



EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India

Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

4-Years B.Tech. Curriculum and
Syllabus for Computer Science and Engineering (CSE)

Eighth Semester

S. No	Course Code	Course Title	Contact Hrs. / Week			Credit
			L	T	P	
THEORY						
1	TIU-UMG-T406	Managerial Ethics & corporate Governance	2	1	0	3
2	TIU-UMB-T401	Environment Science	3	1	0	3
3	TIU-UCS-E4##	ELECTIVE-II	3	1	0	3

PRACTICAL						
1	TIU-UCS-D498	Final Thesis / Dissertation	0	0	3	8
2	TIU-UCS-G498	Grand Viva	0	0	0	2
SESSIONAL						
3	TIU-UES-S498	Entrepreneurship Skill Development	0	0	3	2
TOTAL CREDIT						21

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External Expert

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S.No	ELECTIVE – II					
1	TIU-UCS-E412	Cloud Computing	3	1	0	3
2	TIU-UCS-E404	Parallel and Distributed Algorithms	3	1	0	3
3	TIU-UCS-E408	Data Warehousing and Data Mining	3	1	0	3
4	TIU-UCS-410	Natural Language Processing (NLP) and Information Retrieval (IR)	3	1	0	3

SYLLABUS

Managerial Ethics and Corporate Governance

TIU-UMG-T406

L-T-P: 3-0-0

Credit: 3

Cloud Computing

TIU-UCS-E412

L-T-P: 3-0-0

Credits:3

1. Basics of Cloud Computing [4L]:

- Defining a Cloud, Cloud Types – NIST Cloud Reference Model, Cloud Cube Model, Deployment Models (Public, Private, Hybrid and Community Clouds), Service Models – Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS)
- Characteristics of Cloud Computing – a shift in paradigm
- Benefits and Advantages of Cloud Computing

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2. Services and Applications by Type [8L]:

- a. IaaS – Basic Concept, Workload, Partitioning of Virtual Private Server Instances, Pods, Aggregations, Silos
- b. PaaS – Basic Concept, Tools and Development Environment with examples
- c. SaaS - Basic Concept and Characteristics, Open SaaS and SOA, examples of SaaS Platform
- d. Identity as a Service (IDaaS)
- e. Compliance as a Service (CaaS)

3. Concepts of Abstraction and Virtualization [4L]:

- a. Virtualization: Taxonomy of Virtualization Techniques
- b. Hypervisors: Machine Reference Model for Virtualization

4. Use of Google Web Services [4L]:

- a. Discussion of Google Applications Portfolio – Indexed Search, Adwords, Google Analytics, Google Translate, A Brief Discussion on Google Toolkit (including introduction of Google APIs in brief), Major Features of Google App Engine Service

5. Use of Amazon Web Services [4L]:

- a. Amazon Web Service Components and Services: Amazon Elastic Cloud, Amazon Simple Storage System, Amazon Elastic Block Store, Amazon SimpleDB and Relational Database Service

6. Use of Microsoft Cloud Services [4L]:

- a. Windows Azure Platform: Microsoft's Approach, Architecture, and Main Elements, Overview of Windows Azure AppFabric, Content Delivery Network, SQL Azure, and Windows Live Services

7. Webmail Services [4L]:

- a. Cloud Mail Services, including Google Gmail, Windows Live Hotmail, Yahoo Mail

8. Cloud-based Storage [4L]:

- a. Cloud File Systems, including GFS and HDFS

9. Cloud Security [4L]:

- a. Cloud security concerns, security boundary, security service boundary
- b. Overview of security mapping
- c. Security of data: cloud storage access, storage location, tenancy, encryption, auditing, compliance
- d. Identity management (awareness of identity protocol standards)

10. Cloud Management [4L]:

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- a. An overview of the features of network management systems and a brief introduction of related products from large cloud vendors, monitoring of an entire cloud computing deployment stack – an overview with mention of some products
- b. Lifecycle management of cloud services (six stages of lifecycle)

Text Books:

1. Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd, 2013
2. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, McGraw Hill Education (India) Private Limited, 2013
3. Cloud Computing: A Practical Approach by Anthony T. Velte, Tata Mcgraw-Hill
4. Cloud Computing by Miller, Pearson.
5. Building Applications in Cloud: Concept, Patterns and Projects by Moyer, Pearson.

References:

1. Cloud Computing (2nd Edition) by Dr. Kumar Saurabh, Wiley India
2. Cloud Computing for Dummies by Judith Hurwitz, R. Bloor, M. Kanfman, F. Halper (Wiley India Edition)
3. Enterprise Cloud Computing by Gautam Shroff, Cambridge
Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India

Data Warehousing & Data Mining
TIU-UCS-E408

L-T-P: 3-0-0

Credits:3

Module 1: Overview and Concepts of Data Warehousing

Overview of Data warehousing

Strategic information and the need for Data warehousing, Defining a Data warehouse, Evolution of Data warehousing, Data warehousing and Business Intelligence

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The Building Blocks of Data warehouse

Defining features - Subject-oriented data, Integrated data, Time-variant data, Nonvolatile data, Data granularity

Data warehouses and Data marts

Architectural Types - Centralized, Independent data marts, Federated, Hub-and-Spoke, Data mart bus

Overview of components - Source Data, Data Staging, Data Storage, Information Delivery, Metadata, and Management and Control components

Business Requirements and Data warehouse

Dimensional nature of Business data and Dimensional Analysis, Dimension hierarchies and categories, Key Business Metrics (Facts), Requirement Gathering methods and Requirements Definition Document (contents)

Business Requirements and Data Design - Structure for Business Dimensions and Key Measurements, Levels of detail

Business Requirements and the Architecture plan

Business Requirements and Data Storage Specifications

Business Requirements and Information Delivery Strategy

Module 2 : Data warehouse Architecture and Infrastructure

Architectural components

Concepts of Data warehouse architecture - Definition and architecture in the areas of Data acquisition, Data storage, and Information delivery

Distinguishing characteristics - Different objectives and scope, Data content, Complex analysis for faster response, Flexible and Dynamic, Metadata-driven etc

Architectural Framework - supporting flow of data, and the Management and Control module

Technical architecture - Data acquisition, Data storage, and Information delivery

Overview of the components of Architectural Types introduced in Module 1.

Infrastructure for Data warehousing

Distinction between architecture and infrastructure, Understanding of how data warehouse infrastructure supports its architecture

Components of physical infrastructure, Hardware and Operating systems for data warehouse, Database Software, Collection of Tools,

Data warehouse Appliances - evolution and benefits

The role of Metadata

Understanding the importance of Metadata

Metadata types by functional areas - Data acquisition, Data storage, and Information delivery

Business Metadata - overview of content and examples

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Technical Metadata - overview of content and examples

Metadata Requirements, Sources of Metadata, Metadata management - challenges, Metadata Repository, Metadata integration and standards

Module 3 : Data Design and Data Preparation

Principles of Dimensional Modeling

Data Design - Design decisions, Basics of Dimensional modeling, E-R modeling versus Dimensional modeling

The STAR schema - illustration, Dimension Table, Fact Table, Factless Fact Table, Data granularity

STAR schema keys - Primary, Surrogate, and Foreign

Advantages of the STAR schema, STAR schema examples

Data Extraction, Transformation, and Loading

Overview of ETL, Requirements of ETL and steps

Data extraction - identification of sources and techniques

Data transformation - Basic tasks, Transformation types, Data integration and consolidation,

Transformation for dimension attributes

Data loading - Techniques and processes, Data refresh versus update, Procedures for Dimension tables,

Fact tables : History and incremental loads

ETL Tool options

Data Quality

Importance of data quality, Challenges for data quality, Data quality tools, Data cleansing and purification, Master Data Management

Module 4 : Information access and delivery

Matching information to classes of users

Information from Data warehouse versus Operational systems, Users of information - their needs and how to provide information

Information delivery - queries, reports, analysis, and applications

Information delivery tools - Desktop environment, Methodology and criteria for tool selection,

Information delivery framework, Business Activity Monitoring, Dashboards and Scorecards

OLAP in Data warehouse

Overall concept of Online Analytical Processing (OLAP), OLAP definitions and rules, OLAP characteristics

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Major features and functions of OLAP - General features, Dimensional analysis, Hypercubes, Drill Down and Roll Up, Slice and Dice, Rotation, Uses and Benefits

Familiarity with OLAP models - Overview of variations, MOLAP, ROLAP, HOLAP, DOLAP, Database OLAP, Web OLAP

Data Warehouse and the web

Web-enabled Data Warehouse - adapting data warehouse for the web

Web-based information delivery - Browser technology for data warehouse and Security issues

OLAP and Web - Enterprise OLAP, Web-OLAP approaches, OLAP Engine design

Data Mining

Overview of Data mining - Definition, Knowledge Discovery Process (Relationships, Patterns, Phases of the process), OLAP versus Data mining

Some aspects of Data mining - Association rules, Outlier analysis, Predictive analytics etc)

Concepts of Data mining in a Data warehouse environment

Major Data Mining techniques - Cluster Detection, Decision Trees, Memory-based Reasoning, Link Analysis, Neural Networks, Genetic Algorithms etc

Data Mining Applications in industry - Benefits of Data mining, Discussion on applications in Customer Relationship Management (CRM), Retail, Telecommunication, Biotechnology, Banking and Finance etc

Books Recommended:

1. Data Warehousing Fundamentals for IT Professionals, Second Edition by Paulraj Ponniah, Wiley India

References:

2. Data Warehousing, Data Mining, & OLAP - Second Edition by Alex Berson and Stephen J. Smith, Tata McGraw Hill Education

3. Data warehouse Toolkit by Ralph Kimball, Wiley India

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PARALLEL AND DISTRIBUTED ALGORITHMS

TIU-UCS-E404

L-T-P: 3-0-0

Credits:3

Fundamentals: Models of parallel and distributed computation, complexity measures.

The PRAM Model: balancing, divide and conquer, parallel prefix computation, pointer jumping, symmetry breaking, list ranking, sorting and searching, graph algorithms, parallel complexity and complexity classes, lower bounds.

Interconnection Networks: topologies (arrays and mesh networks, trees, systolic networks, hyper cubes, butterfly) and fundamental algorithms, matrix algorithms, sorting, graph algorithms, routing, and relationship with PRAM models; Asynchronous Parallel Computation; Distributed Models and Algorithms.

Concepts of Distributed Computation: Termination; Failure tolerance; Network topology.

Distributed Search: Distributed BFS, Random walks; Introduction to Markov processes; Random walks (hitting time, cover time); (s,t)-connectivity.

Distributed Networks: Broadcasting; Robust distributed networks

Recommended Books:

Main Reading:

1. V. Kumar, A. Grama, A. Gupta, G. Kaarypis, Introduction to Parallel Computing, Addison Wesley Press

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