

**NORTH MAHARASHTRA UNIVERSITY,  
JALGAON (M.S.)**

**Final Year Engineering  
(Information Technology)**

**Faculty of Engineering and Technology**



**COURSE OUTLINE**

**Semester – VII**

**W.E.F. 2015– 2016**



**Annexure - I**

**BE Semester - VII**

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	Theory		Practical		Total	
						ISE	ESE	ICA	ESE		
Advanced Unix Programming*	D	3	---	---	3	20	80	---	---	100	3
Enterprise Resource Planning	D	3	---	---	3	20	80	---	---	100	3
Interdisciplinary Elective	E	3	---	---	3	20	80	---	---	100	3
Elective - I	E	3	---	---	3	20	80	---	---	100	3
Embedded System*	D	3	--	---	3	20	80	---	---	100	3
Advanced Unix Programming Lab*	D	---	---	2	2	---	---	25	25(PR)	50	1
Embedded System Lab*	D	---	---	2	2	---	---	25	25(OR)	50	1
Elective – I Lab #	E	---	---	2	2	---	---	25	25(OR)	50	1
Project – I*	D	---	---	2	2	---	---	25	25(OR)	50	2
Seminar – II*	D	---	---	2	2	---	---	25	---	25	2
Industrial Visit*	D	---	---	---	---	---	---	25	---	25	1
<b>Total</b>		<b>15</b>	<b>---</b>	<b>10</b>	<b>25</b>	<b>100</b>	<b>400</b>	<b>150</b>	<b>100</b>	<b>750</b>	<b>23</b>

**ISE: Internal Sessional Examination**

**ESE: End Semester Examination**

**ICA: Internal Continuous Assessment**

**#Lab for Elective-I**

**Inter Disciplinary Elective**

**1 Software Engineering & Project Management**

**2 Enterprise Resource Planning and SAP**

**Elective I**

**1 Pattern Recognition**

**2 Android Programming\***

**3 Human Computer Interaction\***

**4 Artificial Intelligence**

**\* Common Subjects with BE Comp**

**BE Semester – VIII**

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Internet Security	D	3	---	---	3	20	80	---	---	100	3
Data Warehousing & Mining*	D	3	---	---	3	20	80	---	---	100	3
Elective - II	E	3	---	---	3	20	80	---	---	100	3
Elective - III	E	3	---	---	3	20	80	---	---	100	3
Internet Security Lab	D	---	---	2	2	---	---	25	25(PR)	50	1
Data Warehousing & Mining Lab*	D	---	---	2	2	---	---	25	25(OR)	50	1
Elective - II Lab#	E	---	---	2	2	---	---	25	25(OR)	50	1
Industrial Lecture\$	C	---	---	1*	1	---	---	50	---	50	2
Project – II*	D	---	---	4	4	---	---	75	75 (OR)	150	6
<b>Total</b>		<b>12</b>	<b>---</b>	<b>11</b>	<b>23</b>	<b>80</b>	<b>320</b>	<b>200</b>	<b>150</b>	<b>750</b>	<b>23</b>

**ISE: Internal Sessional Examination**

**ESE: End Semester Examination**

**ICA: Internal Continuous Assessment**

**#Lab for Elective-II**

**\$ Minimum 6 lectures to be conducted by experts from the industry in alternate weeks. Next week group discussion on the lecture conducted.**

**Elective II**

- 1 Software Metrics & Quality Assurance\***
- 2 Distributed System\***
- 3 Cryptography & Network Security\***
- 4 Neural Network & Fuzzy Logic\***

**Elective III**

- 1 Mobile Computing\***
- 2 Bio-Informatics\***
- 3 Cloud Computing**
- 4 iPhone Programming\***

\* Common Subjects with BE Comp

# Advanced UNIX Programming

## COURSE OUTLINE

Course Title  
**Advanced UNIX Programming**

Short Title Course Code  
**AUP**

### Course Description:

The principle objective of this course is to teach students

- a. How UNIX is designed and structured.
- b. How to write programs on and for Unix Platforms.
- c. How to work efficiently within Unix Environment.
- d. Command level view of Unix OS.
- e. The important parts of the Unix Operating system's application programming interface.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	3	14	42	3

**Prerequisite Course(s):** Basic Knowledge of operating system (Unix/Linux) and C Programming.

## COURSE CONTENT

**Advanced UNIX Programming**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE) : 80 Marks**  
**Paper Duration (ESE) : 03 Hours**  
**Internal Sessional Exam (ISE) : 20 Marks**

1. **(8 Hrs, 16 Marks)**
  - a. **Unix System Overview-** Introduction, UNIX Architecture, Logging In, Files and Directories, Input and Output
  - b. Programs and Processes, Error Handling, User Identification, Signals
  - c. Time Values, System Calls and Library Functions
  - d. **File I/O-** Introduction, File Descriptors, open Function, creat Function, close Function, lseek Function, read Function, write Function
  - e. File Sharing, Atomic Operations- Appending to a file, Creating a file

- f. dup and dup2 Functions, sync, fsync, and fdatasync functions, fcntl function

2. **(8 Hrs, 16 Marks)**

- a. **Files and Directories-** Introduction, stat, fstat, and lstat Functions, File Types, File Access Permissions, access Function, umask Function
- b. chmod and fchmod Functions, Sticky Bit, File Size, File Truncation, File Systems, link, unlink, remove and rename function
- c. Symbolic Links, symlink and readlink Functions, File Times, mkdir and rmdir Functions, chdir, fchdir, and getcwd Functions
- d. **System Data Files and Information** – Introduction, Password File- getpwuid, getpwnam, getpwent, setpwent, endpwent, Shadow Passwords- getspnam, getspent, setspent, endspent
- e. Group File- getgrgid, getgrnam, getgrent, setgrent, endgrent, Login Accounting, System Identification- uname, gethostname
- f. Time and Date Routines- time, gettimeofday, gmtime, localtime, mktime, asctime, ctime, strftime

3. **(8 Hrs, 16 Marks)**

- a. **Process Environment-** Introduction, main Function, Process Termination- Exit Functions, atexit Function
- b. Command-Line Arguments, Environment List, Memory Layout of a C Program, Memory Allocation- malloc, calloc, realloc, free
- c. Environment Variables
- d. **Process Control** – Introduction, Process Identifiers- getpid, getppid, getuid, geteuid, getgid, getegid
- e. fork Function- file sharing, vfork Function, wait and waitpid Functions
- f. Race Conditions, exec Functions- execl, execv, execl, execve, execlp, execvp, Process Accounting

4. **(8 Hrs, 16 Marks)**

- a. **Signals** – Introduction, Signal Concepts, signal Function, Unreliable Signals
- b. Interrupted System call, Reliable-Signal Terminology and Semantics, kill and raise Functions, alarm and pause Functions
- c. Signal Sets- sigemptyset, sigfillset, sigaddset, sigdelset, sigismember, sleep Function
- d. **Threads** – Introduction, Thread Concepts, Thread Identification- pthread\_equal, pthread\_self, Thread Creation- pthread\_create, Thread Termination- pthread\_exit, pthread\_join, pthread\_cancel, pthread\_cleanup\_push, pthread\_cleanup\_pop, pthread\_detach
- e. Thread Synchronization- pthread\_mutex\_init, pthread\_mutex\_destroy, pthread\_mutex\_lock, pthread\_mutex\_trylock, pthread\_mutex\_unlock
- f. **Daemon Processes** – Introduction, Daemon Characteristics, Coding Rules, Error Logging

5.

**(8 Hrs, 16 Marks)**

- a. Interprocess Communication** – Introduction, Pipes, FIFOs-  
mkfifo, XSI IPC, identfired and keys, ftok
- b. Message Queues-** msgget, msgctl, msgsnd, msgrcv, Semaphores-  
semget, semctl, semop, Shared Memory-shmget, shmctl, shmat,  
shmdt
- c. Network IPC-** Socket Descriptors- socket, shutdown
- d. Associating Addresses with sockets-** bind
- e. Connection Establishment-** connect, listen, accept
- f. Data Transfer-** send, recv

**Text Book:**

1. W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

**Reference Book:**

1. W. Richard Stevens, Unix Network Programming - Interprocess Communications, Volume 2, 2/E, Pearson Education

# Enterprise Resource Planning

## COURSE OUTLINE

Course Title

**Enterprise Resource Planning**

Short Title Course Code

**ERP**

### Course Description:

This course is aimed at introducing foundation understanding of enterprise systems and how these systems fit into today's business operations. Enterprise Systems are now essential infrastructure to both large corporate entities, as well as to small-to-medium organization, as they remove the need to have a large number of separate individual computer-based applications.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	3	14	42	3

Prerequisite Course(s): None

## COURSE CONTENT

**Enterprise Resource Planning**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE) : 80 Marks**

**Paper Duration (ESE) : 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

### **1. Introduction to Enterprise Resource Planning (8 Hrs, 16 Marks)**

- a. Introduction: A brief history of ERP, Reasons for the growth of the ERP market, The advantages of ERP.
- b. Enterprise- An Overview: Business functions and business processes, Integrated management information, The role of the Enterprise, Business modeling, Integrated data model.
- c. Benefits of ERP: Information integration, Reduction of lead-times, on-time shipment, Reduction in cycle time, improved resource utilization, Better customer satisfaction, Improved supplier performance, Increased flexibility,



Reduced quality costs, Better analysis and planning capabilities, Improved information accuracy and decision making capability, Use of latest technology.

## **2 ERP and Related Technologies**

**(8 Hrs, 16 Marks)**

- a. ERP Related Technologies: Business process re-engineering(BPR), Business intelligence(BI), Business analytics(BA), Data Warehousing, Data Mining, On-line analytical processing (OLAP), Product-life cycle management(PLM), Supply chain management (SCM), Customer relationship management (CRM), Geographic information systems (GIS), Intranets and Extranets.
- b. ERP Security: Technological advancements, Computer Crimes, ERP and security, Computer security, Crime and security.

## **3 ERP Marketplace and Functional Modules**

**(8 Hrs, 16 Marks)**

- a. ERP Marketplace and Marketplace Dynamics: Market overview, ERP market Tiers, Saas, Iaas and Paas, Marketplace dynamics- on-premise ERP and on-demand ERP, Industry-wise ERP market share, ERP: The Indian scenario.
- b. Business Modules of an ERP Package: Functional modules of ERP software, Integration of ERP, Supply chain and customer relationship applications.

## **4 ERP Implementation**

**(8 Hrs, 16 Marks)**

- a. ERP Implementation Basics: Why ERP?, Technical, operational and business reasons for implementing ERP, Challenges to successful ERP implementation, The implementation challenges.
- b. ERP Implementation Life Cycle: Objectives of ERP implementation, Different phases of ERP implementation, Why do many ERP implementation fails?
- c. ERP Package Selection: Why many ERP package implementations fail?, ERP package evaluation and selection, The selection process, ERP packages: make or buy?

## **5 ERP- Present and Future**

**(8 Hrs, 16 Marks)**

- a. ERP and E-Business: ERP and E-Business, E-Business: supply chain integration, The E-Business process model, Components of the E-Business supply chain, ERP/E-Business integration.
- b. ERP, The Internet and WWW-ERP II: The Internet explosion, ERP, the Internet

and WWW, ERP to ERP II: bringing ERP to the entire enterprise, Best practices of ERP II.

- c. Future Directions and Trends in ERP: New markets, New Channels, Faster implementation methodologies, Easier customization tools, Reduction in implementation time, Growth of third party service providers, Growth of SaaS and Cloud ERP market, Industry specific solutions, Mobile ERP solutions.
- d. ERP Case Studies: SAP, Oracle JD Edwards, Oracle Peoplesoft, QAD.

**Text Books:**

- 1. Alexis Leon, "Enterprise Resource Planning", Third Edition, Tata McGraw Hill, 2014.
- 2. Vinod Kumar Garg, N.K Venkitakrishna, "ERP Concepts and Practice", PHI
- 3. S. Sadagopan, "ERP – A Managerial Perspective", Tata McGraw Hill

**Reference Books:**

- 1. V.K. Garg, N .K. Venkita Krishnan, "ERP Ware: ERP Implementation Framework ", PHI.
- 2. Henandez, "The SAP R/3 Handbook", 2nd ED., Tata McGraw Hill
- 3. Ravi Shankar , S. Jaiswal, "Enterprise Resource Planning", Galgotia.
- 4. AnnettaClewto and Dane Franklin, "Guide to Planning ERP Application",McGraw-Hill, 1997.
- 5. Dr. Ravi Kalakota, "E-Business Network Resource planning using SAP R/3 Baan and Peoplesoft : A Practical Roadmap For Success".

# Software Engineering & Project Management

(Inter Disciplinary Elective)

## COURSE OUTLINE

Course Title

**Software Engineering & Project Management**

Short Title Course Code

**SEPM**

**Course Description:** The objective of this course is to introduce students from other engineering streams to get the knowledge of Software Development Life Cycle, application of analysis, design, testing principles and project planning & management concepts to develop quality software economically.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

**Prerequisite Course(s): Software Engineering**

## COURSE CONTENT

**Software Engineering & Project Management**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE): 80 Marks**

**Paper Duration (ESE): 03 Hours**

**Internal Sessional Exam (ISE): 20 Marks**

**1. Introduction to Software Engineering**

**(08Hrs, 16 Marks)**

- a. Nature of Software
- b. Software Process
- c. Software Engineering Practice
- d. Software Myths
- e. Generic Process model
- f. Process Assessment and Improvement
- g. Perspective Process Models
- h. Specialized Process Models
- i. Personal and Team Process Models

**2. Introduction to Project Management**

**(08Hrs, 16 Marks)**

- a. What is project
- b. The triple constraint
- c. What is project management, Stakeholders, Project Management Knowledge Area, Project Management tools and techniques
- d. Role of a Project Manager, Project Manager's job description, Suggested Skills for Project Manager, Importance of people and leadership skills
- e. Project Management
- f. Organizational Structure
- g. Project Life Cycle and Phases
- h. Nature of IT projects

- i. Characteristics of IT project Team members
- j. Trends affecting IT Project Management, Globalization , Outsourcing , Virtual Teams

**3. Project Integration & Scope Management (08Hrs, 16 Marks)**

- a. Project Selection
- b. Developing Project Charter
- c. Developing Project Management Plan
- d. Collecting Requirements
- e. Creating Work Breakdown Structure
- f. Controlling Scope

**4. Project Time & Cost Management (08Hrs, 16 Marks)**

- a. Defining and Sequencing Project Activities and Dependencies
- b. Developing Schedule, Gantt Chart, Critical Path Method , Incorporating Project Uncertainty - PERT , Critical Chain Method
- c. Resource loading and Resource Leveling
- d. Schedule Controlling
- e. Estimating Techniques
- f. Earned Value Management
- g. Project Quality Management
- h. Planning Quality
- i. Performing Quality Assurance
- j. Quality Control, Tools and Techniques

**5. Project Resource & Communication Management (08Hrs, 16 Marks)**

- a. Development of Human Resource Plan
- b. Project Organizational Chart and Responsibility Assignment
- c. Multi project Scheduling and Resource Allocation
- d. Identifying Stakeholders
- e. Planning Communication

**Text Books:**

1. Pressman Roger S., "Software Engineering: A Practitioners Approach", 7th Edition, Tata McGraw Hill.
2. Joseph Phillips, PMP Project Management Professional Study Guide, Third Edition McGraw Hill.

**Reference Books:**

1. Samuel Mantel, Jack Meredith, Scott Shafer, Margaret M. Sutton, With M.R. Gopalan, "Project Management Core Text Book", Wiley India Edition.
2. K.K. Chitkara, UddeshKohli, "Project Management Handbook", Tata McGraw-Hill Education Pvt. Ltd., 2006

# Enterprise Resource Planning and SAP

(Inter Disciplinary Elective)

## COURSE OUTLINE

Course Title  
**Enterprise Resource Planning and SAP**

Short Title Course Code  
**ERP & SAP**

**Course Description:** This course is aimed at introducing foundation understanding of enterprise systems and how these systems fit into today's business operations. Enterprise Systems are now essential infrastructure to both large corporate entities, as well as to small-to-medium organization, as they remove the need to have a large number of separate individual computer-based applications.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

**Prerequisite Course(s):** Industrial Management

## COURSE CONTENT

**Enterprise Resource Planning and SAP**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 hours / week**

**End Semester Examination (ESE) : 80 Marks**

**Paper Duration (ESE) : 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

### 1. ERP Introduction

**(08 Hours, 16 marks)**

- a Enterprise – An Overview: Introduction, Business Function and Business Processes, Integrated management Information, Role of enterprising ERP system, Business Modeling, Integrated data model
- b Introduction to ERP: Introduction, Common ERP Myths, A Brief History of ERP, The Advantages of ERP, Roadmap for the successful ERP Implementation

### 2. ERP Risk, Benefits and Related Technologies

**(08 Hours, 16 marks)**

- a Risks and Benefits of ERP: The quantifiable benefits from ERP system, The Intangible Benefits of ERP, Risks of ERP, Risks factor of ERP implementation, Benefits of ERP
- b ERP and Related Technologies: Introduction, BPR, Data warehousing, Data Mining, OLAP, PLM, SCM, CRM, GIS, Internet and Extranet

- 3. ERP Functional Modules and Implementation (08 Hours, 16 marks)**
- a ERP Functional Modules: Introduction, Functional Modules of ERP software, Supply chain and customer relationship application
  - b ERP Implementation Life Cycle: Introduction, Objective of ERP Implementation, Different phases of ERP Implementations
- 4. ERP Consultants, Vendor & Employees, eBusiness and Future Direction (08 Hours, 16 marks)**
- a Consultants, Vendors and Employees: Introduction, In-house implementation-Pros and Cons, Vendors, Consultants, Employee and Employee resistance, Reason for employee resistance, Dealing with employee resistance
  - b ERP and eBusiness: Introduction, ERP and eBusiness, eBusiness-supply chain integration, The eBusiness process model, Components of the eBusiness supply chain, ERP/eBusiness integration, ERP internet and WWW
  - c Future Direction and Trends in ERP: Introduction, New market new channel and faster implementation methodologies
- 5. SAP Introduction and Architecture of Web Application Server (08 Hours, 16 marks)**
- a SAP Introduction: SAP Transformation into a Global Business, SAP for industries, SAP R/3 Releases and Fundamentals, SAP Enterprise Core Application Overview, SAP Services Overview
  - b The Architecture of the SAP Web Application Server: The SAP Web Application Server, Basic Architectural Concepts, Services Work Process Types, Building the Client/Server SAP web AS System

**Text Books:**

1. Alexis Leon, "Enterprise Resource Planning", Second Edition, Tata Mcgraw Hill
2. Jose A. Hernandez, Jim Keogh, Franklin Foster Mertinez, "SAP R/3 Handbook", Third Edition, Tata McGraw Hill

**Reference Books:**

1. V.K. Garg, N .K. Venkita Krishnan, "ERP Ware: ERP Implementation Framework, PHI.
2. Annetta Clewwto and Dane Franklin, "Guide to Planning ERP Application", McGRaw-Hill, 1997.
3. George Anderson, Danielle Larocca, "Teach yourself SAP in 24 hours", Pearson Education.

# Pattern Recognition (Elective I)

## COURSE OUTLINE

Course Title  
**Pattern Recognition**

Short Title Course Code  
**PR**

### Course Description:

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): **Computer Architecture**

## COURSE CONTENT

**Advanced Computer Architecture**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE) : 80 Marks**

**Paper Duration (ESE) : 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

### **1 Introduction and mathematical**

**(08 Hrs. 16 Marks)**

- What is Pattern recognition; Applications and Examples
- Clustering vs. Classification; Supervised vs. unsupervised
- Relevant basics of Linear Algebra, vector spaces
- Probability Theory basics
- Basics of Estimation theory
- Decision Boundaries, Decision region / Metric spaces/ distances

### **2 Classification**

**(8 Hrs, 16 Marks)**

- Bayes decision rule, Error probability
- Normal Distribution
- Linear Discriminant Function (equal covariance matrices)
- K-NN Classifier
- Fisher's LDA

- f. Single Layer Perceptron Multi-layer Perceptron
- g. Training set, test set; standardization and normalization

### **3 Clustering**

**(8 Hrs, 16 Marks)**

- a. Basics of Clustering; similarity / dissimilarity measures; clustering criteria.
- b. Different distance functions and similarity measures
- c. Minimum within cluster distance criterion
- d. K-means algorithm;
- e. Single linkage and complete linkage algorithms,
- f. K-medoids, DBSCAN
- g. Data sets - Visualization; Unique Clustering; No existence of clusters

### **4 Feature selection**

**(8 Hrs, 16 Marks)**

- a. Problem statement and Uses; Algorithms - Branch and bound algorithm, sequential forward / backward selection algorithms
- b. Probabilistic separability based criterion functions, interclass distance based

### **5 Feature Extraction**

**(8 Hrs, 16 Marks)**

- a. PCA + Kernel PCA

#### **Recent advances in Pattern Recognition**

- a. Structural PR, SVMs, FCM, Soft-computing and Neuro-fuzzy techniques, and real-life examples

#### **Text Book:**

1. R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2001.
2. Statistical pattern Recognition; K. Fukunaga; Academic Press, 2000.

#### **Reference Book:**

1. S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009.

#### **Related Links:**

1. <http://www.ph.tn.tudelft.nl/PRInfo/>
2. <http://kdd.ics.uci.edu/>
3. <http://morden.csee.usf.edu/nnc/index1.html>
4. <http://www.iapr.org/>



# Android Programming (Elective I)

## COURSE OUTLINE

Course Title  
**Android Programming**

Short Title Course Code  
**AP**

**Course Description:** This course provides the students the platform to learn and understand the Android technology and encourage them to design, develop and deploy Android applications.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	3	14	42	3

**Prerequisite Course(s):** Basics knowledge of object oriented concepts.

## COURSE CONTENT

**Android Programming**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE) : 80 Marks**  
**Paper Duration (ESE): 03 Hours**  
**Internal Sessional Exam (ISE) : 20 Marks**

- 1. Introduction to Mobile Operating Systems and Mobile Application Development (08 Hrs. 16 Marks)**
  - Introduction to Mobile OS:** Palm OS, Windows CE, Embedded Linux, J2ME (Introduction), Symbian (Introduction)
  - Overview of Android:** Devices running android, Why Develop for Android, Features of Android, Architecture of Android, Libraries.
  - Setup Android Development Environment:**  
Android development Framework- - Android-SDK Eclipse, Emulators – What is an Emulator / Android AVD? , Creating & setting up custom Android emulator, Android Project Framework
- 2. Android Activities, UI Design and Database (08 Hrs. 16 Marks)**
  - Understanding Intent, Activity, Activity Lifecycle and Manifest, Form widgets, Text Fields
  - Layouts:** Relative Layout, Table Layout, Frame Layout, Linear Layout, Nested layouts
  - UI design:** Time and Date, Images and media, Composite, Alert Dialogs & Toast, Popup

- d. **Menu:** Option menu, Context menu, Sub menu
- e. **Database:** Introducing SQLite, SQLite Open Helper, SQLite Database, Cursor
- f. **Content providers:** defining and using content providers, example- Sharing database among two different applications using content providers, Reading and updating Contacts, Reading bookmarks

**3. Preferences, Intents and Notifications (08 Hrs. 16 Marks)**

- a. **Preferences:** Shared Preferences, Preferences from xml
- b. **Intents:** Explicit Intents, Implicit intents
- c. **Notifications:** Broadcast Receivers, Services (Working in background) and notifications, Alarms

**4. Telephony, SMS and Location Based Services (08 Hrs. 16 Marks)**

- a. **Telephony:** Accessing phone and Network Properties and Status, Monitoring Changes in Phone State, Phone Activity and data Connection
- b. **SMS:** Sending SMS and MMS from your Application, sending SMS Manually, Listening for incoming SMS
- c. **Location based Services:** Using Location Based Services, Working with Google Maps, Geocoder

**5. Accessing Android Hardware (08 Hrs. 16 Marks)**

- a. **Networking:** An overview of networking, checking the network status, communicating with a server socket, Working with HTTP, Web Services
- b. **Bluetooth:** Controlling local Bluetooth device, Discovering and bonding with Bluetooth devices, Managing Bluetooth connections, communicating with Bluetooth
- c. **Audio and Video:** Playing Audio and Video, Recording Audio and Video, Using Camera and Taking Picture

**Text/Reference Books:**

1. Reto Meier, "Professional Android™ Application Development", Wrox Publications.
2. Lauren Dercy and Shande Conder, "Sams teach yourself Android application development", Sams publishing
3. Hello Android, Introducing Google's Mobile Development Platform, Ed Burnette, Pragmatic Programmers, ISBN: 978-1-93435-617-3

# Human Computer Interaction (Elective -I)

## COURSE OUTLINE

Course Title

**Human Computer Interaction (Elective-I)**

Short Title Course Code

**HCI**

### Course Description:

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	3	14	42	3

Prerequisite Course(s): Software Engineering

## COURSE CONTENT

**Human Computer Interaction**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE) : 80 Marks**

**Paper Duration (ESE) : 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

### 1. Introduction

**(08Hrs, 16 Marks)**

- a. Importance of user interface
- b. Importance of good design
- c. GUI-Benefits of good UI
- d. Concept of Direct Manipulation
- e. Graphical systems :Advantage and disadvantage
- f. Characteristics of GUI
- g. The web user Interface
- h. Characteristics of Web UI

### 2. Design Process

**(08Hrs, 16 Marks)**

- a. The Human interaction with computer
- b. Important human characteristics in design
- c. Human consideration in design
- d. Human Interaction Speeds
- e. Understand the Principles of Good Screen Design

### 3. Models in HCI

**(08Hrs, 16 Marks)**

- a. Cognitive models
- b. Goals and task hierarchies
- c. Design focus, GOMS
- d. Linguistics models
- e. Physical and device models
- f. Cognitive Architectures

**4. Interaction styles**

**(08Hrs, 16 Marks)**

- a. Menus
- b. Windows
- c. Device based controls
- d. Screen based controls

**5. Communication**

**(08Hrs, 16 Marks)**

- a. text messages
- b. feedback and guidance
- c. Graphics
- d. Icons and images
- e. colours

**Text Books:**

1. Alan Dix, J. E. Finlay, G. D. Abowd, R. Beale "Human Computer Interaction", Prentice Hall.
2. Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley publication.

**Reference Books:**

1. Ben Shneidermann "Designing the user interface ", Pearson Education Asia.
2. Donald A. Norman, "The design of everyday things", Basic books.
3. Rogers Sharp Preece, "Interaction Design:Beyond Human Computer Interaction",Wiley.
4. Guy A. Boy "The Handbook of Human Machine Interaction", Ashgate publishing Ltd.
5. Alan Cooper, Robert Reimann, David Cronin, "About Face3: Essentials of Interaction design", Wiley publication.
6. Jeff Johnson, "Designing with the mind in mind", Morgan Kaufmann Publication.

# Artificial Intelligence (Elective I)

## COURSE OUTLINE

Course Title  
**Artificial Intelligence**

Short Title Course Code  
**AI**

### Course Description:

The objective of this course is to introduce the students to the fundamentals of Artificial Intelligence, Expert Systems and Neural Networks and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	<b>03</b>	<b>14</b>	<b>42</b>	<b>03</b>

Prerequisite Course(s):

## COURSE CONTENT

**Artificial Intelligence**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE) : 80 Marks**

**Paper Duration (ESE) : 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

### **1. Introduction to Artificial Intelligence (08Hrs, 16 Marks)**

- a. Definitions of AI, History
- b. Turing test
- c. AI Problem and Techniques: Problem as State Space Search, Problem characteristics
- d. Production System: Water Jug problem
- e. Heuristic Search Techniques: BFS, DFS, A\*, AO\*, Mean Ends Analysis

### **2. Knowledge Engineering (08Hrs, 16 Marks)**

- a. Knowledge Representation Issues
- b. Knowledge Representation using Predicate Logic
- c. Knowledge Representation using Rules
- d. Weak and Strong Filler Structures for Knowledge: Semantic net, Frames, Script, Conceptual dependency

### **3. Game Playing and Planning (08Hrs, 16 Marks)**

- a. Game Tree
- b. Minimax Search with Additional Refinements
- c. Overview of Planning and types
- d. Goal Stack Planning : Block World, STRIPS
- e. Nonlinear, Hierarchical and Other Planning Techniques

**4. Understanding , NLP and Expert System (08Hrs, 16 Marks)**

- a. Understanding as a constraint Satisfaction: Waltz's algorithm, Constraint determination, Trihedral figures labeling
- b. Natural Language Processing Steps
- c. Learning Techniques
- d. Introduction to Expert system
- e. Architecture of Expert System
- f. Expert System Shell
- g. Knowledge Acquisition in Expert System

**5. Neural Network (08Hrs, 16 Marks)**

- a. Characteristics of Neural Networks: Features of Biological Neural Networks, Biological Neural Networks, Performance Comparison of Computer and Biological Neural Networks
- b. Historical Development of Neural Network
- c. Artificial Neural Networks: Terminology
- d. Models of Neuron: McCulloch-Pitts Model, Perceptron, Adeline
- e. Topology
- f. Basic Learning Laws
- g. Learning Methods: Supervised and unsupervised

**Text Books:**

1. Elaine Rich, Kevin Knight and ShivshankarNair "Artificial Intelligence". 3<sup>rd</sup> Edition TMH.
2. B. Yegnanarayana "Artificial Neural Networks " PHI 2005

**Reference Books:**

1. S. Rajasekaran and G.A. Vijayalakshmi, "Neural Networks, Fuzzy Logic, and Genetic Algorithms" PHI
2. Timothy J Ross, "Fuzzy Logic with Engineering Application", TMH
3. Dan W. Patterson, "Introduction to artificial intelligence and expert system", PHI

# Embedded System

## COURSE OUTLINE

Course Title  
**Embedded System**

Short Title Course Code  
**ES**

**Course Description:** The objective of this course is to introduce students the knowledge of Embedded System, Architecture of embedded system, programming, and process of embedded system development, interfaces, real time OS concept and creation of target image.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	<b>03</b>	<b>14</b>	<b>42</b>	<b>03</b>

**Prerequisite Course(s):** Knowledge of Microprocessor/Microcontroller and Operating System

## COURSE CONTENT

**Embedded System**

**Semester-VII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**Semester Examination (ESE) : 80 Marks**  
**Paper Duration (ESE) : 03 Hours**  
**Internal Sessional Exam (ISE) : 20 Marks**

- 1. Introduction to Embedded System (08Hrs, 16 Marks)**
  - a. What is Embedded System?
  - b. Application areas
  - c. Categories of the Embedded System
  - d. Overview of Embedded System architecture
  - e. Specialties of Embedded System
  - f. Recent trends in Embedded System
  - g. Hardware architecture-CPU, Memory, Clock Circuitry, WDT, Chip Select, Communication Interfaces.
  - h. Communication Protocols-I<sup>2</sup>C, SPI & CAN
- 2. Process of Embedded System Development (08Hrs, 16 Marks)**
  - a. The development process
  - b. Requirement engineering
  - c. Design
  - d. Implementation
  - e. Integration and Testing
  - f. Packaging
  - g. Configuration Management
  - h. Managing Embedded System development projects
- 3. ARM System Architecture (08Hrs, 16 Marks)**
  - a. RISC design philosophy, ARM design philosophy

- b. Embedded system hardware, Embedded system software
- c. Registers, Current program status register
- d. Pipeline, Exception, Interrupts Vector table
- e. Core Extensions
- g. Architecture revision
- h. ARM Processor families

**4. Real Time Operating System**

**(08Hrs, 16 Marks)**

- a. Architecture of kernel
- b. Tasks & Task Scheduler
- c. Interrupt Service Routines, Semaphores, Mutex, Mailbox, Message queues
- d. Pipes, Event Register, Timers, Signals, Memory management
- e. Priority Inversion Problem
- f. RTOS services in contrast with traditional OS.
- g. Introduction to uCOSII RTOS, Salient Features of uCOSII, Study of kernel structure of uCOSII
- h. Synchronization in uCOSII, Inter-task communication in uCOSII, Porting of RTOS.

**5. Embedded Linux**

**(08Hrs, 16 Marks)**

- a. Introduction to the Linux kernel,
- b. Configuring and booting the kernel
- c. The root file system
- d. Root file directories, /bin, /lib etc.,
- e. Linux file systems,
- f. Types of file system: Disk, RAM, Flash and Network
- g. Some debug techniques- Syslog and Strace, GDB
- h. TCP/IP Networking- Network configuration

**Text Books:**

1. Dr. K.V.K.K. Prasad, "Embedded /Real-Time System: Concepts, Design & Programming", Dreamtech, Edition 2010.
2. Andrew. N. Sloss, DomnicSymes, Chris Wright, "ARM System Developer's Guide", Elsevier, edition 2004.

**Reference Books:**

1. KarimYaghmour , "Building Embedded Linux Systems", 2003 O'Reilly & Associates,
2. Rajkamal, "Embedded Sytems ", TMH.
3. David Simon, "Embedded systems software primer", Pearson
4. Steve Furber, "ARM System-on-Chip Architecture", Pearson
5. Iyer, Gupta, "Embedded real systems Programming", TMH



# Advanced UNIX Programming Lab

## LAB COURSE OUTLINE

Course Title  
**Advanced UNIX Programming Lab**

Short Title Course Code  
**AUP Lab**

### Course Description:

This laboratory provides students with a comprehensive study of Unix commands. The practical's make students able for designing program for process creation, atexit function, file management and status information and various interprocess communications because of these students able to write efficient, maintainable, and portable code.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

**Prerequisite Course(s):** Fundamental knowledge of C.

### LAB COURSE CONTENT

**(Note: Minimum FOUR Experiments each from group A and B)**

#### Group A

1. Write a program for File Management (any 7 option)
2. Write a program for Simulation of various commands(any7 option)
3. Write a program to display user and system information
4. Write a program to display file status flags on specified descriptor
5. Write any program using atexit function
6. Write a program for process creation using fork and vfork function

#### Group B

1. Write a program for Inter Process Communication using pipe
2. Write a program for catching of Signals
3. Write a program for Daemon process
4. Write a program for multithreading
5. Write a program for client server communication using socket
6. Write a program for Inter Process Communication using Message Queue

### Guidelines for ICA:

Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

**Guidelines for ESE:**

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

**Text Book:**

1. W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

**Reference Book:**

1. W. Richard Stevens, Unix Network Programming - Interprocess Communications, Volume 2, 2/E, Pearson Education

**Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

# Embedded System Lab

## LAB COURSE OUTLINE

Course Title  
**Embedded System Lab**

Short Title      Course Code  
**ES Lab**

### Course Description:

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

## LAB COURSE CONTENT

**(Note: Minimum FOUR Experiments each from group A and B)**

### Group A

1. Writing basic C-programs for I/O operations.
2. Program to interface LCD.
3. Program to demonstrate I2C Protocol.
4. Program to demonstrate CAN Protocol.
5. Program to interface Keyboard and display key pressed on LCD.
6. Program to interface stepper motor.
7. Program to interface Graphics LCD.

### Group B

1. Program to interface Touch Panel.
2. Program to implement AT commands and interface of GSM modem.
3. Interfacing 4 x 4 matrix keyboards and 16 x 2 character LCD display to microcontroller /Microprocessor and writing a program using RTOS for displaying a pressed key.
4. Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard LCD, LED etc. and porting it on microcontroller/microprocessor.
5. Implement a semaphore for any given task switching using RTOS on microcontroller board.
6. Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.
7. Program for exploration of (Process creation, Thread creation) using Embedded Real Time Linux.

### Guidelines for ICA:

Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

**Guidelines for ESE:**

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

**Text Books:**

1. Dr. K.V.K.K. Prasad, "Embedded /Real-Time System: Concepts, Design & Programming", Dreamtech, Edition 2010.
2. Andrew. N. Sloss, DomnicSymes, Chris Wright, "ARM System Developer's Guide", Elsevier, edition 2004.

**Reference Books:**

1. KarimYaghmour , "Building Embedded Linux Systems", 2003 O'Reilly & Associates,
2. Rajkamal, "Embedded Sytems ", TMH.
3. David Simon, "Embedded systems software primer", Pearson
4. Steve Furber, "ARM System-on-Chip Architecture", Pearson
5. Iyer,Gupta, "Embedded real systems Programming", TMH

**Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

**Pattern Recognition Lab (Elective I Lab)****LAB COURSE OUTLINE**

Course Title  
**Pattern Recognition**

Short Title  
**PR**

Course Code

**Course Description:** This laboratory provides students with a comprehensive study of Pattern Recognition.

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

**Prerequisite:** Vector spaces and Linear Algebra; Algorithms. Probability theory; Statistics.

### **LAB COURSE CONTENT**

**(Note: Minimum SIX Experiments from the list given below)**

1. Write program to build a Bayesian classifier
2. Write a program to recognize line patterns in a given set of points.
3. Implement Image Block matching by 2D Log Search and Brute-force approach
4. Write a program to implement Edit Distance Problem
5. Implement model for Single Layer Perceptron Multi-layer Perceptron.
6. Write program for K-Means Clustering
7. Simulation of Neural supervised and Unsupervised Learning in any soft Computing tool.
8. To implement Fuzzy Sets and Fuzzy Relations
9. Exploring different feature spaces - using Fourier shape descriptors, experimenting with wavelet transform, template matching.
10. Using and interpretation of ROC curves, experiments with PCA and ICA

#### **Guidelines for ICA:**

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

#### **Guidelines for ESE:**

The oral examination will be based on the assignments performed by the candidates as part of ICA. Questions will be asked during the oral examination to judge the understanding of the student. It is expected that student knows theoretical (Software Engineering) aspect of the problem.

#### **Text Book:**

1. R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2001.
2. Statistical pattern Recognition; K. Fukunaga; Academic Press, 2000.

#### **Reference Book:**

1. S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009.

**Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

# Android Programming Lab (Elective I Lab)

## LAB COURSE OUTLINE

Course Title <b>Android Programming Lab</b>	Short Title <b>AP Lab</b>	Course Code
--	------------------------------	-------------

**Course Description:** This course provides the students the platform to learn and understand the Android technology and encourage them to design, develop and deploy Android applications.

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	<b>02</b>	<b>14</b>	<b>28</b>	<b>01</b>

**Prerequisite Course(s)** : Basic knowledge of object oriented concepts.

## LAB COURSE CONTENT

### Term Work:

Any **SIX** lab assignments should be framed by concern staff member based on above syllabus. The Practical should be carried out using JDK 6.0 or above, Android SDK and Eclipse.

These tools are available for free download at

1. [www.developer.android.com](http://www.developer.android.com)
2. [www.eclipse.org](http://www.eclipse.org)
3. [www.sun.com](http://www.sun.com)

1. Program to show use of UI elements
2. Program to show demo of layouts
3. Program to create Menus and Dialog box.
4. Program to show how to use intents (implicit and explicit)
5. Program to work with database (create, insert ,delete ,update ,select operations)
6. Program to show how to use notifications
7. Program to make call, send and receive SMS.
8. Program to work with Google maps.
9. Program to play Audio and video files
10. Program to send and receive file using Bluetooth
11. Program to show how to use Networking and web-services in Android

### Guidelines for ICA:

Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

### Guidelines for ESE:

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

### Text Books/Reference Books:

1. Reto Meier, "Professional Android™ Application Development", Wrox Publications
2. Lauren Dercy and Shande Conder, "Sams teach yourself Android application development", Sams publishing
3. Hello Android, Introducing Google's Mobile Development Platform, Ed Burnette, Pragmatic Programmers, ISBN: 978-1-93435-617-3

**Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.



# Human Computer Interaction Lab

## LAB COURSE OUTLINE

Course Title

**Human Computer Interaction Lab**

Short Title

**HCI Lab**

Course Code

### Course Description:

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

Prerequisite Course(s): Web Technology lab

## LAB COURSE CONTENT

**(Note: Minimum FOUR Experiments each from group A and B)**

### Group A

1. Know your client –  
Children (3-4 years of age): An application to teach Alphabets , shapes.
2. Learn HCI design principles –Identify 3 different websites catering to one specific goal ze.g. Goal – on-line shopping and 3 different websites – ebay, amazon, flipkart, zovi, myntra) and perform a competitive analysis on them to understand how each one caters to the goal, the interactions and flow of the payment system and prepare a report on the same.
3. Learn the importance of menus and navigation – website redesign: News websites like CNN are always cluttered with information
4. Menu designing: Choose a unique domain, design a menu and show how it can be accommodated on an interface.
5. Icon designing: Choose a unique domain, design a few icons and show how it can be accommodated on an interface.
5. Understand the need of colors and animation – web site for an artist: A celebrity in some form of art like music, dance, painting, martial arts, etc (not actors). This site will be used to display his works and should portray his character.
7. Any other new relevant topics covering the above syllabus

### Group B

1. Online shopping website
2. E -learning web site
3. Video/ Audio on demand web site
4. Travel reservation system
5. ATM Interface
6. Online trading on stock market
7. University web site
8. Placement agency

**(Note:** A project with a team of minimum 2 and maximum 3 students. The purpose of the project is focused on User interaction and NOT on the implementation of the entire project. Explain technology in interface Design; explain the user interface design process; coloring guidelines; Speech Recognition and speech generation; Types of windows; Components of UI, such as Text Boxes, List Boxes, Messages, Icons, Multimedia; Mental models; Importance of the mental models in UI design.)

**Guidelines for ICA:**

Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

**Guidelines for ESE:**

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

**Text Books:**

1. Alan Dix, J. E. Finlay, G. D. Abowd, R. Beale "Human Computer Interaction", Prentice Hall.
2. Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley publication.

**Reference Books:**

1. Ben Shneidermann "Designing the user interface ", Pearson Education Asia.
2. Donald A. Norman, "The design of everyday things", Basic books.
3. Rogers Sharp Preece, "Interaction Design:Beyond Human Computer Interaction",Wiley.
4. Guy A. Boy "The Handbook of Human Machine Interaction", Ashgate publishing Ltd.
5. Alan Cooper, Robert Reimann, David Cronin, "About Face3: Essentials of Interaction design", Wiley publication.
6. Jeff Johnson, "Designing with the mind in mind", Morgan Kaufmann Publication.

**Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

# Artificial Intelligence (Elective I Lab)

## COURSE OUTLINE

Course Title  
**Artificial Intelligence**

Short Title Course Code  
**AI Lab**

### Course Description:

The objective of this course is to introduce the implementation of the fundamentals of Artificial Intelligence, Expert Systems and Neural Networks and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

## LAB COURSE CONTENT

(Note: Minimum FOUR experiments from the Group A and FOUR experiments from the Group B .)

### Group A

1. Implementation of single perceptron training algorithm.
2. Implementation of Unification Algorithm.
3. Implementation of Hill Climbing Algorithm.
4. Implementation of Game playing with Min/Max Search.
5. Development of Mini PC Troubleshooting Expert System
6. Implementation of A\* Algorithm

### Group B

1. Implementation of Dynamic database.
2. Implementation of parsing method implementation.
- 3 Development of Mini Medical Expert System
4. Application development using Neural Network.
5. Development of Intelligent Perception System.
6. Implementation of basic learning neural learning algorithm

### Text Books:

1. Elaine Rich, Kerin Knight and Shivshankar Nair "Artificial Intelligence", 3<sup>rd</sup> Edition TMH
2. B. Yegnanarayana "Artificial Neural Networks", PHI 2005

**Reference Books:**

1. S. Rajasekaran and G.A. Vijayalakshmi, "Neural Networks, Fuzzy Logic, and Genetic Algorithms" PHI
2. Timothy J Ross, "Fuzzy Logic with Engineering Application", TMH
3. Dan W. Patterson, "Introduction to artificial intelligence and expert system", PHI

**Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

# Project-I

**Project-I**  
Course Title

**P-I**  
Short Title

Course Code

## Course Description:

The course explores the knowledge of design, experiment and analysis of data. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	2

## COURSE CONTENT

**Project-I**

**Semester-VII**

**Lab:2 Hrs/week**

**Examination Scheme**

**Total Semester Credits: 02**

**Internal Continuous Assessment (ICA): 25 Marks**

**End Semester Examination (ESE)-Oral:25 Marks**

**Total: 50Marks**

1. It is expected that the broad area of Project-I shall be finalized by the student in the beginning of the VII semester / extension of Minor project undertaken may be Project-I.
2. A group of Minimum 3 and Maximum 5 students shall be allotted for Project-I and same project group for Project-II.
3. Exhaustive survey of literature based on a clear definition of the scope and focus of the topic should be carried out by the students. The **Synopsis/Abstract** on the selected topic, after detail literature survey should be submitted to the Project coordinator appointed by Head of the department.
4. Project-I may involve literature survey, problem identification, work methodology preparing specification and material procurement, collection of data , conduction of experiments and analysis. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
5. Approximately more than 50% work should be completed by the end of VII semester.
6. Each student group is required to maintain log book for documenting various activities of Project-I and submit group project report in the form of thermal bound at the end of semester –VII. Submit the progress report in following format:



## Seminar-II COURSE CONTENT

**Seminar-II**  
Course Title

**S-II**  
Short Title

Course Code

**Course Description:** The course explores the knowledge of presentation and effective communication. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	2

## COURSE CONTENT

**Seminar-II**

**Semester-VII**

**Practical : 2 Hrs/Week**

**Examination Scheme**  
**Total Semester Credits: 02**  
**Internal Continuous Assessment (ICA): 25 Marks**

1. Each Student shall select a topic for seminar which is not covered in curriculum. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
2. Topic of Seminar shall be registered within a three weeks from commencement of VII Semester and shall be approved by the committee.
3. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-II. Seminar shall be related state of the art topic of his choice approved by the committee.
4. Each student should deliver a seminar in scheduled period (Specified in time table or time framed by department) and submit the seminar report (paper bound copy/Thermal bound)in following format:
  1. *Title*
  2. *Abstract*
  3. *Introduction*
  4. *Literature survey*
  5. *Concept*
  6. *Functional and Technical Details*
  7. *Applications*
  8. *Comparison with similar topics / methods*
  9. *Future scope*
  10. *References*





# Industrial Visit

**Industrial Visit**  
Short Title

**IV**  
Course Code

Course Title

**Course Description:** The course explores the knowledge industry organization, new trends in manufacturing, maintenance and safety. The industrial visit provides the practical visualization of theoretical study of various engineering subject.

## COURSE CONTENT

**Semester-VII**

**Examination Scheme**  
**Total Semester Credits: 01**  
**Internal Continuous Assessment (ICA): 25 Marks**

1. Industry visits to minimum two industries shall be carried out by each student preferably or college shall arrange the industrial visit during the vacation period otherwise during the regular VII semester.
2. The student should obtain appropriate certificates of visit from the concerned organizations just after the visits.
3. Every Student should submit Industrial Visit report individually at the end of Semester-VII(First Term of Final Year)
4. The report(Thermal Bound) should contain information about the following points:
  - a. *The organization - activities of organization and administrative setup technical personnel and their main duties.*
  - b. *The project / industry brief description with sketches and salient technical information.*
  - c. *The work / processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.*
  - d. *Suggestions (if any) for improvement in the working of those organizations.*
5. The evaluation of the report of technical visits will be made by panel of three teachers appointed by Head of the department based on following points:

**Guide lines for ICA:** ICA shall be based on knowledge gain by student and Industrial Visit Report submitted by the student in the form of Thermal bound. Assessment of the Industrial Visit for award of ICA marks shall be done jointly by industrial visit coordinators departmental committee based on viva -voce as per the guidelines given in **Table- C**

**Table-C**

SN	Name of Student	Name of Industry	Report writing	Depth of Understanding	Total
			15	10	25

**NORTH MAHARASHTRA UNIVERSITY,  
JALGAON (M.S.)**

**Final Year Engineering  
(Information Technology)**

**Faculty of Engineering and Technology**



**COURSE OUTLINE**

**Semester – VIII**

**W.E.F. 2015– 2016**



# Internet Security

## COURSE OUTLINE

Course Title  
**Internet Security**

Short Title  
**IS**

Course Code

### Course Description:

This course provides a comprehensive view of the network security principles and measures to prevent vulnerabilities and security attacks in the systems. Also provide skills to design security protocols for recognize security problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	3	14	42	3

**Prerequisite Course(s):** Basic knowledge of security.

## COURSE CONTENT

**Internet Security**

**Semester-VIII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE) : 80 Marks**

**Paper Duration (ESE): 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

### 1. Security Basics

**(08 Hrs. 16 Marks)**

- a. Information security
- b. History of security-physical, communications, emissions, network and Information Security
- c. Information security as process- Anti-virus Software, Accesses controls, smartcards, biometrics, intrusion detection, policy management Encryption, physical security mechanism
- d. Type of attacks- access attack, modification attack, denial of service attack and repudiation attacks
- e. Encryption: private key, public key, ciphers,DES, RSA &Diffie-Hellman key exchange algorithm

### 2. Hacking Techniques

**(08 Hrs. 16 Marks)**

- a. Hackers, hackers motivations- challenge, greed, malicious Intent
- b. Historical hacking techniques-open Sharing, bad passwords, unwise programming, social engineering, buffer overflows, denial of service
- c. Advanced hacking techniques-sniffing switch networks, IP spoofing

- d. Policy- importance of policy and types of policy
- e. Risk – risk, identification of risk, measure risk

**3. Information Security Process and IDS (08 Hrs. 16 Marks)**

- a. Information security process- assessment, policy, implementation, training and audit
- b. Introduction to hash function and digital signature
- c. Intrusion Detection System (IDS) and types of intrusion detection- host based and network based
- d. Set up an IDS, manage an IDS
- e. Intrusion prevention system (IPS)

**4. Internet Security Protocol and Authentication Mechanism**

**(08 Hrs. 16 Marks)**

- a. Internet Security Protocol:SSL,SET, SSL Versus SET
- b. Email Security: Introduction, SMTP protocol, PEM, PGP, S/MIME
- c. Biometric authentication
- d. Kerberos

**5. Network Security**

**(08 Hrs. 16 Marks)**

- a. Firewalls: Introduction, types, configuration, Demilitarized zone networks, limitations of firewall
- b. IP Security: Introduction, IPSec Overview, IPSec Management
- c. Virtual Private Networks: Introduction, Architecture

**Text Books:**

1. Eric Maiwald, "Network Security A Beginner's Guide", Osborne/Tata McGraw-Hill
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill

**Reference Books:**

1. William Stallings, "Cryptography and Network and Network security", Pearson Education , Fourth Edition.
2. Bernard Menezes, "Network Security and Cryptography", Cengage Learning.

# Data Warehousing & Mining

## COURSE OUTLINE

Course Title  
**Data Warehousing & Mining**

Short Title Course Code  
**DWM**

**Course Description:** The objective of this course is to introduce the students to Learn and practice data modeling using the multidimensional database schemas and developing data warehouse to extract knowledgeable information for decision support system.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

**Prerequisite Course(s):** Knowledge of Database Management System

## COURSE CONTENT

**Data Warehousing & Mining**

**Semester-VIII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE): 80 Marks**

**Paper Duration (ESE) : 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

### 1. Introduction to Data Warehousing

**(08Hrs, 16 Marks)**

- a. What is a Data Warehouse?
- b. A Multidimensional data model
- c. Data Warehouse Architecture
- d. From Data Warehousing to Data Mining
- e. Why preprocess data?
- f. Data Cleaning
- g. Data Integration and Transformation
- h. Data Reduction
- i. Data discretization and concept hierarchy generation

### 2. Introduction to Data Mining

**(08Hrs, 16 Marks)**

- a. What is Data Mining?
- b. Data Mining Functionalities: What kinds of Patterns can be Mined?
- c. Classification of Data Mining Systems
- d. Data Mining Task Primitives
- e. Integration of Data Mining system with a Data Warehouse System
- f. Major issues in Data Mining
- g. Data Mining statics: Guidelines for successful Data Mining
- h. Applications and Trends in Data Mining

**3. Mining Frequent Patterns (08Hrs, 16 Marks)**

- a. Mining frequent pattern
- b. Associations: Basic concepts
- c. Market basket analysis
- d. Apriori Algorithm
- e. Association rules from frequent item sets
- f. Mining multilevel association rules
- g. Constraint based association mining
- h. Association mining to correlation analysis

**4. Classification and Prediction (08Hrs, 16 Marks)**

- a. Introduction to Classification and Prediction
- b. Classification by Decision tree Induction
- c. Bayesian classification
- d. Rule based classification
- e. Classification by Back propagation
- f. Other classification methods
- g. Prediction: Linear Regression
- h. Non-linear regression

**5. Cluster Analysis (08Hrs, 16 Marks)**

- a. What is Cluster Analysis and Outliers
- b. Types of data in cluster analysis
- c. Categorization of clustering methods
- d. Classical Partitioning methods: k-Means and k-Medoids
- e. Hierarchical Methods: Agglomerative and divisive
- f. Density Based Methods: DBSCAN
- g. Grid Based Methods: STING
- h. Outlier analysis

**Text Books -**

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques",  
Second Edition, Morgan Kaufmann.

**Reference Books -**

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction To Data Mining", Person Education, 2007.
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
3. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

# Software Metrics and Quality Assurance (Elective II)

## COURSE OUTLINE

Course Title  
**Software Metrics and Quality Assurance**

Short Title Course Code  
**SMQA**

### Course Description:

This course introduces the students about the concepts software measurement and metrics. It includes scope of software metrics, internal product attributes, and external product attributes Software quality and quality assurance techniques. This course also describes about cost estimation, documentation and testing tools, etc.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	03

Prerequisite Course(s): Software Engineering.

## COURSE CONTENT

Software Metrics and Quality Assurance

Semester-VIII

Teaching Scheme

Examination Scheme

Lecture: 3 Hours/Week

End Semester Examination (ESE): 80 Marks

Paper Duration (ESE) : 03 Hours

Internal Sessional Exam (ISE) : 20 Marks

### 1. Introduction to Software Measurement:

(08Hrs, 16 Marks)

- a. Measurement in everyday life
- b. Measurement in Software Engineering
- c. The scope of software metrics
- d. The representational theory of measurement
- e. Measurement and Models
- f. Measurement scales and scales types
- g. Meaningfulness in measurement
- h. Classifying software measures & Determining what to measure

### 2. Measuring internal product attributes:

(08Hrs, 16 Marks)

- a. Measuring internal product attributes: Size
- b. Aspects of software size, Length & Reuse
- c. Functionality & Complexity
- d. Measuring internal product attributes: Structure
- e. Types of Structural measures - Control Flow Structures
- f. Modularity and Information Flow attributes & Data structures



- g. Difficulties with general “complexity” measures

**3. Measuring external product attributes:**

**(08Hrs, 16 Marks)**

- a. Software Quality - Modelling Software Quality & Measuring aspects of Quality
- b. Software Reliability:
- c. Basics of Reliability Theory
- d. The Software Reliability Problem
- e. Parametric Reliability Growth Models
- f. Predictive Accuracy
- g. The importance of the operational environment

**4. Cost estimation & Documentation:**

**(08Hrs, 16 Marks)**

- a. Making Process Predictions - Good Estimates
- b. Cost estimation-Problems and approaches
- c. Models of Effort and cost
- d. Software Documentation

**5. Quality Assurance Techniques:**

**(08Hrs, 16 Marks)**

- a. Quality Assurance Techniques- Testing Principles, Goals, Testing Life Cycle, Phases of Testing Manual Testing- Test case design criteria.
- b. Automated Testing Introduction of Testing Tools- J-Meter, Win Runner, QTP, Selenium etc.
- c. ISO-9000 Model
- d. SEI's CMM Model
- e. Comparison of the ISO-9000 model with SEI's CMM model

**Text Books:**

1. Flanton, Pfleeger, “Software Metrics- A Rigorous and Practical Approach” Thompson Learning.
2. Mordechai Ben-menachem/Garry S.Marliss, “Software Quality”, Thompson Learning.
3. Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672-32798-8.

**Reference Books:**

1. Roger S. Pressman, “Software Engineering- A Practitioner’s Approach”, TMH.
2. Swapna Kishore and Rajesh Naik, “ISO 9001:2000 for Software Organizations”, TMH.

# Distributed System (Elective II)

## COURSE OUTLINE

Course Title  
**Distributed Systems**

Short Title Course Code  
**DS**

### Course Description:

This course introduces students to the principles, design and implementation of distributed systems. The lectures focus primarily on the principles and design of distributed systems and cover processes, communication, naming, synchronization, security, access control and security management.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
<b>Lecture</b>	<b>3</b>	<b>14</b>	<b>42</b>	<b>3</b>

**Prerequisite Course(s):** Operating Systems, Computer Networks.

## COURSE CONTENT

**Distributed System**

**Semester-VIII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE): 80 Marks**

**Paper Duration (ESE) : 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

### **1 Introduction to Distributed Systems and Architectures**

**(08Hrs, 16 Marks)**

- d. Introduction: Definition of a Distributed system.
- e. Goals: Making Resources Accessible, Distribution Transparency, Openness, Scalability, Pitfalls.
- f. Types of Distributed System: Distributed Computing Systems, Distributed Information Systems, Distributed Pervasive Systems.
- g. Architectural Styles: Layered architectures, Object-based architectures, Data-centered architectures, Event-based architectures.
- h. System Architectures: Centralized Architectures, Decentralized Architectures, Hybrid Architectures.

## 2 Processes

**(08Hrs, 16 Marks)**

- c. Threads: Introduction to Threads, Threads in Distributed Systems.
- d. Virtualization: The Role of Virtualization in Distributed Systems, Architectures of Virtual Machines.
- e. Clients: Networked User Interfaces, Client-Side Software for Distribution Transparency.
- f. Servers: General Design Issues, Server Clusters, Managing Server Clusters.
- g. Code Migration: Approaches to Code Migration , Migration and Local Resources , Migration in Heterogeneous Systems.

## 3 Communication

**(08Hrs, 16 Marks)**

- a. Fundamentals: Layered Protocols , Types of Communication.
- b. Remote Procedure Call: Basic RPC Operation, Parameter Passing , Asynchronous RPC.
- c. Message-Oriented Communication: Message-Oriented Transient Communication, Message-Oriented Persistent Communication.
- d. Stream-Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization.

## 4 Synchronization and Election

**(08Hrs, 16 Marks)**

- d. Clock Synchronization: Physical Clocks, Global Positioning System, Clock Synchronization Algorithms.
- e. Logical Clocks: Lamport's Logical Clocks, Vector Clocks.
- f. Mutual Exclusion: A Centralized Algorithm, A Decentralized Algorithm, A Distributed Algorithm, A Token Ring Algorithm.
- g. Global State: Needs, Properties and Various Global States
- h. Election Algorithm: Bully and Ring Algorithm.

## 5 Security, Access Control and Security Management

**(08Hrs, 16 Marks)**

- e. Introduction to Security: Security Threats, Policies and Mechanisms, Design Issues, Cryptography.
- f. Secure Channels: Authentication, message integrity and confidentiality.
- g. Access Control: General Issues in Access Control, Firewalls, Denial of Service.
- h. Security Management: Key Management, Authorization Management.

### Text Books:

1. A.S.Tanenbaum, M. Van Steen , “ Distributed Systems” , Pearson Education 2004.
2. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design” , Third Edition – 2002- Pearson Education Asia.

### Reference Books:

1. Pradeep K. Sinha, “Distributed Operating Systems”, Prentice Hall of India Private Limited.

2. Sunita Mahajan, Seema Shah, " Distributed Computing", Oxford, Second Edition.
3. Randay Chow, Theodore Johnson, "Distributed Operating System and Algorithm Analysis", Publisher: Pearson (LPE). ISBN – 978-81-317-2859-8.
4. G. SudhaSadasivam, Radha Shankarmani, "Middleware and Enterprise Integration Technologies " , Wiley Precise Textbook.
5. Tom white, "Hadoop: The Definitive Guide" , 2nd E, O'Reilly Media, 2011.

# Cryptography & Network Security (Elective II)

## COURSE OUTLINE

Course Title  
**Cryptography & Network Security**

Short Title    Course Code  
**CNS**

### Course Description:

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	<b>03</b>	<b>14</b>	<b>42</b>	<b>3</b>

Prerequisite Course(s): Basics of computer networks and security

## COURSE CONTENT

**Cryptography & Network Security**

**Semester-VIII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE): 80 Marks**

**Paper Duration (ESE): 03 Hours**

**Internal Sessional Exam (ISE): 20 Marks**

### **1. Introduction**

**(08 Hrs. 16 Marks)**

- a. The Need for Security, Security Approaches
- b. Security Attacks
- c. Security Services
- d. Security Mechanisms
- e. Network Security Model
- f. Basics of Cryptography: Symmetric Cipher Model
- g. Substitution Techniques
- h. Transposition Techniques

### **2. Cipher Properties & Secret Key Cryptography**

**(08 Hrs. 16 Marks)**

- a. Other Cipher Properties- Confusion, Diffusion
- b. Block and Stream Ciphers
- c. Data Encryption Standard(DES)
- d. Strength of DES
- e. Block Cipher Design Principles
- f. Modes of Operations
- g. Triple DES
- h. International Data Encryption algorithm(IDEA)

### **3. Public Key Cryptography & IP Security**

**(08 Hrs. 16 Marks)**

- a. Principles of Public Key Cryptosystems
- b. RSA Algorithm
- c. Diffie-Hellman Key Exchange

- d. IP Security Overview
- e. Architecture
- f. Authentication Header
- g. Encapsulating Security Payloads
- h. Service provided by IP Security

**4. Cryptographic Hash Functions (08 Hrs. 16 Marks)**

- a. Applications of Cryptographic Hash Functions
- b. Secure Hash Algorithm
- c. Message Authentication Codes – Message Authentication Requirements and Functions
- d. HMAC
- e. Digital signatures
- f. Digital Signature Schemes
- g. Authentication Protocols
- h. Digital Signature Standards

**5. Authentication Applications (08 Hrs. 16 Marks)**

- a. Kerberos
- b. Key Management and Distribution
- c. X.509 Directory
- d. Authentication service
- e. Public Key Infrastructure
- f. Electronic Mail Security
- g. Pretty Good Privacy
- h. S/MIME

**Text Books:**

1. William Stalling, "Cryptography and Network and Network security-Principals and practices", Pearson Education
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill

**Reference Books:**

1. Bernard Menezes, "Network Security and Cryptography", Cengage Learning,
2. King, Dalton, and Osmanoglu, "Security Architecture", TMH edition
3. Kaufman, Perlman, and Spenciner, "Network Security", PHI

# Neural Networks and Fuzzy Logic (Elective II)

## COURSE OUTLINE

Course Title  
**Neural Networks and Fuzzy Logic**

Short Title Course Code  
**NNFL**

### Course Description:

- i. To expose the students to the concepts of artificial neural networks.
- ii. To provide comprehensive knowledge of fuzzy logic control.
- iii. Provide adequate knowledge of application of ANN and fuzzy logic control to real time systems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

**Prerequisite Course(s):** Linear Algebra, DSGT, Artificial Intelligence.

## COURSE CONTENT

**Neural Networks and Fuzzy Logic**

**Semester-VIII**

### Teaching Scheme

**Lecture: 3 Hours/Week**

### Examination Scheme

**End Semester Examination (ESE) : 80 Marks**

**Paper Duration (ESE): 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

- 1. Introduction to Neural Network (08Hrs, 16 Marks)**
  - a. Human Brain, Biological Neural Networks
  - b. Model of Artificial Neuron, McCulloch and pitts models of neuron, Perceptron model, Adaline model
  - c. Neural Network Architectures
  - d. Neural Learning Laws, Hebb's Law, Perceptron learning Law, Widrow and Hoff Learning, Corelation learning, InStar and out Star learning
  - e. Neural Network Learning Methods, Hebbian learning, Competitive Learning, Error Correction Learning, Reinforcement Learning, Stochastic Learning
- 2. Multilayer Perceptron Model (08Hrs, 16 Marks)**
  - a. Multilayer Perceptron
  - b. Non-Linear Activation function
  - c. Architecture of Backpropagation Network
  - d. Backpropagation Learning
  - e. Illustration of Backpropagation Learning
  - f. Applications of Backpropagation
- 3. Associative Memory and Adaptive Resonance Theory (08Hrs, 16 Marks)**
  - a. Autocorrelators
  - b. Hetrocorrelators
  - c. Exponential BAM

- d. ART1
- e. ART2
- f. Applications of Associative Memory
- g. Applications of Adaptive Resonance Theory

**4. Unsupervised Learning**

**(08Hrs, 16 Marks)**

- a. Hamming Net and Maxnet
- b. Unsupervised Learning of clusters- clustering and similarity measures, Winner take all Learning
- c. Counter Propagation network
- d. Feature Mapping
- e. Self-Organizing Features Map

**5. Fuzzy Logic**

**(08Hrs, 16 Marks)**

- a. Fuzzy Versus Crisp
- b. Crisp Relations and Fuzzy Relations
- c. Crisp Logic
- d. Fuzzy Logic
- e. Fuzzy Rule Based System
- f. Defuzzification
- g. Applications of Fuzzy Logic

**Text Books:**

1. S. Rajasekaran & G. A. V. Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms", PHI.
2. J. M. Zurda, "Introduction to Artificial Neural Networks", Jaico Publishing House

**Reference Books:**

1. S. Haykin, "Neural Networks", Pearson Education, 2<sup>nd</sup> Ed., 2001.
2. Klir & Yuan, "Fuzzy Sets and Fuzzy Logic", PHI, 1997.
3. Chin-Teng Lin & C. S. George Lee, "Neural Fuzzy Systems", Prentice Hall PTR.
4. V. Kecman, "Learning and Soft Computing", MIT Press, 2001.
5. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", Wiley - India, 2007
6. B. Yegnanarayana, "Artificial Neural Networks", Prentice Hall of India, 1999.



# Mobile Computing (Elective III)

## COURSE OUTLINE

Course Title  
**Mobile Computing**

Short Title Course Code  
**MC**

### Course Description:

The objective of this course is to introduce students the knowledge about Mobile Computing Architecture, Mobile Technologies: GSM, Bluetooth, GPRS, CDMA and security issues in Mobile Computing.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

**Prerequisite Course(s):** Knowledge of Computer Networks.

## COURSE CONTENT

**Mobile Computing**

**Semester-VIII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 hours / week**

**End Semester Examination (ESE): 80 Marks**  
**Paper Duration (ESE) : 03 Hours**  
**Internal Sessional Exam (ISE) : 20 Marks**

### 1) Introduction

**(08 Hrs, 16 Marks)**

- a. Mobility of Bits and Bytes,
- b. Wireless -The Beginning,
- c. Mobile Computing,
- d. Dialogue Control,
- e. Networks,
- f. Middleware and Gateways,
- g. Application and Services (Contents),
- h. Developing Mobile Computing Applications,
- i. Security in Mobile Computing,
- j. Standards - Why is it Necessary? , Standard Bodies

### Mobile Computing Architecture

- k. Internet – The Ubiquitous Network,
- l. Architecture for Mobile Computing,
- m. Three-Tier Architecture.

### 2) Emerging Technologies

**(08 Hrs, 16 Marks)**

- a. Design considerations for Mobile Computing,
- b. Mobile Computing through Internet,
- c. Making Existing Applications Mobile -Enabled,

- d. Bluetooth,
- e. Radio Frequency Identification,
- f. Wireless Broadband (WiMAX),
- g. Mobile IP,
- h. Internet Protocol Version 6 (IPv6),
- i. Java Card.

### **3) GSM and GPRS**

**(08 Hrs, 16 Marks)**

#### **Global System for Mobile Communications (GSM):**

- a. Global System for Mobile Communications,
- b. GSM Architecture,
- c. GSM Entities,
- d. Call Routing in GSM,
- e. PLMN Interfaces,
- f. GSM Addresses and Identifiers,
- g. Network Aspects in GSM,
- h. GSM Frequency Allocation,
- i. Authentication and Security.

#### **General Packet Radio Service (GPRS):**

- j. Introduction,
- k. GPRS and Packet Data Network,
- l. GPRS Network Architecture,
- m. GPRS Network Operations,
- n. Data Services in GPRS,
- o. Applications for GPRS,
- p. Limitations of GPRS,
- q. Billing and Charging in GPRS.

### **4) WAP, CDMA and 3G**

**(08 Hrs, 16 Marks)**

#### **WAP:**

- a. Introduction,
- b. WAP,
- c. MMS,
- d. GPRS Application,

#### **CDMA and 3G**

- e. Introduction,
- f. Spread-Spectrum Technology,
- g. Is-95,
- h. CDMA versus GSM,
- i. Wireless Data,
- j. Third Generation Networks,
- k. Applications on 3G.

### **5) Security Issues in Mobile Computing**

**(08 Hrs, 16 Marks)**

- a. Introduction,
- b. Information Security,
- c. Security Techniques and Algorithms,
- d. Security Protocols,
- e. Public Key Infrastructure,
- f. Trust,
- g. Security Models,
- h. Security Frameworks for Mobile Environment.

**Text Book:**

1. Asoke K Talukder and Roopa R Yavagal, "Mobile Computing (Technology, Applications and Service Creation)", Tata Mcgraw-Hill.

**Reference Books:**

1. Raj Kamal, "Mobile Computing", Oxford University Press-New Delhi
2. Yi-Bang Lin, ImrichChlamtac, "Wireless and Mobile Network Architectures", Wiley Publication.
3. Charles Perkins, "Mobile IP", Addison Wesley.

# Bio-Informatics (Elective III)

## COURSE OUTLINE

Course Title  
**Bio Informatics**

Short Title Course Code  
**BI**

### Course Description:

This course provides a comprehensive view of the Bio Informatics principles and its applications in engineering.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	<b>03</b>	<b>14</b>	<b>42</b>	<b>3</b>

**Prerequisite Course(s):** Basic knowledge of Biological terms and concepts of database management system.

## COURSE CONTENT

**Bio Informatics**

**Semester-VIII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE): 80 Marks**

**Paper Duration (ESE): 03 Hours**

**Internal Sessional Exam (ISE): 20 Marks**

### **1. Introduction to Bioinformatics (08 Hrs. 16 Marks)**

- a. Introduction and Historical overview of Bioinformatics,
- b. Bioinformatics Applications,
- c. Molecular biology Basic concepts-Protein and amino acid, DNA and RNA
- d. Tools for web search,
- e. Bioinformatics Major databases,
- f. Data mining of biological databases.

### **2. Data Structure & Data Analysis (08 Hrs. 16 Marks)**

- a. Sequence Visualization, Structure visualization,
- b. statistical concepts, micro arrays,
- c. Imperfects data, quantitative randomness, data analysis,
- d. Tool selective, Statistics of alignment,
- e. Clustering and classification.

### **3. Bioinformatics Databases and Data mining (08 Hrs. 16 Marks)**

- a. Introduction, Primary & Secondary database,
- b. Biological databases, Protein pattern databases and structure classification databases

- c. Methods & Technology overview, infrastructure,
- d. Pattern recognition & discovery, machine learning, text mining & tools,
- e. Dot matrix analysis, substitution matrices, dynamic programming, word methods,
- f. Multiple sequence, alignment, tools for pattern matching.

**4. Data Representation, Simulation & Collaboration (08 Hrs. 16 Marks)**

- e. Drug discovery, fundamentals
- f. Protein structure
- g. System biology
- h. Collaboration & communications, standards
- i. Bioinformatics Issues.

**5. Human Genome Project and Bioinformatics Tools (08 Hrs. 16 Marks)**

- d. History, Nucleic Acids, Genes, Genomes
- e. Introduction of National Institutes of Health (NIH),
- f. Introduction of National Library of Medicine (NLM)
- g. Introduction of National center for Biotechnology Information (NCBI)
- h. Human Genome Project, it's need, goal, uses and applications
- i. Introduction, working with FASTS, working with BLAST,
- j. FASTA & BLAST algorithms & comparison

**Text Books:**

1. S.C. Rastogi, N. Mendiratta, P. Rastogi "Bioinformatics-Methods & Application", [RMR] PHI
2. Bryan Bergeron, "Bioinformatics Computing", Pearson Education [BB].

**Reference Books:**

3. A.D. Baxevanis and B.F.F. Ouellette, "Bioinformatics: A practical guide to the analysis of genes and proteins" (Eds). 2002 John Wiley and Sons.
4. D.W. Mount, "Bioinformatics: Sequence and Genome Analysis", 2001, Cold Spring Harbor Laboratory Press.
5. S.C. Rastogi, Namita Mendirata, Parag Rastogi "Bioinformatics concepts Skills and application, CBS publisher.
6. Imtiyaz Alam Khan (IAK) "Elementary Bioinformatics", Pharma Book Syndicate.
7. Indu Shekhar Thakur (IST) "Environmental Biotechnology", IK International Publication.
8. A.D. Baxevanis and B.F. Ouellette, "Bioinformatics, A Practical Guide to the Analysis of Genes and Proteins"
9. David W. Mount, "Bioinformatics: Sequence and Genome Analysis".
10. Stuart M. Brown, "Essentials of Medical Genomics".
11. Jean-Michel Claverie & Cedric Notredame, "Bioinformatics for Dummies".

# Cloud Computing (Elective III)

## COURSE OUTLINE

Course Title  
**Cloud Computing**

Short Title Course Code  
**CC**

### Course Description:

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s):

## COURSE CONTENT

**Cloud Computing**

**Semester-VIII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE): 80 Marks**

**Paper Duration (ESE): 03 Hours**

**Internal Sessional Exam (ISE): 20 Marks**

**1. Cloud Computing Introduction (08Hrs, 16 Marks)**

- a. Defining cloud computing, Cloud types- The NIST model, The cloud cube model, Deployment models and Service models
- b. Examining characteristics of cloud computing- Paradigm shift, Advantages of cloud computing, Disadvantages of cloud computing

**2. Understanding Cloud Architecture (08Hrs, 16 Marks)**

- a. Exploring the Cloud Computing Stack- Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications
- b. Connecting to the Cloud- The Jolicloud Netbook OS, Chromium OS: The Browser as an Operating System

**3. Cloud Services (08Hrs, 16 Marks)**

- a. Defining Infrastructure as a Service (IaaS), IaaS workloads, Defining Platform as a Service (PaaS), Defining Software as a Service (SaaS), SaaS characteristics, Open SaaS and SOA, Salesforce.com and CRM SaaS
- b. Defining Identity as a Service (IDaaS) - What is an identity?, Networked identity service classes, Identity system codes of conduct, IDaaS interoperability, Defining Compliance as a Service

(CaaS)

**4. Managing Clouds**

**(08Hrs, 16 Marks)**

- a. Administrating the Clouds, Management responsibilities, Lifecycle management, Cloud Management Products
- b. Identity and access management- Trust boundaries and IAM, Why IAM? , IAM challenges, IAM definitions, IAM architecture

**5. Cloud Security**

**(08Hrs, 16 Marks)**

- a. Security Management in the Cloud, Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management
- b. Privacy- Privacy, Data Life Cycle, Key Privacy Concerns in Cloud

**Reference Books:**

1. Barrie Sosinsky, "Cloud Computing Bible", WileyPublication,India, 2011.
2. Tim Mather, SubraKumaraswamy and ShahedLatif "Cloud Security and Privacy", O'REILLY

# iPhone Programming (Elective III)

## COURSE OUTLINE

Course Title  
**iPhone Programming**

Short Title Course Code  
**IPP**

### Course Description:

This course provides the students the platform to learn and understand the iPhone technology and encourage them to design, develop and deploy Android applications.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	3	14	42	3

Prerequisite Course(s): Basic knowledge of C, C++, JAVA.

## COURSE CONTENT

**iPhone Programming**

**Semester-VIII**

**Teaching Scheme**

**Examination Scheme**

**Lecture: 3 Hours/Week**

**End Semester Examination (ESE) : 80 Marks**

**Paper Duration (ESE): 03 Hours**

**Internal Sessional Exam (ISE) : 20 Marks**

- 1. Introduction: Basic concepts of Objective C (08 Hrs. 16 Marks)**
  - a. What is objective C and Xcode , Installing Xcode and compiling objective C
  - b. Object oriented programming in objective -C, similarities and differences from C and C++
  - c. Objective-C: Classes, Objects, Methods, Data Types & Expressions, Program Looping, Decision Making.
  
- 2. The Foundation Framework of Objective-C (08 Hrs. 16 Marks)**
  - a. Introduction to the Foundation Framework, inheritance, Polymorphism
  - b. Dynamic Typing & Binding, Categories and Protocols
  - d. The Preprocessor, Numbers, Strings and Collections
  - e. Working with Files, Memory Management, Copying Objects
  
- 3. Cocoa, Cocoa Touch and the iOS SDK (08 Hrs. 16 Marks)**
  - a. **Introduction to Cocoa and Cocoa Touch:** Framework Layers of Cocoa and Cocoa Touch
  - b. **Introduction to iOS:** overview of the iOS 5 Architecture, Features of iOS, Registering as a Apple Developer
  - c. **iOS -Environment Setup:**XCode Installation, Interface Builder, iOS simulator



- d. **Writing iOS Applications:** Creating first iOS application, Outlets, Actions and View Controllers

**4. Introduction to iPhone application programming (08 Hrs. 16 Marks)**

- a. A simple iPhone Application
- b. Basic UI Elements: UITextField, UIButton, Labels, UIToolbar, UIStatusBar, UITabBar, UIAlert, UISwitch, UISlider, Action Sheet, Accelerometer, Image View, Web View, KeyBoard Inputs

**5. iPhone Multimedia and Webservices (08 Hrs. 16 Marks)**

- a. Accessing Built-in Application, Multimedia (audio and video),
- b. Animation with views
- c. Webservices, SQLite

**Text Books:**

1. Stephen G.Kochan , "Programming in Objective-C" Sixth Edition, Addison-Wesley Publications.
2. Wei-Meng Lee , "Beginning iPhone SDK Programming with Objective-C", Wiley Publication.

**Reference Books:**

1. Joe Conway , "iPhone Programming THE BIG NERD RANCH GUIDE " , Aaron Hillegass. The Big Nerd Ranch Inc.
2. Gary Bennett, Mitch Fisher, Brad Less, "Objective-C for Absolute Beginners", Apress Publication.
3. Neil Smyth, "iPhone iOS 5 Development Essentials".

# Internet Security Lab

## LAB COURSE OUTLINE

Course Title  
**Internet Security Lab**

Short Title Course Code  
**IS Lab**

### Course Description:

This laboratory provides students with a comprehensive study of the Network Security and Cryptography. This laboratory provides the students with the means of implementing the security concepts using programming languages.

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

**Prerequisite Course(s)** Basic knowledge of security related concepts.

## LAB COURSE CONTENT

Any FIVE lab assignments should be framed by concern staff member based on above syllabus. Concern staff should implement the experiments using any programming language C/C++/Java.

1. Implementing Substitution Ciphers  
Mono-Alphabetic  
Poly-Alphabetic
2. Implementing Vernam Cipher
3. Implement Encryption/Decryption using Ceaser Cipher
4. Implementing DES key generation Algorithm
5. Implementing RC4/RC5 algorithm
6. Creation & export of digital certificates
7. Implementation of digital signature
8. Implementation of RSA algorithm
9. Implement Diffie-Hellman Key Exchange algorithm

### Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

### Guidelines for ESE:

The oral examination will be based on the assignments performed by the candidates as part of ICA. Questions will be asked during the oral/practical examination to judge the understanding of the student. It is expected that student knows theoretical (Internet Security) aspect of the problem.

### Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

# Data Warehousing and Mining Lab

## LAB COURSE OUTLINE

Course Title

**Data Warehousing and Mining Lab**

Short Title

**DWM Lab**

Course Code

### Course Description:

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

## LAB COURSE CONTENT

### Group A

1. Develop a program to construct a multidimensional data model (Star, Snowflake or Fact constellations)
2. Develop a program to implement data pre-processing techniques.
3. Develop a program to implement data integration techniques.
4. Implement Apriori algorithm for frequent item set.

### Group B

1. Develop a program to implement data generalization and summarization techniques.
2. Develop a program to extract association mining rules.
3. Develop a program for classification of data.
4. Develop a program for implementing one of the clustering techniques.

**Note:** Concerned Faculty should suitably frame at least **6** practical assignments (**Three** from Group A and **Three** from Group B) out of the above list.

Use of open source Tool/ Technology (like Weka) for Laboratory Assignments is recommended.

### Guidelines for ICA:

Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

### Guidelines for ESE:

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

### Text Books -

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques",  
Second Edition, Morgan Kaufmann.

## **Reference Books -**

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction To Data Mining", Person Education, 2007.
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, 2006.
3. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

## **Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.



# Distributed System Lab (Elective II Lab)

## LAB COURSE OUTLINE

Course Title  
**Distributed Systems**

Short Title Course Code  
**DS Lab**

### Course Description:

This laboratory provides students with a comprehensive study of the Distributed Systems. Classroom lectures stress the strengths of Distributed Systems, which provide students with the means of writing efficient, maintainable and portable code and simulating Distributed Systems concepts like Remote Procedure Call (RPC), Client-Server application, Distributed Mutual Exclusion, Distributed Chat Server, Lamport's Logical Clock, Bully and Ring election algorithms and Hadoop.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

**Prerequisite Course(s):** C/C++/Java, Operating Systems and Computer Networks.

**(Note: Minimum SIX Experiments from the given list)**

**1. Write a Program for Remote Procedure Call (RPC).**

Implementation of Remote Procedure Call (RPC) concept in C/C++/Java.

**2. Write a Program to implement Echo Client-Server application.**

Implementation of Echo Client-Server application in C/C++/Java.

**3. Write a Program to find length of given string using thread.**

Implementation of to find length of given string using thread in C/C++/Java.

**4. Simulate the Distributed Mutual Exclusion.**

Simulation of the Distributed Mutual Exclusion concept in C/C++/Java.

**5. Implementation of Distributed Chat Server.**

Implementation of the Distributed Chat Server in C/C++/Java.

**6. Simulate the function of Lamport's Logical Clock.**

Simulation of the function of Lamport's Logical Clock in C/C++/Java.

**7. Implementation of Date and Time server using Java RMI.**

Implementation of the Date and Time server using Java RMI.

**8. Implementation of server that adds given two values by the clients using Java RMI.**

Implementation of the server that adds given two values by the clients using Java RMI.

**9. Write a program for word count using Hadoop.**

Implementation of the program for word count using Hadoop.

**10. Implement merge sort algorithm and run it using Hadoop for large data set.**

Implementation of the merge sort algorithm and run it using Hadoop for large data set.

**11. Write simulation program for synchronization using Bully and Ring election algorithm.**

Simulation for synchronization concept using Bully and Ring election algorithm.

**Guidelines for ICA:**

Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

**Guidelines for ESE:**

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

**Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

# Cryptography & Network Security Lab (Elective II Lab)

## LAB COURSE OUTLINE

Course Title  
**Cryptography & Network Security**

Short Title Course Code  
**CNS Lab**

### Course Description:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

**Prerequisite Course(s):** Basic knowledge of computer networks and security.

### (Note: Minimum FIVE Experiments from the given list)

1. Write a Program to Implement Columandar Cipher Text
2. Write a Program to Implement Encryption/Decryption using Ceaser Cipher.
3. Write a Program to Simulate Diffie-Hellman Key Exchange
4. Write a Program to Implement Play Fair Cipher.
5. Write a Program for Encryption/Decryption using Rail Fence Technique
6. Write a Program to Implement RSA Algorithm

### Guidelines for ICA:

Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

### Guidelines for ESE:

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

### Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.



# Neural Networks and Fuzzy Logic Lab (Elective II Lab)

## LAB COURSE OUTLINE

Course Title

Neural Networks and Fuzzy LogicLab

Short Title Course Code

NNFL Lab

### Course Description:

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

## LAB COURSE CONTENT

### Group A

1. Implementation of Perceptron Learning
2. Implementation of McCulloch-Pitts model.
3. Implementation of Hopfield model.
4. Implement Delta rule.
5. Implement model for multilayer perceptron.

### Group B

1. To implement crisp set
2. To implement Fuzzy Sets.
3. To implement Fuzzy Relations
4. Simulation of Neural supervised Learning in any soft Computing tool.
5. Simulation of Neural unsupervised Learning in any soft Computing tool.

**Note:** Concerned Faculty should suitably frame at least **6** practical assignments (**Three** from Group A and **Three** from Group B) out of the above list

### Text Books:

1. S. Rajasekaran & G. A. V. Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms", PHI.
2. J. M. Zurda, "Introduction to Artificial Neural Networks", Jaico Publishing House.

### Reference Books:

1. S. Haykin, "Neural Networks", Pearson Education, 2<sup>nd</sup> Ed., 2001.
2. Klir & Yuan, "Fuzzy Sets and Fuzzy Logic", PHI, 1997.
3. Chin-Teng Lin & C. S. George Lee, "Neural Fuzzy Systems", Prentice Hall PTR.
4. V. Kecman, "Learning and Soft Computing", MIT Press, 2001.
5. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", Wiley - India, 2007.
6. B. Yegnanarayana, "Artificial Neural Networks", Prentice Hall of India, 1999.

### Guidelines for ICA:

Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

**Guidelines for ESE:**

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

**Note:-**

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

# Industrial Lecture

## COURSE CONTENT

**Industrial Lecture**  
Course Title

**IL**  
Short Title

Course Code

### Course Description:

The gap between industry's needs and the academic community's aspirations appears to be considerably large. There exists a strong feeling, at least in the academic circles, that unless technology driven initiatives find a surer place in the industrial sector in this country, the academia-industry interaction is likely to remain confined to developmental activities with limited exploratory or research-based content. As institutes committed primarily to creation and growth of technological knowledge, technical institutes have an important role to play in the industrial sector of the country's economy. This fact by way of encouraging mechanisms to foster interaction between the academia and industry. Typically, academic interest in the multidimensionality of a problem leads to a tendency to explore a variety of options to arrive at a solution. This industrial lecture develops ability of student for expectations of the industrialists from the fresh engineers.

	<b>Hours per Week</b>	<b>No. Of Weeks</b>	<b>Total Hours</b>	<b>Semester Credits</b>
<b>Lecture</b>	<b>1</b>	<b>14</b>	<b>14</b>	<b>2</b>

## COURSE CONTENT

**Semester-VIII**

**Examination Scheme**

**Total Semester Credits: 02**

**Internal Continuous Assessment (ICA): 50 Marks**

1. There is a need to create avenues for a close academia and industry interaction through all the phases of technology development, starting from conceptualization down to commercialization.
2. List of renowned persons from industry shall be prepared by the committee appointed by Head of the department. After approval from the Principal, Minimum five Industrial lectures in alternate week shall be arranged, which shall be delivered by the experts/Officials from Industries/Govt. organizations/Private Sectors/Public Sectors / R&D Labs covering the various aspects.
3. Topics of Industrial Lectures shall be Technical in nature and should not be the specific contents from the curriculum.
4. Students shall submit the report based on minimum five lectures giving summary of the lecture delivered.
5. The summary should contain brief resume of the expert, brief information of his organization and brief summary of the lecture in bullet point form.

**Guide lines for ICA:** Assessment of the Industrial Lecture for award of ICA marks shall be done jointly by departmental committee as per attendance in industrial lecture, report submitted by student and overall performance in semester as per the guidelines given in **Table- D**

**Table-D**

<b>SN</b>	<b>Name of Student</b>	<b>Attendance (05 Marks per Lecture)</b>	<b>Dept of Understanding (03 Marks per Lecture)</b>	<b>Report Writing</b>	<b>Total</b>
		<b>25</b>	<b>15</b>	<b>10</b>	<b>50</b>

# Project-II

Course Title  
**Project-II**

Short Title Course Code  
**Project-II**

## Course Description:

The course explores the knowledge of design, experiment and analysis of data. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	4	14	56	6

## COURSE CONTENT

Semester-VIII

Examination Scheme

**Total Semester Credits: 06**

**Internal Continuous Assessment (ICA ): 75 Marks**

**End Semester Examination (ISE):75 Marks**

**Total: 150Marks**

1. Project-I work decided in VII semester shall be continued as Project-II
2. Students should complete implementation of ideas given in synopsis/Abstract, so that project work should be completed before end of semester.
3. Project-II may involve fabrication, design , experimentation , data analysis within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability, and sustainability. The stage also includes testing , possible results and report writing
4. Each students project group is required to maintain log book for documenting various activities of Project-II and submit group project report at the end of Semester-VIII in the form of Hard bound.

1. *Title*
2. *Abstract*
3. *Introduction*
4. *Problem identification and project objectives*
5. *Literature survey*
6. *Analysis*
7. *Design*
8. *Coding*
9. *Testing*
10. *Results & conclusions*
11. *Future Scope*
12. *References*

**Guide lines for ICA :** ICA shall be based on continuous evaluation of students performance throughout semester in project-II and report submitted by the students project group in the form Hard bound. Assessment of the project-II for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-D**.

**Guide lines for ESE:-**

In ESE the student may be asked for demonstration and questions on Project. Evaluation will be based on answers given by students in oral examination.

**Assessment of Project-II**

**Title of the Project:** \_\_\_\_\_

**Name of the Guide:** \_\_\_\_\_

**Table-D**

		Assessment by Guide (50 Marks)				Assessment by Committee (25 Marks )		
SN	Name of Student	Attendance , Participa- tion and team work	Material procurement / assembling/ Designing/Pr ogramming	Case study/ Execution	Project Report	Dept of Understan- ding	Presentation	Total
<b>Marks</b>		<b>10</b>	<b>15</b>	<b>15</b>	<b>10</b>	<b>10</b>	<b>15</b>	<b>75</b>