**Department of Computer Science**
**University of Peshawar**

**UNDERGTRADUATE CURRICULUM**

**BCS**

Code: BCS471                                                                                    Cred Hrs: 3
**Compiler Construction**

**Compiler and Interpreters**
    a)      Compiler
    b)      Interpreter

**Compilation Process**

**Organization of Compiler**

**Analysis**
    a)      Lexical
    b)      Syntax
    c)      Semantic

**Symbol Tables**

**Recognizer**
    a)      Top-Down Recognizer
    b)      Bottom up recognizer

**Error Detection and Recovery**

**Storage Allocation**

**Code Generation Code Optimization**
    a)      Code Generation
    b)      Code Optimization

**Books:**
    1.      *Elder and John, Compiler Construction A Recursive Descent Model, Prentice Hall International, 1994.*
    2.      *Alfred V. Aho, Principles of Compiler Design, Addison Wesley, 1977.*

Code: BCS472                                                                                    Cred Hrs: 3
**Wireless and Mobile communications**

**Principles of wireless communication**
1) Technologies used for wireless communications.
2) Major wireless standards.
3) The problems characterising wireless and mobile computing.
4) Limitations of the wireless technology.

**Wireless networks**
1)   The main components of a Wireless LAN.

2) Modes of Operation for Wireless LANs (Infrastructure Mode, Adhoc Mode).
3) Compatibility of different technologies.
4) Main components of a satellite-based network.

**Wireless LANs Standards**
802.11 and its flavors (802.11a, 802.11b, 802.11g), HIPERLAN.

## Characteristics of radio propagation
## Fading, Multipath propagation

.
## Narrowband digital modulation
The need for modulation. Binary and multi-level (M-ary) amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK).

**Mobile computing**
Introduction, need for mobile computing.

**Radio Channel Characterisation**
Multipath propagation, Co-channel interference, Exponential power delay profile, Propagation effects - scattering, ground reflection, fading, Log-normal shadowing, Coherence Bandwidth.

**PHY Layer techniques**
Wideband modulation techniques to cope with intersymbol interference (Diversity, Spread Spectrum, Frequency Hopping, Direct Sequence, Adaptive Equalisation, Orthogonal Frequency Division Multiplexing).

**MAC protocols**
MAC protocols for digital cellular systems such as GSM. MAC protocols for wireless LANs such as IEEE802.11 and HIPERLAN I and II. The near far effect. Hidden and exposed terminals. Collision Avoidance (RTS-CTS) protocols.

**The Cellular Concept--System Design Fundamentals**
Frequency reuse, Reuse distance, Cluster size, Channel assignment strategies, Handoff strategies, Co-channel interference and system capacity, Trunking and grade of service

**Wideband CDMA concept/principles**
Example:-Global System for Mobile W-CDMA(3G) UMTS.

## Protocols supporting mobility
1) The functions of the main protocols for mobile stations
    a) Mobile network layer protocols such as mobile-IP, Dynamic Host Configuration Protocol (DHCP).
    b) Mobile transport layer protocols such as mobile-TCP, indirect-TCP.
    c) Wireless Application Protocol (WAP). Bluetooth.
## 2) Understand the range of applicability of each protocol

**Books:**
1. J.Schiller, Mobile communications, 2nd Edition, Addison-Wesley, 2003.
2. T.S. Rappaport, Wireless communications: Principle and Practice, 2nd Edition, Prentice Hall, 2001.
3. A S. Tanenbaum, Computer Networks, 4th Edition, Prentice Hall, 2002.
4. William Stallings, Wireless Communications and Networks, 1st Edition, Prentice Hall, 2001.

Code: BCS473                                                                                     Cred Hrs: 3

<u>**Software Project-I**</u>

Code: BCS474                                                         Cred Hrs: 3

<u>**Digital Signal Processing**</u>

**Digital Signal Processing and DSP Systems**
    Need for DSP
    Advantages of DSP Systems

**A Model of a DSP System**
    Input
    Signal Conditioning
    Anti-Aliasing Filters
    Analog-to-Digital Converter
    Processor
    Digital-to-Analog Converter
    Output Smoothing Filter
    Output Transducer
    DSP Processors
    DSP Format Types
    Alternative Formats for Commercial DSP Processors

**How Numbers are processed in a DSP**
    Polynomials
    Transcendental Functions
    Series Expansions
    Limits
    Integration
    Oscillatory Motion
    Complex Numbers

**Acquisition of the Signal**
    Sampling Theory
    Sampling Resolution
    Aliasing
    Reconstruction

**Application Examples-Filters**
    Filtering
    Sample Filter
    Types of Filters
            Bessel
            Butterworth
            Elliptical

**Fourier Series**
    Insights to be gained from Fourier series
    Fourier Series
    Nyquist Frequency

**Orthogonality and Quadrature**
        Orthogonality – Basic Building Blocks of DSP
        Quadrature – Signal 90 degrees of phase with each other

**Transforms**

The Z- Transform
DFT – Discrete Fourier Transform
Laplace Transform

## Finite Impulse Response Filter – FIR
What is it?
Stability
Cost
Design Methodology
Design Examples
Convolution

## Infinite Impulse Response Filter – IIR
What is it?
Stability
Cost
Design Methodology
Design Examples

## DSP Tools
Programming Language
Mathematical Tools
Special Purpose Tools
Development Package

## DSP and the Future
New User
DSP Directions
Future Technologies

**Books:**

1.      *John G. Proakis, Dimitris Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 3rd Edition, Prentice Hall, 1995.*
2.      *Robert D. Strum and Donald E. Kirk, First Principles of Discrete System and Digital signal Processing, Addison Wesley, 1998.*

Code: BCS475                                                                                      Cred Hrs: 3

## E-Commerce Applications and Technologies

**Fundamentals of E-Commerce Technologies:** An overview of the principles of E-Commerce. The origin and growth of E-Commerce. Technologies that support the development of E-Commerce applications. Business models and strategies for E-Commerce. Legal issues related to E-Commerce such as privacy, consumer rights and intellectual property.

**Electronic Payments Systems:** Electronic money, electronic contracts, micro-payments, authenticity, integrity and reliability of transactions, the encryption and digital signature techniques available to support secure transactions on the internet.

**Cryptography, Information Security and E-Commerce:** Symmetric cryptography, Asymmetric cryptography, Digital signature, one-way hashing, zero-knowledge proof, certificate and certificate authority. Secure information infrastructure, virtual private network (VPN), online shopping and payment systems, e-crash. Economic impact. Smart card, steganography, time stamping. Cryptanalysis technology. Authentication protocols, analysis and evaluation.

**Distributed Systems and Software:** Architectural models for distributed systems, server techniques, remote procedure call and multicast communication, emerging standard and platforms (CORBA, DCOM), distributed transactions, concurrency control, reliability and security issues.

**Network and Web Programming:** Client-server system design; interprocess communication; sockets; blocking and nonblocking I/O; multithreaded process; iterative and concurrent server designs; Web programming includes HTML, JAVA, Web page design and construction.

**Open Systems for E-Commerce:** Introduction to open system standards and protocols. Transaction protocols. Electronic commerce applications using open system and artificial intelligence technologies. Application of intelligent agents for automated transaction processing. Integration of Web programming techniques with information and communication systems.

**Project in E-Commerce Technologies:** An individual or a team project on E-Commerce technologies. *Project in E-Commerce Technologies are designed to allow students to gain first hand experience in studying and developing real-world systems for E-Commerce. These could be conducted either individually or by teamwork. Possible projects include, but are not limited to: On-line Banking and Financial Systems Supply Chain, Web-based Forecasting and pricing Electronic Payment Systems, Internet Shopping, Virtual Store or Virtual Campus, Electronic Office, Cryptography Servers, Security Fire Wall, Network Management and Quality of Service, Distributed System Technologies in CORBA or DCOM,

**HTML(Hypertext Markup Language):** Internet, web & HTMLK Fundamentals, The world Wide Web & Web Servers,

**Creating Static Web Pages with HTML:**

**Advanced HTML:**

**Java Script:** Data Type, Control Structures, Object & Function, Event Handling,

**VB Script:** Introduction, Data Types, Syntax, Control, etc,

**Active Server Pages:**

**Common Gateway Interface (CGI) Script:**

**Database Connectivity:** Using ASP, Using CGI,

**Books:**
1. Ann Navarro, Todd Stauffer, HTML by Example, 1st Edition, Que Corp, 1999.
2. Andrew Wooldrige, Mike Morgan, Mona Everett, Scott J. Walter, Special Edition Using Java Script, Que Corp, 1997.

Code: BCS476                                                                Cred Hrs: 3
### Expert Systems

Introduction, The Principles of operation of expert systems, State transition model: Expert system models: Planning actions, solving a problem, diagnosis, Producing advice; how to backtrack; a structure for expert system.
The structure of state spaces: connectivity, form; the implicit description of state spaces; search: depth and breadth first search.
Functions for handling lists: functions for search; best first search.
Eliciting knowledge from on expert: interviewing, examples, problem solving, psychological techniques.
Knowledge representation schemes: rules, semantic nets, logic, frames.
Some existing expert systems: MYCIN, DENDRAL, MACSYMA, PROSPECTOR.
Characteristics of knowledge-bases systems, features of problem solvers, Architectural principals.

The choices of system (language/package) production pit falls.

**Books:**
Gary Marshall, Advanced Students' Guide to Expert Systems, Heinemann Newnes Publications, Oxford, 1990.

Code: BCS477                                                                Cred Hrs: 3
Data Mining & Data Warehousing

Features of a data warehouse. Transformation Process. Multidimensional queries. Data warehousing job functions. Data warehousing operations: Hash join processing, bitmapped indexes, star queries, parallel processing, read-ahead mechanisms. Data Mining: Benefits. Data Mining Techniques: Association, discovery,

classification, clustering. Data Marts: Stand along data marts, subset data marts, multidimensional database. Queries against data mart. Data Mining Tools.

**Books:**
1.    *Alex Berson, Stephen J. Smith, Data Warehousing, Data Mining, and OLAP (Data Warehousing/Data Management), Computing McGraw Hill, 1997.*
2.    *George M. Marakas, Modern Data Warehousing, Mining and Visualization: Core Concepts, 1st Edition, Prentice Hall, 2002.*
3.    *Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, 1st Edition, Prentice Hall, 2002.*


Code: BCS478                                                                                             Cred Hrs:3
### Management Information System

Information systems, strategic role of information systems, organizations and business process, information management and decision making, ethical and social impact of IS. Computers and IS Software and hardware data resources and telecommunication ensuring quality in information system, enhancing decision making. Accounting, Executive, Decision support, Management Marketing Information Systems. Controlling and managing international information system.

**Books:**
1.    *Kenneth C. Laudon, Jane P. Laudon, Management Information Systems, 8th Edition, Prentice Hall, 2003.*
2.    James A. O'Brien, *Management Information Systems: Managing Information Technology in the E-Business Enterprise,6th Edition, McGraw Hill, 2003.*
3.    Raymond McLeod, George Schell, *Management Information Systems,*
       *9th Edition, Prentice Hall,2003.*


Code: BCS479                                                                                             Cred Hrs:3
### Distributed Computing

Introduction to Distributed Computing. Architectures and interaction mechanisms. Remote procedure Calling

(RPC). SunRPC and its application using Linux. Distributed Object Technology (DOT). Java RMI. COBRA using

Java as programming Language. Knowledge representation issues. XML and SOAP. Service Description,

Advertisement and Discovery. Load balancing. Transaction management. Fault Tolerance and Recovery

Mechanisms. Agent Theory.

**Books:**

1.    *George Coulouris, Jean Dollimore, Tim Kindberg, Distributed Systems: Concepts and Design, 3rd Edition, Addison Wesley, 2000.*
2.    *M.L. Liu, Distributed Computing: Principles and Applications, 1st Edition, Addison Wesley, 2003.*
3.    *Andrew S. Tanenbaum, Maarten van Steen, Distributed Systems: Principles and Paradigms, 1st Edition, Prentice Hall, 2002.*