

CMP 478.3 Network Programming (3-0-3)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50		50
Total	80	20	100

Objectives:

Computer network programming involves writing computer programs that enable process to communicate with each other across a computer network or within same system. **Network programming is client-Server programming** so to make

Two processes to communicate with each other one process must take the initiative while the other is waiting for it. Therefore, network programming ineluctably assumes a client-server model. The process initiating the communication is a client, and the process waiting for the communication to be initiated is a server.

The core objectives of the course is to design and implement the client-server based system, which must able to communicate across the different network platform without depending on operating system architecture.

At the end of the course, the students would able to design and implement computer network based client server application which can talk across the network or within the same system.

Course Contents:

- 1. Network Programming Fundamentals (6hrs)**
 - Introduction to Networking and network programming
 - Client/Server mode
 - Communication Protocol (TCP, IP, UDP, SCTP)
 - TCP state transition Diagram
 - Protocol comparison
- 2. UNIX Programming (22hrs)**
 - Sockets Introduction
 - Socket Address Structures
 - Values Result arguments
 - Byte ordering and Manipulation functions
 - Fork and exec functions
 - Concurrent Servers
 - UNIX /INTERNET domain socket
 - Socket System Calls
 - Passing file descriptor

I/O models (blocking, non-blocking, multiplexing, signal driven, asynchronous)
Socket option, getsockopt, setsockopt, fcntl
Daemon Process, Syslogd Daemon, syslog function, ioctl operation, ioctl function
Socket operations
UNIX and Internet domain socket implementation.

3. Winsock Programming (15hrs)

Introduction to Winsock architecture
Winsock DLL
Windows sockets and Blocking I/O
Windows Socket Extension; Setup and Cleanup Function
Function for Handling Blocked I/O
Asynchronous Database function
Asynchronous I/O functions
Error Handling Functions; Asynchronous Operation
Using Non-Blocking socket, Non-Blocking with connect
Select in conjunction with accept, select with recv/recvfrom and send/sendto
Sending and Receiving Data over connection.

4. Network Utilities and Application (2hrs)

Telnet
Netsat
ifconfig/ipconfig
ping
TFTP
Remote Login

Laboratory Exercises:

1. Implementing ECHO server using C and LINUX.
2. Implementing Date and Time Routines in C and LINUX.
3. Implementing Concurrent Server using FORK and EXEC call in LINUX.
4. UNIX and Internet Domain SOCKET in LINUX using C.
5. Implementing Winsock using C.
6. Implementing Message Exchanger between LINUX and Windows.

Reference Books:

1. Steven, R., UNIX network Programming VOL-1
2. Alok k.Sinha.,Network Programming in WINDOWS NT,Addison Wesley,1996
3. Douglas E.Comers,David L.Stevens Internetworking with TCP/IP Volume III,Second Edition

Software Project Management (3-1-0)

Evaluation:

Theory		Practical		Total	
Sessional	50		-		50
Final	50		-		50
Total	100		-		100

Course Objectives:

- The objective of this course is to provide exposure to the student in the area of Software Project Management as a new management framework uniquely suited to the complexities of modern software development process.
- This course discusses the software engineering approach to modern software development process (Unified Process).

Course Contents:

- 1. Software Management Practice and Software Economics (12 hrs)**
 - 1.1. Conventional Software Management Theory and Practice
 - 1.2. Software Economics and Cost Estimation
 - 1.3. Improving Software Economics
 - 1.4. Software Process
 - 1.5. Team Effectiveness and Software Environment and Quality Target
 - 1.6. Principles of Conventional Software Engineering
 - 1.7. Principles of Modern Software Management
 - 1.8. Iterative Process
- 2. Software Process Primitives and Process Management Framework (14 hrs)**
 - 2.1. Software Process Life-Cycle Phases
 - 2.2. Various Elements of the Software Process (Management, Engineering and Pragmatic)
 - 2.3. Technical and Management Perspective of Software Architecture
 - 2.4. Software Process Workflow and Iteration Workflow
 - 2.5. Status Monitoring - Software Process Checkpoints and Milestone
- 3. Techniques of Planning, Controlling and Automating Software Process (15 hrs)**
 - 3.1. Iterative Process Planning (Process Work Breakdown Structure, Planning Guidelines, Cost and Schedule Estimation Process, Iteration Planning Process)
 - 3.2. Project Organization and Responsibilities
 - 3.3. Process Automation - Tools and Environment
 - 3.4. Project Control and Process Automation
 - 3.5. Process Customization
- 4. Modern Approach to Software Project and Economics (4 hrs)**
 - 4.1. Elements of Modern Software Projects and Management Principles
 - 4.2. Next-Generation Software Economics and Cost Models
 - 4.3. Modern Process Transition - Paradigm Shifts

***Note:** This course module does not have any laboratory assignments. However, the conceptual clarity gained from the subject will be utilized during the Project Work of 8th Semester.*

Text Book:

Royce, W., *Software Project Management - A Unified Framework*, Addison-Wesley, 2000, ISBN: 81-7808-013-3

Reference:

Conway, K., *Software Project Management - From Concept to Deployment*, IDG Books, 2001, ISBN: 81-7722-109-4

DATA MINING

Objectives:

This course deals with the analysis of the aspect data mining. It introduces advanced aspects of data warehousing and data mining, encompassing the fundamental principles, algorithms, research results and application of the current technologies. It will provide an in depth understanding of various concepts and popular techniques used in the field of data mining.

1. Introduction (6 hours)

- 1.1. Data Mining introduction
- 1.2. Data Mining Definition
- 1.3. Knowledge Discovery in Databases (KDD)
- 1.4. KDD vs Data Mining
- 1.5. DBMS vs Data Mining
- 1.6. Data mining techniques
- 1.7. Data Mining Issues
- 1.8. Data Mining Applications

2. Data Warehousing (10 hours)

- 2.1. Data Warehousing Introduction
- 2.2. Data Warehousing Definition
- 2.3. Multidimensional Data Model
- 2.4. OLAP
- 2.5. OLAP Scheme
- 2.6. OLTP
- 2.7. OLTP vs OLAP
- 2.8. Data Warehouse schema
- 2.9. Data Warehouse Architecture
- 2.10. Data Warehouse Server
- 2.11. Data Warehouse Metadata
- 2.12. Data Warehouse Backend Process

3. Association Analysis (5 hours)

- 3.1. Basics and Algorithms
- 3.2. Frequent Itemset
- 3.3. *Apriori* Principle
- 3.4. FP-Growth
- 3.5. FP-Tree
- 3.6. Handling Categorical Attributes

4. Clustering Techniques (9 hours)

- 4.1. Introduction
- 4.2. Paradigms and Algorithms
- 4.3. K-means Clustering
- 4.4. k-medoids
- 4.5. CLARA
- 4.6. CALARANS Hierarchical Clustering
- 4.7. DBSCAN Clustering

5. **Classification** (10 hours)

- 5.1. Introduction
- 5.2. Basics and Algorithms
- 5.3. Decision Tree Classifier
- 5.4. Rule Based Classifier
- 5.5. Nearest Neighbor Classifier (KNN)
- 5.6. Bayesian Classifier
- 5.7. Artificial Neural Network Classifier

6. **Web Mining** (5 hours)

- 6.1. Introduction
- 6.2. Web Mining Taxonomy
- 6.3. Web Content Mining
- 6.4. Web structure mining
- 6.5. Web Usage Mining
- 6.6. Prominent Applications

Practical:

Using Java, Python, MATLAB or any other DataMining tools to illustrate the working principle of the techniques in simulated or real word data

References:

- 1. Pieter Adriaans, Dolf Zantinge, Data Mining , Pearson Education
- 2. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Second Edition
- 3. Jiawei Han and Micheline Kamber, *Data Mining: Concepts and Techniques*, 2nd Edition, 2006, Morgan Kaufmann.
- 4. Hand, Mannila, and Smyth. Principles of Data Mining. Cambridge, MA: MIT Press, 2001. ISBN: 026208290X.
- 5. Berry and Linoff. Mastering Data Mining. New York, NY: Wiley, 2000. ISBN: 0471331236.
- 6. Delmater and Hancock. Data Mining Explained. New York, NY: Digital Press, 2001. ISBN: 1555582311.
- 7. Making Sense of Data II by Glenn Myatt & Wayne Johnson, John Wiley& Sons, 2009
- 8. Anand Rajaraman and Jeffrey Ullman, Mining of Massive Datasets
- 9. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, *Introduction to Data Mining*, 2005, Addison-Wesley.