# Purbanchal University

## Bachelor in Information Technology (BIT)

**Year: III** **Semester: VI**

| S.N | Course Code | Course description | Credits | Lecture (Hrs) | Tutorial (Hrs) | Practical (Hrs) | Total (Hrs) |
|---|---|---|---|---|---|---|---|
| 1 | BIT370CO | Embedded System Programming | 3 | 3 | - | 3 | 6 |
| 2 | BIT373CO | Computer Network | 3 | 3 | 1 | 2 | 6 |
| 3 | BIT371CO | Data Mining & Data Warehousing | 3 | 3 | 1 | 2 | 6 |
| 4 | BIT376CO | Advance Object-Oriented Programming | 3 | 3 | 1 | 2 | 6 |
| 5 | BIT379CO | Project-VI | 3 | - | 1 | 4 | 5 |
| 6 | BIT308SH | Research Methodology | 2 | 2 | 1 | - | 3 |
| | | **Total** | **17** | **14** | **5** | **13** | **32** |

# Embedded System Programming

## BIT370CO

**Year: III** **Semester: VI**

| Teaching Schedule Hours/Week | | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|
| Theory | Tutorial | Practical | Internal Assessment | | Final | | Total |
| 3 | - | 3 | Theory | Practical | Theory | Practical | 150 |
| | | | 20 | 50 | 80 | - | |

*** Continuous**

**** Duration: 3 hours**

**Course Objective**

The objective of the course is to equip students with the knowledge of design and development process for dedicated computer systems in relation to the environment in which they operate.

1. **Introduction** **[8 Hrs]**
   Overview of dedicated and automated systems and their specific requirements (robust design, environmental issues, temporal constraints, technological constraints, software systems); the product design cycle

2. **System specification and integration** **[12 Hrs]**
   Development of a system specification, including case studies, evaluation and justification of the available levels of system integration (custom chip design through to turnkey-systems) and technological choice

3. **Software issues** **[11 Hrs]**
   Development environment: compliers, linkers, debuggers, emulators, real time operating systems and kernels, designing and implementing code for dedicated systems

4. **Hardware issues** **[14 Hrs]**
   Choice of processor: I/O, memory, speed, integration, development facilities, economics; DSP devices, interfacing to commonly used peripheral devices, backplane bus standards, transducers: sensors for measuring physical phenomena, output devices such as power actuators and motors, data transformation, signal conditioning, and data conversion, the impact of EMC regulations on design practice

**Laboratory**: The laboratory exercises should cover all the features mentioned above.

**References**:


- S Health, "*Embedded System Design*", Butterworth-Heinemann 1997, ISBNO-75063-237-2
- David E. Simon, "*An Embedded Software Primer*", Pearson Education, 2001

# Computer Network

# BIT373CO

**Year: III** **Semester: VI**

| Teaching Schedule Hours/Week | | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|
| Theory | Tutorial | Practical | Internal Assessment | | Final | | Total |
| 3 | 1 | 2 | Theory | Practical | Theory | Practical | 150 |
| | | | 20 | 50 | 80 | - | |

**Course objective**

The course aims at providing a sound conceptual foundation in the area of computer networks with emphasis on the design aspects. The course attempts to provide a balance treatment of the state-of-the-art in the area and thus prepare the students for taking more rigorous and specialized courses in this and related field.

**Course contents**

1. **Network concepts, classification and components** **[7Hrs]**
   a. Introduction, features and advantages of network, networking criteria
   b. Types of network (LAN, MAN, WAN, Peer to Peer model, Client/Server model)
   c. LAN topologies (Bus, Ring, Star, Hybrid, etc)
   d. Wireless networks (Bluetooth, Wifi, WiMax, ect)
   e. Circuit switching, packet switching and message switching networks
   f. Network components (NIC, bridge, repeater, Hub, Switch, Router, Gateway)
   g. Layered architecture, interfaces, services and protocol hierarchies.
   h. ISO-OSI Reference model
   i. TCP/IP Reference model

2. **Data communication and services** **[8 Hrs]**
   a. Concepts of data, signal, channel and circuits, channel speed and bandwidth, throughput, bit rate and baud rate, maximum data rate of a channel, propagation time, transmission time.
   b. Analog and digital transmission
   c. Asynchronous and synchronous transmission
   d. Data encoding techniques
   e. Multiplexing and demultiplexing
   f. Transmission media
   g. Guided: coaxial, twisted-pair, fiber-optic; unguided: radio, microwaves, infrared, VSAT
   h. Transmission errors, error detection and correction codes; detection methods (VRC, LRC, CRC, Cheksum)

3. **Data link layer** **[8 Hrs]**
   a. Data link layer design issues
   b. Media access control. MAC address
   c. Farming methods
   d. Error control (detection and correction)
   e. Flow control, sliding window protocol
   f. Data link layer protocols: HDLC, SLIP, and PPP
   g. ALOHA, CSMA/CD, FDDI, Token ring, Token bus and IEEE802.3, 802.4, 802.5

4. **Network layer** **[8 Hrs]**
   a. Network layer design issues
   b. IP based networking (Mobile-IP, Subnet Mask, Private and Public address IP address, IPv4 addressing, Subnetting, VLSM, CIDO, Supernetting, multicasting, broadcasting, IPv6)
   c. Concept of routing (Static and dynamic routing)
   d. Routing algorithm (Shortest-path, Flooding, Flow-based, Distance-vector, Link-state)
   e. Congestion control and prevention, Leaky-bucket algorithm, Token-bucket algorithm
   f. Internetworking, Tunneling and routing, ATM internetworking, Mobile routing schemes
   g. Network layer protocols: IP, NAT, ICMP, IGMP, RIP, ARP, RARP, OSPF, IGRP, EIGRP, BGP

5. **Transport layer** **[5 Hrs]**
   a. Transport layer design issues
   b. Service primitive, QoS
   c. Connection-oriented and connectionless networks
   d. Transport layer protocols: TCP and UDP
   e. Elements of transport layer

6. **Application layer** **[5 Hrs]**
   a. Application layer and its function
   b. Electronic mail: SMTP
   c. File transfer: FTP, Telnet
   d. Dynamic host configuration protocol (DHCP)
   e. DNS, HTTP, WWW, SNMP

7. **Network security** **[4 Hrs]**
   a. Cryptography, digital signature
   b. Firewalls
   c. Virtual private network

**Laboratory:**

There shall be following laboratory exercises that cover the various features and concepts of computer networking. In practical, students should be able to set up small networks. Also, they should be able to configure network hardware and network software. Following lab exercises may be helpful.

- Installation of network interface card and various network devices like hub, switch, router
- Cabling: construction of straight-through and cross-over cable
- Installation and configuration of server and workstation in windows/Linux
- Setup client/Server and peer-to-peer networking and verify it
- Workgroup networking, domain networking
- Familiarization with basic network commands: observing IP address and MAC address, setting IP address and default gateway in PC
- File sharing and printer sharing
- Firewall configuration
- Configure HTTP, FTP, DHCP, Telnet server and verify it
- Configuration of DNS and e-mail server
- Basic network commands and network management and troubleshooting
- Static routing and dynamic routing (RIP and OSPF)
- Implement the data link layer farming methods such as character, character stuffing and bit stuffing
- Implementation of CRC
- Design of local area network (LAN)
- Case study; An existing network system of your college

**Reference**


- "*Computer Networks*", A. S. Tanenbaum
- "*Data Communications and Networking*", Behrouz A. Forouzan
- William Stallings, "*Data & Computer Communications*", Prentice Hall of India, New Delhi
- "*Computer Networking*", James F. Kurose, Keith W. Ross

# Data Mining & Data Warehousing

## BIT371CO

**Year: III** **Semester: VI**

| Teaching Schedule Hours/Week | | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|
| Theory | Tutorial | Practical | Internal Assessment | | Final | | Total |
| 3 | 1 | 2 | Theory | Practical | Theory | Practical | 150 |
| | | | 20 | 50 | 80 | - | |

**Course objective**

This course aims at introducing advances aspects of data warehousing and data mining, encompassing the principles, research results and commercial application of the current technologies. It also provides knowledge to introduce students to the basic concepts and techniques of data mining, using recent data mining software for solving practical problems.

**Contents**

1. **Introduction to data mining** **[4 Hrs]**
   Basic concepts of data mining
   Use and benefits of data mining
   Application of data mining
   KDD environment: data selection cleaning, enrichment, coding and mining
   Problems in data mining

2. **Introduction to data warehousing** **[4 Hrs]**
   Basic concepts of data warehousing
   Use and benefits of data warehousing
   Application of data warehousing
   Problems in data warehousing

3. **Data warehouse logical and physical design** **[6 Hrs]**
   Data warehouse logical design: star schemas, fact tables, dimensions, other schemas. Multidimensional data models, materialized views
   Data warehouse physical design: hardware and I/O consideration, parallelism, indexes

4. **Data warehousing technologies and implementations** **[4 Hrs]**
   Data extraction, transportation, transformation, loading and refreshing

5. **Data warehouse to data mining** **[9 Hrs]**

Data mining architecture

Data warehouse architecture

OLAP architecture

Types of OLAP servers

OLAP operations in multidimensional data models

OLAP to OLAM

Stages of data mining process

6. **Data mining approaches and methods** **[10 Hrs]**

Models of data mining

Data mining techniques

Data mining tasks

Classification and predictions

- Decision tree, rule-based classification, back propagation, genetic algorithm, linear regression, non-liner regression

Association rules and mining frequent patterns

- Market basket analysis, A Priori algorithm, FP growth

Clustering

- Partitioning method (K means. K medoids)
- Hierarchical method (Agglomerative, Divisive)

7. **Mining complex types of data** **[3 Hrs]**

Multimedia data mining

Text mining

Web mining

- Web content mining, web usage mining, web structure mining

8. **Application and trends in data warehousing and data mining** **[5 Hrs]**

Integration of data mining tools with database system

Data mining in distributed heterogeneous database systems

Importance of data mining in marketing, e-commerce and CRM

Aspects of security and privacy in data mining

Social impact of data mining

Social impact of data mining

Trends in data mining

**Laboratory works**

The student must do the project work using data mining and data warehousing concept. Topics should be given by the course instructor and at the end of the semester student should present their project work.

**Reference books**

- "*Data Mining Concepts and Techniques*", Morgan Kaufmann J. Han, M Kamber, Second edition
- Sam Anahory, Dennis Murray, "*Data Warehousing in the Real World*", Pearson Education
- Adriaans, P. and D. Zatinge, "*Data Mining*", Addison Wesley, 1996
- Kimball, R. "*The Data Warehouse Toolkit*", Wiley, 1996
- W. H. Inmon, "*Building The Data Warehouse*", 3rd Edition, Wiley, 2003
- Margaret H. Dunham, "*Data Mining: Introductory and Advance Topics*", Pearson Education 2004

**Prerequisite**

- C. Data Structure, Database Management Systems

# Research Methodology

## BIT308SH

**Year: III** **Semester: VI**

| Teaching Schedule Hours/Week | | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|
| Theory | Tutorial | Practical | Internal Assessment | | Final | | Total |
| 2 | 1 | - | Theory | Practical | Theory | Practical | 50 |
| | | | 10 | - | 40 | - | |

**Course objective**

After completion of this course, students will be able to:

- Perform individual research work on the field of information and communication technologies.
- Perform to research, select and organize information, as well as synthesize solution and anticipate their consequences.
- Acquire knowledge of research methods, procedures and processes, development of critical and self-critical assessment.
- Ability to sue knowledge in practice.

**Course contents**

1: **Introduction to Research** **[6 Hrs]**

Meaning of research, applied and fundamental research, scientific research process, management research methods: Action research, evaluation research, managerial research, meaning of project work, objectives of project work, methods of field and project work: Exploratory/descriptive, case study, feasible study

2: **Research Design** **[5 Hrs]**

Concept of research design, elements of research design, types of research design: historical, descriptive, development, case study, co-relational, causal-comparative and action research design

3: **Sampling process and data collection** **[7 Hrs]**

Sampling and its significance in research, types of sampling, probability and non-probability sampling: stratified, systematic, multistage, judgment, quota and convenience sampling, sampling error and non-sampling error, primary and secondary data, use of secondary data, methods of collecting primary data: interviewing, questionnaire and observation

4: **Testing of statistical hypothesis** **[6 Hrs]**

Statistical hypothesis, level of significance, difference between parametric and non-parametric tests. Use of z-distribution in hypothesis testing of population mean and population proportion in one-sample case

5: **Writing the research report** **[6 Hrs]**

Purpose of writing a report, contents and style of report, types of report: Descriptive and Analytical report, presenting data, table and figures in report, use of quotations, abbreviations, bibliography

**Reference books**


- Kerlinger, Fred N. “Foundation of Behavioral Research”

# Project – VI
# BIT 379CO

**Full marks: 100**
**Internal: 40**
**Final: 60**

**Course objectives**

After finishing this project, student will be able to develop professional application.

**Course content**

- There should be total of 45 hours covering important feature of software engineering practices, RDBMS and any object oriented programming.
- The application project will be assigned in a group of two/three students.
- An interested topic will be collected and instructed to each group.
- Students must develop the assigned application, submit written report and give oral presentation

**Project evaluation criteria**

The internal practical marks allotted for the project should be based on the following criteria:

- Mid-term presentation – 10 marks
- Pre-final submission and presentation – 20 marks
- Final presentation – 10 marks

The external marks should be given based on the following criteria:

- Presentation – 10 marks
- Project – 20 marks
- Documentation – 20 marks
- Viva – 10 marks

# Advance Object Oriented Programming

## BIT 376 CO

**Year: III** **Semester: VI**

| Teaching Schedule Hours/Week | | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|
| | | | Internal Assessment | | Final | | Total |
| Theory | Tutorial | Practical | Theory | Practical | Theory | Practical | |
| 3 | 1 | 2 | 20 | 50 | 80 | - | 150 |

**Contents:**

**1. Introduction to Java** **(12 Hours)**

- 1.1 Overview of Object oriented Programming in Java
- 1.2 JVM, Java environment , Java tools
- 1.3 Features of Java
- 1.4 Control Statements
- 1.5 Looping
- 1.6 Array
- 1.7 String and StringBuffer
- 1.8 Vector
- 1.9 Class and Objects
- 1.10 Inheritance
- 1.11 Polymorphism
- 1.12 Working with Collections
- 1.13 Interface and Packages
- 1.14 Exception Handling(try,catch,throw,throws,User defined exception)
- 1.15 Multi threaded Programming(life cycle, thread creation, thread synchronization)

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**2. Applet Programming** **(2 hours)**

- 2.1 Introduction to Applet
- 2.2 Standard Applet Methods
- 2.3 Putting an Applet on a Web Page
- 2.4 Passing parameter to Applets
- 2.5 Comparison between Applet and Application

**3. GUI Programming** **(7 hours)**

- 3.1 AWT Vs. Swing
- 3.2 Using Swing Components
- 3.3 Using Automic Components (JLabel, JButton etc)
- 3.4 Using JFrame, JPanal, JTree and JTable
- 3.5 Event handling(Mouse driven, Keyboard driven and other)

**4. Java IO** **(5 hours)**

- 4.1 Working with Input/output APIs
- 4.2 Working with scanner class

4.3 Working with Files
4.4 Working with Object Serialization

**5. JDBC** **(4 hours)**

5.1 JDBC Basic
5.2 Different Types of Drivers
5.3 Setting up a database
5.4 Setting up a Connection
5.5 Retrieving Values from Result Sets
5.6 Deleting/Updating tables
5.7 Working with Statement and PreparedStatement

**6. Socket Programming** **(6 hours)**

6.1 Overview of Socket Programming
6.2 Introduction of APIs related to Socket Programming
6.3 Server Side Programming (TCP and UDP)
6.4 Client Side Programming (TCP and UDP)
6.5 A Sample Program

**7. Distributed Application** **(5 hours)**

7.1 Introduction to Distributed Objects
7.2 Overview of RMI
7.3 Rmi Architecture
7.4 Creating Distributed Application using RMI

**8. Overview of Servlet and JSP** **(4 Hours)**

8.1 Introduction to Servlet and JSP and its Architecture
8.2 Configuring Apache Tomcat to host Servlet/JSP files
8.3 Sample program of Servlet and JSP.

**Laboratory:**
There shall be lab exercises covering all features of above chapters.

**Books Reference**


1. Cay S. Horstman, "*Core Java Volume I & II*", PHI
2. Bruce Eckel, "*Thinking in Java*", PHI
3. Herbert Schildt, "Java: *The Complete Reference*", McGraw Hill
4. Java 2.0 by "Ivan Bayross"
5. Programming with java by: "E. BALAGURUSAMY" latest edition.