CSC-451 Data Warehousing and Data Mining

Course no: CSC- 451 Full Marks: 60+20+20
Credit hours: 3 Pass Marks: 24+8+8
Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Analysis of advanced aspect of data warehousing and data mining.

Goal: This course introduces advanced aspects of data warehousing and data mining, encompassing the principles, research results and commercial application of the current technologies

Course Contents:

Unit- 1 **5 Hrs.**
Concepts of Data Warehouse and Data Mining including its functionalities, stages of Knowledge discovery in database(KDD) , Setting up a KDD environment, Issues in Data Warehouse and Data Mining, Application of Data Warehouse and Data Mining

Unit-2 **4 Hrs.**
DBMS vs. Data Warehouse, Data marts, Metadata, Multidimensional data model, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations.

Unit- 3 **6 Hrs.**
Data Warehouse Architecture, Distributed and Virtual Data Warehouse, Data Warehouse Manager, OLTP, OLAP, MOLAP, HOLAP, types of OLAP, servers.

Unit- 4 **4 Hrs.**
Computation of Data Cubes, modeling: OLAP data, OLAP queries, Data Warehouse back end tools, tuning and testing of Data Warehouse.

Unit- 5 **4 Hrs.**
Data Mining definition and Task, KDD versus Data Mining, Data Mining techniques, tools and application.

Unit- 6 **5Hrs.**
Data mining query languages, data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification, data mining languages and standardization of data mining.

Unit- 7 **6 Hrs.**
Mining Association Rules in Large Databases: Association Rule Mining, why Association Mining is necessary, Pros and Cons of Association Rules, Apriori Algorithm.

Unit- 8 **7 Hrs.**

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Introduction to Regression, Types of Regression, Introduction to clustering, K-mean and K-Mediod Algorithms.

Unit- 9 **4 Hrs.**

Mining Complex Types of Data: Mining Text Databases, Mining the World Wide Web, Mining Multimedia and Spatial Databases.

Laboratory Works: Cover all the concept of datawarehouse and mining mention in a course

Samples

1. Creating a simple data warehouse
2. OLAP operations: Roll Up, Drill Down, Slice, Dice through SQL- Server
3. Concepts of data cleaning and preparing for operation
4. Association rule mining though data mining tools
5. Data Classification through data mining tools
6. Clustering through data mining tools
7. Data visualization through data mining tools

Reference books:

1. Data Mining Concepts and Techniques, Morgan Kaufmann J. Han, M Kamber Second Edition ISBN: 978-1-55860-901-3
2. Data Warehousing in the Real World – Sam Anahory and Dennis Murray, Pearson Edition Asia.
3. Data Mining Techniques – Arun K Pujari, University Press.
4. Data Mining- Pieter Adriaans, DolfZantinge
5. Data Mining, Alex Berson,StephenSmith,KorthTheorling,TMH.
6. Data Mining, Adriaans, Addison-Wesley Longman

CSC-458 Cloud Computing

Course No: CSC-458 Full Marks: 60+20+20
Credit Hours: 3 Pass Marks: 24+8+8
Nature of the course: Theory (3Hrs.) + Lab (3Hrs.)

Course synopsis: This course gives an introduction to cloud computing and its techniques. The topics covered include; introduction to cloud computing, cloud architecture, cloud service models, Service Oriented Architectures, security in cloud computing, disaster management in clouds.

Goal: Cloud computing has become a great solution for providing a flexible, on-demand, and dynamically scalable computing infrastructure for many applications. Cloud computing also presents a significant technology trends, and it is already obvious that it is reshaping information technology processes and the IT marketplace. Thus objective of this course is to introduce the aspects of cloud computing issues.

Course Contents:

Unit1: Introduction 10 Hrs.
Defining the Cloud, The Emergence of Cloud Computing, Cloud-Based Services, Grid Computing or Cloud Computing, Components of Cloud Computing, Cloud Computing Deployment Models: Public, Private, Hybrid, Benefits of Using a Cloud Model, Legal Issues in Using Cloud Models, Characteristics of Cloud Computing, Evolution of Cloud Computing, Challenges for the Cloud computing, Grid Computing, Distributed Computing in Grid and Cloud

Unit 2: Cloud Service Models 15 Hrs.
Communication-as-a-Service (CaaS): Advantages of CaaS, Fully Integrated, Enterprise-Class Unified Communications, Infrastructure-as-a-Service (IaaS): Modern On-Demand Computing, Amazon's Elastic Cloud, Amazon EC2 Service Characteristics, Monitoring-as-a-Service (MaaS), Protection Against Internal and External Threats, Platform-as-a-Service (PaaS): The Traditional On-Premises Model, The New Cloud Model, Key Characteristics of PaaS, Software-as-a-Service (SaaS): SaaS Implementation Issues, Key Characteristics of SaaS, Benefits of the SaaS Model, Jericho Cloud Cube Model

Unit 3: Building Cloud Networks 9 Hrs.
Evolution from Managed service providers (MSP) to Cloud Computing, Single Purpose architectures to multi-purpose architectures, Data center virtualization, Cloud data center, Service Oriented Architectures (SOA), Combining and SOA, Characterizing SOA, Open Source Software in data centers

Unit 5 : Security in Cloud Computing 11 Hrs.
Cloud Security Challenges, Software-as-a-Service Security: Security management, Risk Management, Security Monitoring and Incident Response, Security Architecture Design, Vulnerability Assessment, Data Privacy and Security, Application Security, Virtual Machine Security, disaster Recovery, Disasters in cloud, Disaster management

Laboratory work: As a part of lab work, the students are highly encouraged

- To simulate the concept of virtualization using virtualization programs/systems.
- To understand and practice examples of cloud services and applications.
- To understand and implement distributed storage and security issues in cloud computing.

Reference Books:

- Cloud Computing: Implementation Management and Security, John W. Rittinghouse and James F. Ransome (Recommended for Unit 1, 2, 3 4)
- Cloud Application architecture, George Reese (Recommended for Unit 4)
- Cloud Computing for Dummies, Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper(Recommended for Unit 3)
- Handbook of cloud computing, Borko Furht, Armando Escalante (Recommended for Unit 1)
- Cloud Computing and SOA Convergence in your Enterprise, a step by step guide, David S. Linthicum (Recommended for Unit 1, 2, 3)

CSC-459 Geographical Information System

Course no: CSC-459 Full Marks: 60+20+20
Credit hours: 3 Pass Marks: 24+8+8
Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Basic concepts of Geographical Information System
Goal: The course covers about spatial data modelling and database design, capturing the real world, spatial analysis and visualization, overview of open GIS

Course Contents:

Unit 1: Introduction **6hrs.**
1.1 Overview, History and concepts of GIS
1.2 Scope and application areas of GIS
1.3 Purpose and benefits of GIS
1.4 Functional components of GIS
1.5 Importance of GPS and remote sensing data in GIS

Unit2: Digital mapping concept **3 hrs.**
2.1 Map concept: map elements, map layers, map scales and representation
2.2 Map projection: coordinate system and projection system

Unit 3: spatial data modeling and database design **9 hrs.**
3.1 introduction to geographic phenomena and data modeling
3.2 spatial relationships and topology
3.3 scale and resolution
3.4 vector, raster and digital terrain model
3.5 Spatial database design with the concepts of geodatabase.

Unit 4: capturing the real world **8hrs.**
4.1 different methods of data capture
4.2 map projection and spatial reference
4.3 data preparation, conversion and integration
4.4 quality aspects of spatial data
4.5 GPS
4.6 Remote Sensing

Unit 5: spatial analysis and visualization **7hrs.**
5.1 spatial analysis
i. overlay
ii. buffering
5.2 map outputs and its basic elements

Unit 6: introduction to spatial data infrastructure **8hrs.**

6.1 SDI concepts and its current trend
6.2 The concept of metadata and clearing house
6.3 Critical factors around SDIs

Unit 7: Open GIS **4hrs.**

7.1 Introduction of open concept in GIS
7.2 Open source software for spatial data analysis
7.3 Web Based GIS system
7.4 System Analysis and Design with GIS

Laboratory work: The lab should cover at least the concepts given the chapters

Reference books:

1- Principles of geographic information systems: An introductory textbook, international institute for Geo-information science and Earth observation, the Netherlands- By rolf De By, Richard A. knippers, yuxian sun

2- ESRI guide to GIS analysis Andy Mitchell, ESRI press, Red lands

3- GIS Cook BOOK

CSC-452 Internship

Course no: CSC-452 Full Marks: 200
Credit hours: 6 Pass Marks: 80
Nature of course: Project

Course Synopsis: The students are required to complete a six credit (minimum ten weeks/180 hour long) internship as a part of the course requirement. Industry is a crucial requirement of the Internship course and this will have to be secured before getting started with the course. The work that the students perform during the Internship will have to be supervised by the faculty members as well as by representatives from the participating Industries. The internship experience is expected to enable the students to assist in the resolution of complex problem associated with Database systems.

At the end of the Internship, the student(s) are required to write a report on their internship work. Such a report needs to be structured according to the prescribed format. The Report forms a major aspect of the evaluation of the Internship work.

Goal

Main goal is to assist students in focusing their interests, thus aiding in their professional carrier. It gives students the opportunity to re-examine their career objectives and explore the variety of opportunities in the field of computer networking.

Preparation

Students, the advisors, and the industry/organization, with which the student team is affiliated, will have to agree on a problem that needs to be addressed during the internship. An internship is designed by the advisor and the student according to mutual interests, needs and availability of related industry/organization. To develop a rewarding program, at the beginning of the internship, the advisor and student are asked to establish an internship plan, in the form of written objectives and goals, and to develop a strategy for attaining those goals. The plan may include a schedule of activities that need to be carried out in order to reach a solution for the problem being addressed. The internship plan is not intended to be rigid. Advisor may be unable to assess certain responsibilities until the student demonstrates his or her ability. The plan should be flexible and subject to revision. The advisor and student should assess the student's progress throughout the term of the internship both to evaluate the student's performance, and to establish new directions as needed.

Role of the Advisor

Advisors are expected to share their experience, insight, and enthusiasm with the student throughout the internship. They should continually monitor the progress of the student, assessing written and oral communications and guiding the development of the student's technical and managerial skills, effectiveness and presentation of self. Advisors are expected to submit a post-internship evaluation of the student's accomplishments and abilities and of the internship program in general.

Role of the Student

In order for the internship to be a mutually beneficial experience, a student should begin with a definition of his/her objectives and specific interests for the minimum of 10-week/180 hour period to ensure that appropriate activities and projects are selected by the advisor and the student. The student will be responsible for the timely completion and professional quality of all activities and projects assigned. The student is expected to speak frequently with the advisor on his/her progress and interest in other projects, as well as to discuss observations and questions about meetings, projects and other activities with which he/she is involved.

The student is required to submit to Advisor, within the first two weeks of the internship, a brief plan for the internship.

Internship Group Size and document preparation

Each group must be of maximum 4 Students
Each student should prepare Individual document on the basis of his/her part in the group project.
Supervisors must be assigned to each group

Domain/Scope of Internship (Project Implementation /Research)

Bank, Hospitals, Software Companies, NTC, Ncell and other Telecommunication Sectors, Government Organizations (IT Related), etc.

Report Format: APA Format

Tentative Contents of Report

Abstract
Introduction (organization +Work Done)
Statement of the problem and Objective
Literature Review and methodology (Optional)
System Analysis
System Design
Implementation
System Testing
Limitation/future enhancement
Conclusion
References and Bibliography

Evaluation Criteria
Proposal Defense : 10% weight {Evaluated by Supervisor and Mentor}
Mid-Term : 30% weight {Evaluated by Supervisor and Mentor}
End-Term : 60% weight.

Proposal Defese (At beginning of the internship)
Topic Selection with Proposal (5 of total)
Presentation (5% of total).

Mid-Term (After 2 month)
Program Design (10% of total)
Demo Presentation (10% of total).
Viva (10% of total)

End-Term (After Completion of internship and before final Exam)
Depth of work (15% of total)
Report (25% of total)
Viva (10% of total)
Presentation (10% of total)

Note: External examiner assigned from TU will be present in final presentation. External Examiner along with Supervisors, Mentor will evaluate internship of students. Proportion of the marks will be same for all evaluators.