

**OPERATING SYSTEMS**

Course Code	CS 4001(Same as IT 4001)
Course Title	Operating Systems
Number of Credits	3 (L: 3, T: 0, P :0)
Pre-requisites	CS 3003 Data Structure
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

A general introduction to various ideas in implementation of operating systems, particularly UNIX. Introduce to various options available so as to develop capacity to compare, contrast, and evaluate the key trade-offs between different design choices.

**UNIT 1:**

- 1.1. Overview of Operating System
- 1.2. Basic concepts
- 1.3. UNIX/LINUX Architecture
- 1.4. Kernel
- 1.5. Services and systems calls
- 1.6. System programs.

**UNIT 2:**

- 2.1. Process management
  - 2.1.1. Process concepts,
  - 2.1.2. Operations on processes
  - 2.1.3. Ipc
- 2.2. Process scheduling:
  - 2.2.1. FCFS
  - 2.2.2. SJF
  - 2.2.3. Priority
  - 2.2.4. Round Robin
- 2.3. Multi- threaded programming
- 2.4. Memory management
  - 2.4.1. Memory allocation
  - 2.4.2. Swapping
  - 2.4.3. Paging
  - 2.4.4. Segmentation
- 2.5. Virtual memory

**UNIT 3:**

- 3.1. File management
  - 3.1.1. Concept of a file
  - 3.1.2. Access methods
- 3.2. Directory structure
- 3.3. File system structure and implementation
  - 3.3.1. Directory implementation
  - 3.3.2. Free- space management
  - 3.3.3. Efficiency and performance.
- 3.4. Different types of file systems

**UNIT 4:**

- 4.1. I/o system
- 4.2. Mass storage structure
  - 4.2.1. Overview
  - 4.2.2. Disk structure
  - 4.2.3. Disk attachment
- 4.3. Disk scheduling algorithms
  - 4.3.1. FCFS

- 4.3.2. SSTF
- 4.3.3. SCAN
- 4.3.4. LOOK
- 4.4. Swap space management
- 4.5. Raid.

**UNIT 5:**

- 5.1. OS Security
- 5.2. Authentication
- 5.3. Access Control
- 5.4. Access Rights
- 5.5. System Logs

**REFERENCE BOOKS:**

1. Operating System Concepts, Silberschatz and Galvin, Wiley India Limited
2. UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education
3. Operating Systems, Internals and Design Principles, Stallings, Pearson Education, India
4. Operating System Concepts, Ekta Walia, Khanna Publishing House
5. Modern Operating Systems, Andrew S. Tanenbaum, Prentice Hall of India
6. Operating systems, Deitel & Deitel, Pearson Education, India

**COURSE OUTCOMES:**

Students should be able to demonstrate basic knowledge about Operating System, be able to apply OS concepts such as processes, memory and file systems to system design, able to configure OS in an efficient and secure manner.

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SEMESTER SCHEME-2020-21

**INTRODUCTION TO DBMS**

Course Code	CS 4002(Same as IT 4002)
Course Title	Introduction to DBMS
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	CS 3002 Scripting Language
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

It covers the development of database-driven applications using the capabilities provided by modern database management system software. The concepts include conceptual modeling, relational database design and database query languages.

**COURSE OUTCOMES:**

After completing the course, the students will understand

- (i) How to design a database, database-based applications
- (ii) How to use a DBMS
- (iii) The critical role of database system in designing several information system-based software systems or applications.

**COURSE CONTENT:**

As a part of the lab, project work is included.

**UNIT 1:**

- 1.1. Introduction
- 1.2. Components of DBMS
- 1.3. Advantage of DBMS
- 1.4. Database System v/s File System
- 1.5. Database System Concepts and Architecture
- 1.6. Application Architecture of DBMS
- 1.7. Overall Database Structure

**UNIT 2 :**

- 2.1. Data Modeling using the Entity-Relationship Model
- 2.2. Notations of ER Diagram
- 2.3. Mapping Constraints
- 2.4. Keys
- 2.5. The Enhanced Entity-Relationship (EER) model

**UNIT 3:**

- 3.1. The Relational Data Model and Relational Database Constraints
- 3.2. Codd's Rule of DBMS
- 3.3. ER/EER to Relational Model mapping
- 3.4. Relational Algebra
- 3.5. Relational Calculus

**UNIT 4:**

- 4.1. SQL-99
  - 4.1.1. Schema definition,
  - 4.1.2. Constraints
  - 4.1.3. Queries and Views
- 4.2. Security
- 4.3. Introduction to SQL programming Techniques

**UNIT 5:**

- 5.1. Functional dependencies and normalization for relational databases
  - 5.1.1. Normalization Concepts
  - 5.1.2. Normal Forms (1NF, 2NF, 3NF, BCNF)

- 5.2. Relational database design algorithms and further dependencies.
  - 5.2.1. Multi-Valued Dependency and 4NF
  - 5.2.2. Join Dependency and 5NF

**REFERENCE BOOKS:**

1. Fundamentals of Database Systems, Elmasri & Navathe, Pearson Education
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, TataMcGraw-Hill.
3. Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw- Hill, New Delhi, India.
4. Introduction to Database Systems, C.J.Date, Pearson Education
5. Introduction to SQL, Rick F.Vander Lans, Pearson Education

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SEMESTER SCHEME-2020-21

**COMPUTER NETWORKS**

Course Code	CS 4003(Same as IT 4003)
Course Title	Computer Networks
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	-
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

Understand functioning of computer networks and popular networking protocols

**COURSE OUTCOMES:**

1. Understanding of computer networks, issues, limitations, options available.
2. Understanding of the care that needs to be taken while developing applications designed to work over computer networks
3. Able to configure basic LAN and connect computers to it.

**COURSE CONTENT:****UNIT 1:**

- 1.1. Introduction to computer networks
- 1.2. Network Models
- 1.3. OSI Reference Model
- 1.4. TCP/IP Model

**UNIT 2:**

- 2.1. Transmission media
  - 2.1.1. Principles
  - 2.1.2. Issues and examples
- 2.2. Wired media – coaxial, utp, stp, fiber optic cables
- 2.3. Wireless media – hf, vhf, uhf, microwave, ku band
- 2.4. Network topologies
- 2.5. Data link layer
  - 2.5.1. Design issues
  - 2.5.2. Example protocols (ethernet, wlan, bluetooth)
  - 2.5.3. Switching techniques

**UNIT 3:**

- 3.1. Network layer
  - 3.1.1. Design issues
  - 3.1.2. Example protocols (ipv4)
- 3.2. Routing
  - 3.2.1. Principles/issues,
  - 3.2.2. Algorithms (distance-vector, link-state) and protocols (rip, ospf)

**UNIT 4:**

- 4.1. Transport layer
  - 4.1.1. Design issues,
  - 4.1.2. Example protocols (tcp)
- 4.2. Application layer protocols (smtp, dns).

**UNIT 5:**

- 5.1. Functioning of Network Devices
  - 5.1.1. NIC, Hub, Switch, Router, WiFi Devices
- 5.2. Network Management System and example protocol (SNMP).

**REFERENCE BOOKS:**

1. Computer Networks, 4<sup>th</sup> Edition (or later), Andrew S. Tanenbaum, PHI

2. TCP/IP Illustrated, Volume-1, W. Richard Stevens, Addison Wesley
3. Data and Computer Communications, William Stallings, PHI
4. An Engineering Approach to Computer Networking, S. Keshav, Addison Wesley/Pearson
5. An Integrated Approach to Computer Networks, Bhavneet Sidhu, Khanna Publishing House

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SEMESTER SCHEME-2020-21

**SSAD/SOFTWARE ENGINEERING**

Course Code	*CS 4004(Same as IT 4004)
Course Title	SSAD/Software Engineering
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	-
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

1. Inculcate essential technology and software engineering knowledge and skills essential to build a reasonably complex usable and maintainable software iteratively.
2. Emphasize on structured approach to handle software development.
3. Enhance communication skills.

**COURSE OUTCOMES:**

The proposed course is expected to provide an introduction to software engineering concepts and techniques to undergraduate students, thus enabling them to work in a small team to deliver a software system. The course content and project will introduce various software technologies, process and project management skills that are needed for the delivery of software in a team setting

**COURSE CONTENTS:**

As per the course design, concepts learned as part of this course will/should be used in the Minor Project (Proj.202). These two courses should go hand in hand to be effective.

**UNIT 1:**

- 1.1. Introduction to Software Engineering
- 1.2. Lifecycle
- 1.3. Process Models
- 1.4. Traditional v/s Agile processes

**UNIT 2:**

- 2.1. Development Activities
  - 2.1.1. Requirements Gathering and Analysis
- 2.2. Design Concepts
  - 2.2.1. Software architecture and Architectural styles
  - 2.2.2. Basic UI design
- 2.3. Effective Coding and Debugging techniques

**UNIT 3:**

- 3.1. Software Testing Basics
  - 3.1.1. Unit, Integration, System and Acceptance Testing
- 3.2. Introduction to various testing techniques (e.g. Stress testing)
- 3.3. Writing and executing test cases
- 3.4. Quality Assurance

**UNIT 4:**

- 4.1. Project Management
  - 4.1.1. Project management concepts,
  - 4.1.2. Configuration and Release Management
  - 4.1.3. Version Control and its tools (Git)
- 4.2. Release Planning
- 4.3. Change Management
- 4.4. Software Maintenance

**REFERENCE BOOKS:**

1. Software Engineering – A Practitioner’s Approach, 7th Edition, Roger Pressman.
2. Software engineering, Ian Sommerville, Pearson Education
3. An Integrated Approach to Software Engineering, Pankaj Jalote, Springer Verlag
4. Software Engineering, Nasib Singh Gill, Khanna Book Publishing Co. India.
5. Software Engineering, K. K. Agarval, Yogesh Singh, New Age International Publishers

**WEB TECHNOLOGIES**

Course Code	CS 4005
Course Title	Web Technologies
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	-
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

To provide basic skills on tools, languages and technologies related to website development. Learnings from this course may be used in the Mini Project and summer internship.

**COURSE OUTCOMES:**

Student will be able to develop/build a functional website with full features.

**COURSE CONTENTS:****UNIT 1: INTRODUCTION TO WWW**

- 1.1. Protocols and programs
  - 1.1.1. Secure connections,
  - 1.1.2. Application and development tools
- 1.2. The web browser
- 1.3. What is server
- 1.4. Setting up UNIX and LINUX web servers
- 1.5. Logging users
- 1.6. Dynamic IP Web Design
  - 1.6.1. Web site design principles
  - 1.6.2. Planning the site and navigation

**UNIT 2: WEB SYSTEMS ARCHITECTURE**

- 2.1. Architecture of Web based systems
  - 2.1.1. Client/server (2-tier) architecture
  - 2.1.2. 3-Tier architecture
- 2.2. Building blocks of fast and scalable data access Concepts
  - 2.2.1. Caches-Proxies- Indexes-Load Balancers- Queues
- 2.3. Web Application architecture (WAA)

**UNIT 3: JAVASCRIPT**

- 3.1. Client side scripting
- 3.2. What is Javascript
- 3.3. Simple Javascript
- 3.4. Variables
- 3.5. Functions, conditions
- 3.6. Loops and repetition

**UNIT 4: ADVANCE SCRIPTING**

- 4.1. Javascript and objects
  - 4.1.1. Javascript own objects
  - 4.1.2. DOM and web browser environments, forms and validations
- 4.2. DHTML
  - 4.2.1. Combining HTML, CSS and Javascript
- 4.3. Ajax
- 4.4. Introduction to XML
- 4.5. Introduction to Web Services

**UNIT 5: PHP**

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  - 5.1. Server side scripting
    - 5.1.1. Arrays
    - 5.1.2. Function and forms



- 5.1.3. Advance php
- 5.2. Databases
  - 5.2.1. Basic command with php examples
  - 5.2.2. Connection to server, creating database
  - 5.2.3. Selecting a database
  - 5.2.4. Listing database
  - 5.2.5. Listing table- names creating a table
  - 5.2.6. Inserting data
  - 5.2.7. Altering tables, queries, deleting database, deleting data and tables
- 5.3. Php myadmin and database bugs

**REFERENCE BOOKS:**

1. "Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson,
2. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education
3. "Web programming- Building Internet Application", Chris Bales
4. Web Applications: Concepts and Real World Design, Knuckles.

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SEMESTER SCHEME-2020-21

**INFORMATION SECURITY**

Course Code	CS 40061 (Same as IT 40061)
Course Title	Information Security
Number of Credits	4 (L: 3, T: 1, P: 0)
Prerequisites	--
Course Category	PE

**COURSE LEARNING OBJECTIVES:**

To learn how to evaluate and enhance information security of IT infrastructure and organisations

**COURSE OUTCOMES:**

Understanding of security needs and issues of IT infrastructure. Have basic skills on security audit of networks, operating systems and application software.

**COURSE CONTENTS:****UNIT 1:**

- 1.1. Introduction to Information Security
- 1.2. Various aspects of information security (PAIN)
- 1.3. Security Features of Operating Systems
  - 1.3.1. Authentication
  - 1.3.2. Logs
  - 1.3.3. Audit Features
  - 1.3.4. File System Protection,
  - 1.3.5. User Privileges
  - 1.3.6. RAID options
  - 1.3.7. Anti-Virus Software, etc.

**UNIT 2:**

- 2.1. Understanding security weaknesses in popular networking protocols
  - 2.1.1. IP
  - 2.1.2. TCP
  - 2.1.3. UDP
  - 2.1.4. RIP
  - 2.1.5. OSPF
  - 2.1.6. HTTP
  - 2.1.7. SMTP etc.
- 2.2. Security weaknesses in common networking devices
  - 2.2.1. Hub
  - 2.2.2. Switch
  - 2.2.3. Router
  - 2.2.4. Wifi
- 2.3. Security solutions to mitigate security risk of
  - 2.3.1. Networking protocols (ipsec, HTTPS, etc)
  - 2.3.2. Devices (VLAN, VPN, Ingress Filtering, etc)

**UNIT 3:**

- 3.1. Basics of Cryptography
- 3.2. PKI
- 3.3. Security considerations while developing softwares

**UNIT 4:**

- 4.1. Network Security Products
- 4.2. Firewall
- 4.3. IDS/IPS
- 4.4. VPN Concentrator
- 4.5. Content Screening Gateways, etc.

**UNIT 5:**

- 5.1. Introduction to Security Standards
- 5.2. ISO 27001
- 5.3. Indian IT Act
- 5.4. IPR Laws
- 5.5. Security Audit procedures
- 5.6. Developing Security Policies
- 5.7. Disaster Recovery, Business Continuity Planning

**REFERENCE BOOKS:**

1. Information Security and Cyber Laws, Sarika Gupta, Khanna Publishing House
2. RFCs of protocols listed in content (<https://www.ietf.org>)
3. Various Acts, Laws and Standards (IT Act, ISO27001 Standard, IPR and Copyright Laws, etc.)
4. Security Guideline documents of Operating Systems (OS Manual, Man Pages, etc)
5. <https://www.cert-in.org.in/>
6. <https://www.sans.org/>

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SEMESTER SCHEME-2020-21

**NETWORK FORENSICS**

Course Code	CS 40062
Course Title	Network Forensics
Number of Credits	4(L: 3, T: 1, P: 0)
Prerequisites	CS 4001 Operating Systems, CS 4003 Computer Networks
Course Category	PE

**COURSE LEARNING OBJECTIVES:**

To understand various network forensic aspects for analysing network security breach

**COURSE OUTCOMES:**

Student will understand basic concepts of network forensics, learn tools, and will be able to do basic forensic investigations and handle security incidents.

**COURSE CONTENTS:****UNIT 1:**

- 1.1. Review of Networking concepts and Protocols
- 1.2. Introduction to Network Forensics
- 1.3. Various aspects of Network Forensics

**UNIT 2:**

- 2.1. Introduction to Network Forensic Tools and techniques
- 2.2. Wireshark
- 2.3. TCP Dump
- 2.4. Syslog
- 2.5. NMS
- 2.6. Promiscuous Mode
- 2.7. Network Port Mirroring
- 2.8. Snooping
- 2.9. Scanning tools, etc.

**UNIT 3:**

- 3.1. Understanding and Examining Data Link Layer
  - 3.1.1. Physical Layer
  - 3.1.2. Ethernet Switch Logs
  - 3.1.3. MAC Table
  - 3.1.4. ARP Table, etc.
- 3.2. Understanding and Examining Network Layer
  - 3.2.1. Router Logs
  - 3.2.2. WiFi Device logs
  - 3.2.3. Firewall logs,

**UNIT 4:**

- 4.1. Understanding audit features of OS and applications
- 4.2. Enabling and Examining Server logs
- 4.3. User activity logs
- 4.4. Browser history analysis
- 4.5. Proxy server logs
- 4.6. Antivirus logs
- 4.7. Email logs

**UNIT 5:**

- 5.1. Limitations and challenges of network forensics due to
  - 5.1.1. Encryption
  - 5.1.2. Spoofing
  - 5.1.3. Mobility
  - 5.1.4. Storage limitations

5.1.5. Privacy laws, etc.

**SUGGESTED LAB WORK:**

This is a skill course. Topics/tools taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should explore features of various tools/applications introduced during the course. Teacher should give weekly tasks as assignment.

**REFERENCE BOOKS:**

1. Manuals of OS, application software, network devices
2. RFCs of various networking protocols (<https://www.ietf.org/>)
3. <https://www.sans.org/>
4. <https://www.cert-in.org.in/>
5. Handbook of Digital Forensics and Investigation, Eoghan Casey, Elsevier Academic Press
6. Cyber Forensics, Albert Marcella and Doug Menendez, CRC Press
7. Computer Forensics (5 volume Set) mapping to CHFI (Certified Hacking Forensics Investigator), by EC-Council

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SEMESTER SCHEME-2020-21

**OPERATING SYSTEMS LAB**

Course Code	*CS 4007 (Same as IT 4007)
Course Title	Operating Systems Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	CS 3003 Data Structures
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

This Lab course is intended to practice and do experiment on concepts taught in theory class of 'Operating Systems' and gain insight into functioning of the Operating Systems.

**COURSE OUTCOMES:**

Students should be able to demonstrate basic knowledge about Operating System, be able to apply OS concepts such as processes, memory and file systems to system design, able to configure OS in an efficient and secure manner, and become an advance user of operating system.

**COURSE CONTENTS:**

S.No.	Topics for Practice
1	Revision practice of various commands like man, cp, mv, ln, rm, unlink, mkdir, rmdir.
2	Implement two way process communication using pipes
3	Implement message queue form of IPC
4	Implement shared memory and semaphore form of IPC
5	Simulate the CPU scheduling algorithms - Round Robin, SJF, FCFS, priority
6	Simulate Bankers algorithm for Deadlock Avoidance and Prevention
7	Simulate all FIFO Page Replacement Algorithm using C program
8	Simulate all LRU Page Replacement Algorithms using C program
9	Simulate Paging Technique of Memory Management
10	Practice various commands/utilities such as catnl, uniq, tee, pg, comm, cmp, diff, tr, tar, cpio, mount, umount, find, umask, ulimit, sort, grep, egrep, fgrep cut, paste, join, du, df, ps, who, etc and many more.

This is a skill course. More student practice and try to find solution on their own, better it will be.

**REFERENCE BOOKS:**

1. Operating System Concepts, Silberschatz, Abraham and Galvin, Peter, Wiley India Limited
2. UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education
3. Operating System Concepts, Ekta Walia, Khanna Publishing House

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**INTRODUCTION TO DBMS LAB**

Course Code	*CS 4008 (Same as IT 4008)
Course Title	Introduction to DBMS Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	CS 3006 Computer Programming Lab
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

This Lab course is intended to practice whatever is taught in theory class of 'Introduction to DBMS'. A few sample case studies are listed with some suggested activities. More case studies may be added to this list. You need to develop these case studies, apply all relevant concepts learnt in theory class as the course progress, identify activities/operations that may be performed on the database. It will be a good idea to also use concepts learnt in the course on Software Engineering/SSAD.

**COURSE OUTCOMES:**

After completing the course, the students will understand

- (i) How to design a database, database-based applications
- (ii) How to use a DBMS
- (iii) The critical role of database system in designing several information system-based software systems or applications.

**COURSE CONTENTS:**

S.No.	Topics for Practice
1	Case Study-1: Employee database – 'Create' employee table, 'Select' and display an employee matching a given condition, 'Delete' duplicate records, delete rows using triggers, insert and update records, find net salary, etc.
2	Case Study-2: Visitor Management database
3	Case Study-3: Students Academic database
4	Case Study-4: Inventory Management System database
5	Case study-5: Bank Operations database
6	Case Study-6: Bus Operator (Roadways) – Do related activities such as prepare E-R Model, Relational Model, do Normalization, Create Tables, Insert data, Delete Data, Query database, create stored procedures, etc.

This is a skill course. More student practice and try to find solution on their own, better it will be.

**REFERENCE BOOKS:**

1. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education
2. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill, New Delhi, India.
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw- Hill, New Delhi, India.
4. Introduction to Database Systems, C.J.Date, Pearson Education
5. Introduction to SQL, Rick F.Vander Lans, Pearson Education

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**COMPUTER NETWORKS LAB**

Course Code	*CS 4009 (Same as IT 4009)
Course Title	Computer Networks Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	-----
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

This Lab course is intended to practice whatever is taught in theory class of 'Computer Networks'. Some of the things that should necessary be covered in lab are listed below:

**COURSE OUTCOMES:**

1. Understanding of computer networks, issues, limitations, options available.
2. Able to configure basic small LAN and connect computers to it.

**COURSE CONTENTS:**

S.No.	Topics for Practice
1	Showing various types of networking cables and connectors, identifying them clearly
2	Looking at specifications of cables and connectors of various companies on Internet, find out differences.
3	Making patch cords using different types of cables and connectors - crimping, splicing, etc
4	Demonstration of different type of cable testers, using them for testing patch cords prepared by the students in Lab and standard cables prepared by professionals
5	Configuring computing devices (PC, Laptop, Mobile, etc) for network, exploring different options and their impact – IP address, gateway, DNS, security options, etc
6	Showing various networking devices – NICs, Hub, Switch, Router, WiFi access point, etc.
7	Looking at specifications of various networking devices various companies on Internet, find out differences.
8	Setting up a small wired LAN in the Lab
9	Setting up a small wireless LAN in the Lab

This is a skill course. More student practice and try to find solution on their own, better it will be.

**REFERENCE BOOKS:**

1. Cisco press books on CCNA
2. User manual of networking devices available in the lab
3. Wiki pages on networking devices

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**WEB TECHNOLOGIES LAB**

Course Code	CS 4010
Course Title	Web Technologies Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	-----
Course Category	PC

**COURSE LEARNING OBJECTIVES:**

This Lab course is intended to practice whatever is taught in theory class of 'Web Technologies'. Some of the things that should necessary be covered in lab are listed below:

**COURSE OUTCOMES:**

Student will be able to program web applications using and will be able to do the following:

1. Use LAMP Stack for web applications
2. Use Tomcat Server for Servlets and JSPs
3. Write simple applications with Technologies like HTML, Javascript, AJAX, PHP, Servlets and JSPs
4. Connect to Database and get results
5. Parse XML files using Java (DOM and SAX parsers)

Student will be able to develop/build a functional website with full features.

**COURSE CONTENTS:**

S.No.	Topics for Practice
1	Coding Server Client Programs
2	Developing Web Application using HTML, JavaScript
3	Developing Advanced Web Application Programs using CSS
4	Practicing PHP : Basics
5	Practicing PHP : Web Application Development
6	Practicing PHP: MySql - tiered Applications
7	Developing a fully functional Web Service Application using all the technologies learned in this course.

**REFERENCE BOOKS:**

1. "Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson,
2. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education
3. "Web programming- Building Internet Application", Chris Bales
4. Web Applications: Concepts and Real World Design, Knuckles

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