Spark, 1st ed., O'Reilly Media, Inc., 2019. 2. Narkhede N, Shapira. G, and Palino T., Kafka: The Definitive Guide - Real-Time Data and Stream Processing at Scale, 1st ed., O'Reilly Media, Inc.,2017 3. Ankit Jain, Mastering Apache Storm, 1st ed., Packt Publishing,2017	4. https://docs.mongodb.com/manual/changeStreams/ 5. Shakuntala Gupta Edward Navin Sabharwal, "Practical MongoDB Architecting, Developing,and Administering MongoDB"Apress,2016 6. https://aws.amazon.com/dynamodb/features/?pg=dynamodbt&sec=hs

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (CLA)				Summative Final Examination (40% weightage)	
		Formative CLA-1 Average of unit test (50%)		Life-Long Learning CLA-2 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	25%	-	25%	-	25%	-
Level 3	Apply	30%	-	25%	-	30%	-
Level 4	Analyze	30%	-	25%	-	30%	-
Level 5	Evaluate	-	-	10%	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Mr. Gangeyan Ranganathan, Project Delivery Specialist Ii , Deloitte Consulting Llp, Sacramento, California	1. Dr Surendiran B, Associate Professor, National Institute of Technology, Puducherry	1. Dr. B Yamini, SRMIST
2. Mr. Shri Raghu Raaman, Solidity Developer, Pixelvault Inc., Toronto, Canada	2. Dr. Selvakumar K., B.E., M.E., Ph. D, Assistant Professor Grade-II, Department of Computer Applications, National Institute of Technology Trichy, Tiruchirappalli-620015, Tamil Nadu, India	2. Dr. G Suseela, SRMIST