# GC UNIVERSITY, FAISALABAD


# Scheme of Studies

## BS (Hons) Computer Science

*8 Semesters / 4 years Degree Program*
*for the year 2010 and onward*

**Department of Computer Science**

## Road Map BS(CS) 2010-14,2011-15,2012-16

## (For Government and Private Affiliated Colleges under Semester System)

### Semester-1

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | CSI-301 | Programming Fundamentals | 4 (3-1) |
| 2 | CIT- 301 | Introduction to Information and Communication Technologies | 4 (3-1) |
| 3 | ENG-301 | English-I (Functional English) | 3 (3-0) |
| 4 | EET-301 | Basic Electronics | 3 (3-0) |
| 5 | MTH-301 | Calculus and Analytical Geometry | 3 (3-0) |
| | | **Total** | **17** |

### Semester-2

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 6 | CSI-302 | Object Oriented Programming | 4 (3-1) |
| 7 | CSI-304 | Discrete Structures | 3 (3-0) |
| 8 | ENG-322 | Reading ,Writing, Speaking and Listening | 3 (3-0) |
| 9 | ISL-302 | Islamic and Pakistan Studies | 3 (3-0) |
| 10 | MTH-322 | Linear Algebra | 3 (3-0) |
| | | **Total** | **16** |

### Semester-3

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 11 | CSI-401 | Data Structure and Algorithms | 3 (2-1) |
| 12 | CSI-403 | Digital Logic Design | 3 (2-1) |
| 13 | CSI-405 | Introduction to Database Systems | 4 (3-1) |
| 14 | ENG-421 | English-III (Communication Skills) | 3 (3-0) |
| 15 | CSI-407 | Numerical Computing | 3 (3-0) |
| 16 | STA-351 | Probability and Statistics | 3 (3-0) |
| | | **Total** | **19** |

### Semester-4

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 17 | CSI-402 | Operating Systems | 3 (2-1) |
| 18 | CSI-404 | Computer Architecture | 3 (2-1) |
| 19 | CSE-402 | Introduction to Software Engineering | 3 (3-0) |

| | | | |
|---|---|---|---|
| 20 | CSI-406 | Computer Communications and Networks | 3 (2-1) |
| 21 | BBA-421 | Financial Management | 3 (3-0) |
| 22 | MTH-421 | Multivariable Calculus | 3 (3-0) |
| | | **Total** | **18** |

**Semester-5**

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 23 | CSI-501 | Web Engineering | 3 (2-1) |
| 24 | CSI-503 | Theory of Automata & Formal Languages | 3 (3-0) |
| 25 | MTH-521 | Differential Equations | 3 (3-0) |
| 26 | CSI-505 | Computer Organization and Assembly Language | 3 (2-1) |
| 27 | BBA-521 | Human Resource Management | 3 (3-0) |
| 28 | SOS-521 | Sociology | 3 (3-0) |
| | | **Total** | **18** |

**Semester-6**

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 29 | CSE-502 | Software Engineering - II | 3 (3-0) |
| 30 | CSI-502 | Distributed Database Systems | 3 (2-1) |
| 31 | CSI-504 | Computer Graphics | 3 (2-1) |
| 32 | CSI-506 | Design and Analysis of Algorithms | 3 (3-0) |
| 33 | CSI-508 | Visual Programming | 3 (2-1) |
| 34 | BBA-521 | Marketing | 3 (3-0) |
| | | **Total** | **18** |

**Semester-7**

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 35 | CSI-601 | Human Computer Interaction | 3 (3-0) |
| 36 | CSI-603 | System Programming | 3 (2-1) |
| 37 | CSI-605 | Compiler Construction | 3 (2-1) |
| 38 | CSI-607 | Artificial Intelligence | 3 (2-1) |
| 39 | PSY-421 | Psychology | 3 (3-0) |
| | | **Total** | **15** |

**Semester-8**

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 40 | CSI-631 | Final year Project | 6 (0-6) |
| 41 | CSI-602 | Professional Practices | 3 (3-0) |
| 42 | CSI-604 | Software Economics | 3 (3-0) |
| | | **Total** | **12** |

**Total Credit Hours 133**

# BS(CS) Session 2010-14,2011-15,2012-16

## For Government and Private Affiliated Colleges under semester system

# Semester-1

### Course Name: Programming Fundamentals

**Course Structure:** Lectures: 3, Labs: 1 **Credit Hours: 4**

**Prerequisites:** None

**Objectives:** The course is designed to familiarize students with the basic structured programming skills. It emphasizes upon problem analysis, algorithm designing, and program development and testing.

**Course Outline:** Overview of computers and programming. Overview of language for e.g. C language C. Basics of structured and Modular programming. Basic Algorithms and problem solving, development of basic algorithms, analyzing problem, designing solution, testing designed solution. Fundamental programming constructs, translation of algorithms to programs, data types, control structures, functions, arrays, records, files, testing programs.

## Reference Material:

1. Problem Solving and Program Design in C / 6E Hanly & Koffman

   Addison-Wesley | Published: 02/06/2009 ISBN-10: 0321535421 | ISBN-13: 9780321535429

2. C How to Program, 5/E

   **(Harvey & Paul) Deitel & Deitel**, ISBN-10: 0132404168 ISBN-13: 9780132404167 Publisher: Prentice Hall Copyright: 2007

## Course Name: Introduction to Information and Communication Technologies

**Course Structure:** Lectures: 3, Labs: 1 **Credit Hours: 4**

**Prerequisites:** None (first semester course)

### Objectives:

This course focuses on a breadth-first coverage of the use of computing and communication technologies to solve real life problems; including computing environments, general application software like word processing, visual presentation applications, tabular data manipulation, DBMS, WWW, Email management systems, Virus, Anti-Virus and Spam Protection; Introduction to the basic computing hardware (main building blocks), operating systems, data networks; software engineering and communication technology along with social and ethical issues. An introduction of the program of study in computing for which this course is being taught (CS, IT, SE etc.). The course attempts to provide every student a set of productivity tools that they will be able to use for the rest of their lives.

### Course Outline:

Number Systems, Binary numbers, Boolean logic, History computer system, basic machine organization, Von Neumann Architecture, Algorithm definition, design, and implementation, Programming paradigms and languages, Graphical programming, Overview of Software Engineering and Information Communication Technology, Operating system, Compiler, DBMS, Computer networks and internet, WWW, web mail applications, Computer graphics, AI, Viruses and Anti-Viruses, Use of office productivity tools, such as word processors, spreadsheets, presentation applications, etc., Social, Ethical, Professional and Legal Issues, and overview of the complete program of studies in computing and its structure.

### Suggested Text Book:

1. Introduction to Computers by Peter Norton, 6th Edition, McGraw-Hill SiE, ISBN 0-07-059374-4.

### Reference Material:

1. Computers: Information Technology in Perspective, 9/e by Larry Long and Nancy Long, Prentice Hall, 2002/ISBN: 0130929891.
2. An Invitation to Computer Science, Schneider and Gersting, Brooks/Cole Thomson Learning, 2000.
3. Information System Today by Leonard Jessup, Joseph Valacich.
4. Computers Today by Suresh K. Basandra.
5. Computer Science: An overview of Computer Science, Sherer.

## Course Name: English I (Functional English)

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours: 3**

**Objectives:** Enhance language skills and develop critical thinking. **Course Contents:** Basics of Grammar, Parts of speech and use of articles, Sentence structure, active and passive voice, Practice in unified sentence, Analysis of phrase, clause and sentence structure, Transitive and intransitive verbs, Punctuation and spelling

**Comprehension**

Answers to questions on a given text

**Discussion**

General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students)

**Listening**

To be improved by showing documentaries/films carefully selected by subject teachers

**Translation skills**

Urdu to English

**Paragraph writing**

Topics to be chosen at the discretion of the teacher

**Presentation skills**

Introduction

## Recommended books:

**Functional English**

a) Grammar

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492

2. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506

b) Writing

1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.

c) Reading/Comprehension

1. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

d) Speaking

## Course Name: Basic Electronics

**Course Structure:** Lectures: 3 Labs: 0 **Credit Hours:** 3

**Prerequisites:** Electric Circuits
**Objectives:** Introduction of
Electronics

**Course Outline:** *Fundamentals of Semiconductor physics:* Band theory, semiconductors (intrinsic and extrinsic), pn junction, pn junctions as a rectifier, clipper and clamper circuits, zener diode and voltage regulator, LED and LCD etc., *Transistors:* Bipolar Junction transistors, BJT biasing circuits, Q-point, BJT as a switch, BJT amplifiers, classes of amplifiers, power amplifiers, Metal oxide transistors, nMOS, pMOS and CMOS inverters circuits. Introduction to A/D and D/A conversion circuits.

### Reference Material:

*University Physics* by Freedman and Young (10 th and higher editions). *College Physics* by Resnick, Halliday and Krane (6th and higher edition).

## Course Name: Calculus and Analytic Geometry

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours:**

3 **Prerequisites:** None

**Objectives:** To provide foundation and basic ground for calculus and analytical geometry background.

**Course Outline:** Complex Numbers, DeMoivre‘s

Simple Cartesian Curves, Functions and Graphs, Symmetrical Properties, Curve Tracing, Limit and Continuity, Differentiation of Functions. Derivative as Slope of Tangent to a Curve and as Rate of Change, Application to Tangent and Normal, Linearization, Maxima/Minima and Point of Inflexion, Taylor and Maclaurin Expansions and their convergence. Integral as Anti-derivative, Indefinite Integration of Simple Functions. Methods of Integration: Integration by Substitution, by Parts, and by Partial Fractions, Definite Integral as Limit of a Sum, Application to Area, Arc Length, Volume and Surface of Revolution.

### Reference Material:

*1. Swokowski, Olinick and Pence, Calculus and Analytical Geometry, 6th*

*edition, 1994, Brooks/Cole Publishers.*

2. *Howard Anton, Calculus, 7th edition. 2002, John Wiley and Sons (WIE).*
3. William E. Boyce Richard C. Diprima, *Calculus*, John Wiley & Sons, ISBN: 0471093335.
4. Thomas Finny, Calculus and Analytical Geometry, 10th edition, John Wiley and Sons.
5. Erwin Kreyzig, Advanced Engineering Mathematics, 7th edition, 1993, John Wiley & Sons Inc.

# Semester-2

## Course Name: Object Oriented Programming

**Course Structure:** Lectures: 3, Labs: 1 **Credit Hours:** 4

**Prerequisites:** Programming Fundamentals

**Objectives:** The course aims to focus on object-oriented concepts, analysis and software development.

**Course Outline:** Evolution of Object Oriented (OO) programming, OO concepts and principles, problem solving in OO paradigm, OO program design process, classes, methods, objects and encapsulation; constructors and destructors, operator and function overloading, virtual functions, derived classes, inheritance and polymorphism. I/O and file processing, exception handling

## Reference Material:

1. C++ How to Program, 6/E
   **(Harvey & Paul) Deitel & Deitel** ISBN-10: 0136152503
   ISBN-13: 9780136152507 Publisher: Prentice Hall
2. Java How to Program, 7/E
   **(Harvey & Paul) Deitel & Deitel** ISBN-10: 0132222205 ISBN-13: 9780132222204 Publisher: Prentice Hall

## Course Name: Discrete Structures

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites: None**

**Objectives:** Introduces the foundations of discrete mathematics as they apply to Computer Science, focusing on providing a solid theoretical foundation for further work. Further, this course aims to develop understanding and appreciation of the finite nature inherent in most Computer Science problems and structures through study of combinatorial reasoning, abstract algebra, iterative procedures, predicate calculus, tree and graph structures. In this course more emphasis shall be given

to statistical and probabilistic formulation with respect to computing aspects.

**Course Outline:** Introduction to logic and proofs: Direct proofs; proof by contradiction, Sets, Combinatorics, Sequences, Formal logic, Prepositional and predicate calculus, Methods of Proof, Mathematical Induction and Recursion, loop invariants, Relations and functions, Pigeonwhole principle, Trees and Graphs, Elementary number theory, Optimization and matching. Fundamental structures: Functions; relations (more specifically recursions); pigeonhole principle; cardinality and countability, probabilistic methods.

## Reference Material:

1. Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 6TH edition, 2006, Mcgraw Hill Book Co.
2. Richard Johnsonbaugh, *Discrete Mathematics,* 7TH edition, 2008, Prentice Hall Publishers.
3. Kolman, Busby & Ross, *Discrete Mathematical Structures*, 4th edition, 2000, Prentice-Hall Publishers.
4. Ralph P. Grimaldi, *Discrete and Combinatorial Mathematics: An Applied Introduction*, Addison-Wesley Pub. Co., 1985.

## Course Name: Reading, Writing, Speaking and Listening

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

## Objectives:

Enhance language skills and develop critical thinking

## Course Contents

**Presentation skills**

**Essay writing**
Descriptive, narrative, discursive, argumentative

**Academic writing**
How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

**Technical Report writing**

**Progress report writing**

*Note: Extensive reading is required for vocabulary building*

## Recommended books:

Technical Writing and Presentation Skills

a) Essay Writing and Academic Writing

1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
2. College Writing Skills by John Langan. Mc=Graw-Hill Higher Education. 2004.
3. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R.

Mandell. St. Martin's Press.

b) Presentation Skills

c) Reading

1. The Mercury Reader. A Custom Publication. Compiled by norther Illinois University. General Editiors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).
2. Reading and Study Skills by John Langan
3. Study Skills by Riachard Yorky

## Course Name: Pakistan Studies

## Introduction/Objectives

- Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan.
- Study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.

## Course Outline

1. **Historical Perspective**
   a. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah.
   b. Factors leading to Muslim separatism
   c. People and Land
      i. Indus Civilization
      ii. Muslim advent
      iii. Location and geo-physical features.
2. **Government and Politics in Pakistan**

   Political and constitutional phases:

a. 1947-58
b. 1958-71
c. 1971-77
d. 1977-88
e. 1988-99
f. 1999 onward

3. **Contemporary Pakistan**
   a. Economic institutions and issues
   b. Society and social structure
   c. Ethnicity
   d. Foreign policy of Pakistan and challenges
   e. Futuristic outlook of Pakistan

## Books Recommended


i. Burki, Shahid Javed. *State & Society in Pakistan,* The Macmillan Press Ltd 1980.
ii. Akbar, S. Zaidi. *Issue in Pakistan's*Karachi:Oxford*Economy*University. Press, 2000.
iii. S.M. Burke and Lawrence Ziring. icalPaki analysis. Karachi: Oxford University Press, 1993.
iv. Mehmood, Safdar. *Pakistan Political Roots & Development.* Lahore, 1994.
v. Wilcox, Wayne.*The Emergence of Banglades.,* Washington: American Enterprise, Institute of Public Policy Research, 1972.
vi. Mehmood, Safdar. *Pakistan Kayyun Toota,* Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.
vii. Amin, Tahir. *Ethno - National Movement in Pakistan,* Islamabad: Institute of Policy Studies, Islamabad.
viii. Ziring, Lawrence. *Enigma of Political Development.* Kent England: WmDawson & sons Ltd, 1980.
ix. Zahid, Ansar. *History & Culture of Sindh.* Karachi: Royal Book Company, 1980.
x. Afzal, M. Rafique. *Political Parties in Pakistan,* Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.
xi. Sayeed, Khalid Bin. *The Political System of Pakistan.* Boston: Houghton Mifflin, 1967.
xii. Aziz, K.K. *Party, Politics in Pakistan,* Islamabad: National Commission on Historical and Cultural Research, 1976.
xiii. Muhammad Waseem, Pakistan Under Martial Law, Lahore: Vanguard, 1987.
xiv. Haq, Noor ul. *Making of Pakistan: The Military Perspective.* Islamabad: National Commission on Historical and Cultural Research, 1993.

## Course Name: Islamic Studies

## Objectives:

This course is aimed at:

1 To provide Basic information about Islamic Studies
2 To enhance understanding of the students regarding Islamic Civilization
3 To improve Students skill to perform prayers and other worships
4 To enhance the skill of the students for understanding of issues related to faith and religious life.

## Course Outlines

### Introduction to Quranic Studies

1) Basic Concepts of Quran
2) History of Quran
3) Uloom-ul -Quran

### Study of Selected Text of Holly Quran

1) Verses of Surah Al-Baqra Related to Faith(Verse No-284-286)
2) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)
3) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
4) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
5) Verses of Surah Al-Inam Related to Ihkam(Verse No-152-154)

### Study of Selected Text of Holly Quran

1) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.)
2) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
3) Verses of Surah Al-Saf Related to Tafakar,Tadabar (Verse No-1,14)

### Seerat of Holy Prophet (S.A.W) I

1) Life of Muhammad Bin Abdullah ( Before Prophet Hood)
2) Life of Holy Prophet (S.A.W) in Makkah
3) Important Lessons Derived from the life of Holy Prophet in Makkah

### Seerat of Holy Prophet (S.A.W) II

1) Life of Holy Prophet (S.A.W) in Madina
2) Important Events of Life Holy Prophet in Madina

3) Important Lessons Derived from the life of Holy Prophet in Madina

**Introduction To Sunnah**

1) Basic Concepts of Hadith
2) History of Hadith
3) Kinds of Hadith
4) Uloom –ul-Hadith
5) Sunnah & Hadith
6) Legal Position of Sunnah

**Selected Study from Text of Hadith**

**Introduction To Islamic Law & Jurisprudence**

1) Basic Concepts of Islamic Law & Jurisprudence
2) History & Importance of Islamic Law & Jurisprudence
3) Sources of Islamic Law & Jurisprudence
4) Nature of Differences in Islamic Law
5) Islam and Sectarianism

**Islamic Culture & Civilization**

1) Basic Concepts of Islamic Culture & Civilization
2) Historical Development of Islamic Culture & Civilization
3) Characteristics of Islamic Culture & Civilization
4) Islamic Culture & Civilization and Contemporary Issues

**Islam & Science**

1) Basic Concepts of Islam & Science
2) Contributions of Muslims in the Development of Science
3) Quranic & Science

**Islamic Economic System**

1) Basic Concepts of Islamic Economic System
2) Means of Distribution of wealth in Islamic Economics
3) Islamic Concept of Riba
4) Islamic Ways of Trade & Commerce

**Political System of Islam**

1) Basic Concepts of Islamic Political System
2) Islamic Concept of Sovereignty
3) Basic Institutions of Govt. in Islam

**Islamic History**

1) Period of Khlaft-E-Rashida
2) Period of Ummayyads
3) Period of Abbasids

**Social System of Islam**

1) Basic Concepts of Social System of Islam
2) Elements of Family
3) Ethical Values of Islam

## Reference Books:

1) Hameed ullah EmergenceMuhammad,ofIslam‖ —, IRI, Islamabad
2) Hameed ullah MuslimMuhammad,ConductofState—‖
3) Hameed ullah Muhammad,Introductionto Islam
4) Mulana Muhammad Yousaf Islahi,‖
5) Hussain Hamid Hassan, —An Introduction to theleaf Stu Publication Islamabad, Pakistan.
6) Ahmad Hasan, —Principles of IslamicResearchJurispruden Institute, International Islamic University, Islamabad (1993)
7) Mir Waliullah, —Muslim Jrisprudence and the Quran Islamic Book Service (1982)
8) H.S. Bhatia, —Studies in Islamic Law,Deep& DeepReligion a Publications New Delhi (1989)
9) Dr. Muhammad Zia-ul-Haq, —Introduction to Allama Sharia A Iqbal Open University, Islamabad (2001)

## Course Name: Linear Algebra

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** To provide fundamentals of solution for system of linear equations, operations on system of equations, matrix properties, solutions and study of their properties.

**Course Outline:** Vectors, Vector Spaces, Matrices & Determinants, Cofactor and Inverse, Rank, Linear Independence, Solution of system of Linear systems, Positive Definite matrix, Linear Transformations, Operations on matrices, Inner products, orthgonality and least squares, Eigenvalue & Eigenvectors. Applications to Systems of Equations and to Geometry, Singular Value Decomposition.

## Reference Material:

*1.* Bernard Kolman, David Hill, Elementary Linear Algebra with Applications, 9th edition, Prentice Hall PTR, 2007.
*2.* Gilbert Strang, Strang, Brett Coonley, Andy Bulman-Fleming, Andrew Bulman-Fleming, Strang's Linear Algebra And Its Applications, 4th edition, Brooks/Cole, 2005
*3.* Howard Anton, Chris Rorres, Elementary Linear Algebra: Applications Version, 9th edition, Wiley, 2005.
*4.* David C. Lay, Linear Algebra and Its Applications, 2nd edition, Addison-Wesley, 2000.

# Semester-3

**Course Name: Data Structures and Algorithms**
**Course Structure:**
Lectures: 2 / Labs: 1 **Credit Hours:** 3
**Prerequisites:** Object Oriented Paradigms

**Objectives:** The course is designed to teach students structures and schemes, which allow them to write programs to efficiently manipulate, store, and retrieve data. Students are exposed to the concepts of time and space complexity of computer programs.

**Course Outline:** Introduction to data structures; Arrays, Stacks, Queues, Priority Queues, Linked Lists, Trees, and Graphs. Recursion, sorting and

searching algorithms, Hashing, Storage and retrieval properties and techniques for the various data structures. Algorithm Complexity, Polynomial and Intractable Algorithms, Classes of Efficient Algorithms, Divide and Conquer, Dynamic, Greedy

**Reference Material:**

*Data Abstraction and Problem Solving with C++, 2nd ed, Frank M. Carrano, Paul Helman, Robert Veroff, Addison-Wesley, 1998.*

*Data Structures and Algorithms* (SAMS teach yourself), Lafore, Sams Publishing, 1999.

*Fundamentals of Data Structures in C++*, Horowitz, Sahni, and Mehta, Computer Science Press, 1995.

*Data Structures in JAVA*, Standish, Addison Wesley, 2000

## Digital Logic & Design

**Course Name:**
**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3
**Prerequisites:** Discrete Structures, Introduction to Computing

**Objectives:** This course introduces the concept of digital logic, gates and the digital circuits. Further, it focuses on the design and analysis combinational and sequential circuits. It also serves to familiarize the student with the logic design of basic computer hardware components.

**Course Outline:** Overview of Binary Numbers, Boolean Algebra, switching algebra, and logic gates, Karnaugh Map and Quin-McCluskey methods, simplification of Boolean functions, Combinational Design; two level NAND/NOR implementation, Tabular Minimization, Combinational Logic Design: adders, subtracters, code converters, parity checkers, multilevel NAND/NOR/XOR circuits, MSI Components, design and use of encoders, decoders, multiplexers, BCD adders, and comparators, Latches and flip-flops, Synchronous sequential circuit

design and analysis, Registers, synchronous and asynchronous counters, and memories, Control Logic Design, Wired logic and characteristics of logic gate families, ROMs, PLDs, and PLAs, State Reduction and good State Variable Assignments, Algorithmic State Machine (ASM) Charts, Asynchronous circuits, Memory systems, Functional organization, Multiprocessor and alternative architectures: Introduction to SIMD, MIMD, VLIW, EPIC; systolic architecture; interconnection networks; shared memory systems; cache coherence; memory models and memory consistency, Performance enhancements, Contemporary architectures.

**Reference Material:**

*Digital Design*, 2nd Ed., M. Morris Mano, Prentice Hall, 1991.
*Practical Digital Logic Design and Testing*, P K Lala, Prentice Hall, 1996.

## Course Name: Introduction to Database Systems

**Course Structure:** Lectures: 3, Labs: 1 **Credit Hours: 4**

**Prerequisites:** Data Structures and Algorithms

**Objectives:** The course aims to introduce basic database concepts, different data models, data storage and retrieval techniques and database design techniques. The course primarily focuses on relational data model and DBMS concepts.

**Course Outline:** Basic database concepts; Entity Relationship modelling, Relational data model and algebra, Structured Query language; RDBMS; Database design, functional dependencies and normal forms; Transaction processing and optimization concepts; concurrency control and recovery techniques; Database security and authorization. Small Group Project implementing a database. Physical database design: Storage and file structure; indexed files; b-trees; files with dense index; files with variable length records; database efficiency and tuning.

## Reference Material:

1. *Database Systems 8E,* C.J.Date, Addison Wesley Pub. Co. (2004).
2. *Database Systems: A Practical Approach to Design, Implementation and Management 5E,* R.Connolly and P.Begg, Addison-Wesley Pub. Co (2009).
3. Fundamentals of Database Systems, 5/E, Elmasri and Navathe, Addison-Wesley, ISBN: 0-201-74153-9.

## Course Name: English III (Communication Skills)

**Course Structure:** Lectures: 3 Labs: 0 **Credit Hours:** 3

## Objectives:

Enable the students to meet their real life communication needs.

## Course Contents

**Paragraph writing**
Practice in writing a good, unified and coherent paragraph

**Essay writing**
Introduction

**CV and job application**

Translation skills
Urdu to English

**Study skills**
Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

**Academic skills**
Letter/memo writing, minutes of meetings, use of library and internet

**Presentation skills**
Personality development (emphasis on content, style and pronunciation)

## Recommended books:

**Communication Skills**

a) Grammar

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.

b) Writing

1. Writing. Intermediate by Marie-Chrisitine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 019 435405 7 Pages 45-53 (note taking).

2. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).

c) Reading

1. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
2. Reading and Study Skills by John Langan
3. Study Skills by Riachard Yorky.

## Course Name: Numerical Computing

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Calculus and Analytical Geometry

**Objectives:** On completion of this unit, students will be able to demonstrate programming proficiency using structured programming techniques to implement numerical methods for solutions using computer-based programming techniques

.using Matlab for all methods. The course must serve the purpose of scientific software development for science and engineering problems.

**Course Outline:** The concepts of efficiency, reliability and accuracy of a method. Minimising computational errors. Theory of Differences, Difference Operators, Difference Tables, Forward Differences, Backward Differences and Central Differences. Mathematical Preliminaries, Solution of Equations in one variable, Interpolation and Polynomial Approximation, Numerical Differentiation and Numerical Integration, Initial Value Problems for Ordinary Differential Equations, Direct Methods for Solving Linear Systems, Iterative Techniques in Matrix Algebra, Solution of non-linear equations.

**Reference Material:**

1. Numerical Methods in Scientific Computing Germund Dahlquist and Åke Björck .
2. Numerical Methods for Scientific Computing : J.H. Heinbockel
3. Numerical Analysis: I.A. Khubaza
4. Numerical Analysis and Programming : Shan S Kuo
5. Numerical Analysis by Berden Fairs
6. Numerical Analysis by Gerald

## Course Name: Probability and Statistics

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** To introduce the concepts of data analysis, presentation, counting techniques, probability and decision making.

**Course Outline:** Introduction to Statistics, Descriptive Statistics, Statistics in decision making, Graphical representation of Data Stem-and Lead plot, Box-Cox plots, measures of central tendencies and dispersion, moments of frequency distribution; Counting techniques, introduction to probability, sample space, events, laws of probability, Condit application to random variable (Discrete and continuous) Binomial, Poisson, Geometric, Negative Binomial Distributions; Exponential Gamma and Normal distributions. Regression and Correlation, Estimation and testing of hypotheses, use of elementary statistical packages for explanatory Data analysis.

## Reference Material:

*1.* Ronald Walpole, Myers, Myers, neersYe,& — Scientists‖,edition,2008, **Prentice**8 **Hall** Publisher.

*2.* Lay L. Devore, Probability and Statistics for Engineering and the Sciences, 2003, Duxbury Publishers.

*3.* G. Cowan, *Statistical Data Analysis*, 1998, Clarendon, Oxford.

# Semester-4

## Course Name: Operating Systems

**Course Structure:** Lectures: 2, Labs: 1 **Credit Hours: 3**

**Prerequisites:** None

**Objectives:** To help students gain a general understanding of the principles and concepts governing the functions of operating systems and acquaint students with the layered approach that makes design, implementation and operation of the complex OS possible.

**Course Outline:** History and Goals, Evolution of multi-user systems, Process and CPU management, Multithreading, Kernel and User Modes, Protection, Problems of cooperative processes, Synchronization, Deadlocks, Memory management and virtual memory, Relocation, External Fragmentation, Paging and Demand Paging, Secondary storage, Security and Protection, File systems, I/O systems, Introduction to distributed operating systems. Scheduling and dispatch, Introduction to concurrency.

Lab assignments involving different single and multithreaded OS algorithms.

## Reference Material:

1. *Applied Operating Systems Concepts,* 7th Edition, Silberschatz A., Peterson, J.L., & Galvin P.C. 2004.
2. *Modern Operating Systems,* 3rd Edition, Tanenmaum A.S., 2008.

## Course Name: Computer Architecture

**Course Structure:** Lectures: 2, Labs: 1 **Credit Hours: 3**

**Prerequisites:** Digital Logic and Design

**Objectives:** Get a deeper understanding of how computers work, working knowledge of various subsystems and the general principles that affect their performance, analyze the performance of systems and quantify the performance measurements, fundamentals of all technologies, and advanced architectural features that boost the performance of computers.

**Course Outlines:** Fundamentals of Computer Design including performance measurements & quantitative principles, principles of Instruction Set Design, Operands, addressing modes and encoding, pipelining of Processors: Issues and Hurdles, exception handling features, Instruction-Level Parallelism and Dynamic handling of Exceptions, Memory Hierarchy Design, Cache Design, Performance

Issues and improvements, Main Memory Performance Issues, Storage Systems, Multiprocessors and Thread Level Parallelism. Case Studies.

## Resources:

1. *Computer Architecture: A Quantitative Approach* by Hennessy & Patterson, Morgan & Kauffman Series (2006) Fourth Edition.
2. *Computer Organization & Design* : *The Hardware/Software Interface* By Patterson & Hennessy, Morgan & Kauffman Series (2008) Fourth Edition.

## Course Name: Introduction to Software Engineering

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours: 3**

**Prerequisites:** Object Oriented Paradigm/Programming

**Objectives:** To study various software development models and phases of software development life cycle. The concepts of project management, change control, process management, software development and testing are introduced through hands-on Team Projects.

**Course Outline:** Introduction to Computer-based System Engineering; Project Management; Software Specification; Requirements Engineering, System Modelling; Requirements Specifications; Software Prototyping; Software Design: Architectural Design, Object-Oriented Design, UML modelling, Function-Oriented Design, User Interface Design; Quality Assurance; Processes & Configuration Management; Introduction to advanced issues: Reusability, Patterns; Assignments and projects on various stages and deliverables of SDLC.

## Reference Material:

1. *Software Engineering 8E by Sommerville Addison Wesley, 2006*
2. *Software Engineering: A Practitioner's Approach /7E,* Roger Pressman, McGraw-Hill, 2009

## Course Name: Computer Communication and Networks

**Course Structure:** Lectures: 2, Labs: 1 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** To introduce students to the concept of computer communication. Analogue & digital transmission. Network Layers, Network models (OSI, TCP/IP) and Protocol Standards. Emphasis is given on the understanding of modern network concepts.

**Course Outline:** Analogue and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission, Protocol design issues. Network system architectures (OSI, TCP/IP), Error Control, Flow Control, Data Link Protocols (HDLC, PPP). Local Area Networks and MAC Layer protocols (Ethernet, Token ring), Multiplexing, Switched and IP Networks, Inter-networking, Routing, Bridging, Transport layer protocols TCP/IP, UDP. Network security issues. Programming exercises, labs or projects involving implementation of protocols at different layers.

## Reference Material:

1. Introduction to Computer Networks /4, A. S. Tanenbaum, Prentice Hall 2003
2. Computer Networks and Internets, 5/E, 2008
   Douglas E. Comer, Purdue University ISBN-10: 0136061273 ISBN-13: 9780136061274 Publisher: Prentice Hall
3. Data and Computer Communications By William Stallings Published by Macmillan Pub. Co., 8th Edition 2006

## Course Name: Financial Management

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3 **Prerequisites:** None

**Course Outline:** Introduction to Financial Management, Concepts and Models in Valuation, The time value of money, Fundamentals of risk and portfolio analysis, Valuation of stocks and bonds, The capital Asset Pricing Model, the Arbitrage Pricing Model and other valuation models. The Cost of Capital: Capital structure and Dividend Policy, The cost of capital, Capital structure theory, Capital structure policy and optimal capital structure, Internal financing and dividends policy Capital Budgeting: The basis of capital budgeting, The determination and use of cash flow, Mutually exclusive investments and capital rationing, Annual equivalent cost and replacement decisions, Risk analysis and the optimal capital budget, Islamic guidelines for financial management: The rational of prohibition of interest, Alternate capital structure, Capital Budgeting in an Interest free economy, working Capital Management in 100% equity capital structure.

**Reference Material:** *Financial Management* by Charles H. Gibson.

## Course Name: Multivariable Calculus

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** Calculus and Analytical Geometry

**Objectives:** The goals are to develop the skills to have ground knowledge of multivariate calculus and appreciation for their further computer science courses.

**Course Outline:** Functions of Several Variables and Partial Differentiation. Multiple Integrals, Line and Surface

Fourier Series: periodic functions, Functions of any period P-2L, Even & odd functions, Half Range expansions, Fourier Transform. Laplace Transform, Z-Transform.

## Reference Material:

1. James Stewart, Multivariable Calculus, 6th edition, 2007, Cengage Learning publishers.
2. Swokowski, Olinick and Pence, *Calculus and Analytical Geometry*, 6th edition, 1994, Thomson Learning EMEA, Ltd.
3. Bernard Kolman, William F. Trench, Elementary Multivariable Calculus, 1971, Academic Press.
4. Howard Anton, Albert Herr, Multivariable Calculus, 5th edition, 1995, John Wiley.

# Semester-5

Course Name: **Web Engineering**

**Course Structure:** Lectures: 2 Lab:1 **Credit Hours:** 3

**Prerequisites:** Fundamentals of Information Technology (required)

## Objectives:

This course will extend the WWW Technologies and Web Based Applications architecture, development, deployment and management concepts studied in the course of Fundamentals of Information Technology. The instructor is expected to cover an in-depth treatment of the web technology and applications related topics including web standards, protocols, web applications architecture, web services, search engine architectures, content management, web2, and semantic web, to explore some of the technologies used for display, data access and processing, and to give the students practice in integrating these to produce a functional web-based system.

## Course Outline:

In-depth study of World Wide Web architectures, protocols and standards (HTTP, HTML, xHTML, CGI, XML, WML, cHTML, etc.), Web Technologies and Tools (such as scripting tools) for web application development and deployment (web servers, application servers, etc.), Web Based Applications including search engines and content management, management of large scale web based information systems, Web Services, Web2, Semantic Web, and Web3, principles of web site design, practical exercise in web site development.

## Suggested Text Books:

1. Nuckles, Craig, Web Applications: Concepts and Real World Design, Wiley 2006
2. Programming the World Wide Web (4th Edition) (Paperback), by Robert W. Sebesta (Author), Paperback: 752 pages, Publisher: Addison Wesley; 4th edition (August 17, 2007), ISBN-10: 0321489691

## Reference Material:

1. Gosselin, Dan, et. al., The Web Warrior Guide to Web Design Technologies, Cengage Learning, 2003
2. Zak, Diane, et. al., The Web Warrior Guide to Web Programming, Cengage Learning, 2003
3. Leasure, T., Bob Leasure and James Leasure, The Web Warrior Guide to Web Database Technologies, Cengage Learning, 2003
4. Morrison, Mike and Joline Morrison, Database Driven Websites, 2/e, Cengage Learning, 2002
5. Web Wizard series for various technologies, Addison-Wesley
6. Jackson, J. C., Web Technologies: A Computer Science Perspective, Pearson (LPE), 2008
7. Web Application Architecture: Principles, Protocols and Practices by Leon Shklar and Richard Rosen (Paperback - Oct 31, 2008), Paperback: 420 pages, Publisher: Wiley; 2 edition (October 31, 2008), ISBN-10: 047051860X

   Web Engineering: The Discipline of Systematic Development of Web Applications by Gerti Kappel, Birgit Prýýll, Siegfried Reich, and Werner Retschitzegger (Paperback - Jul 5, 2006)

## Course Name: Theory of Automata and Formal languages

**Course Structure:** Lectures: 3 Labs: 0 **Credit Hours:** 3

**Prerequisites:** Discrete Structures

**Objectives:** The course aims to develop an appreciation of the theoretical foundations of computer science through study of mathematical & abstract models of computers and the theory of formal languages. *Theory of formal languages* and use of various abstractparsingmacwill be studied for identifying/validating the synthetic characteristics of programming languages. Some of the abstract mach

**Course Outline:** *Finite State Models:* Language definitions preliminaries, Regular expressions/Regular languages, Finite automata (FAs), Transition graphs (TGs), NFAs, Kleene's theore

Pumping lemma and non regular language *Grammars and PDA:* Context free grammars, Derivations, derivation trees and ambiguity, Simplifying CFLs ,

Normal form grammars and parsing, grammars *Turing Machines Theory:* Turing machines, Post machine, Variations on TM, TM encoding, Universal Turing Machine, Context sensitive Grammars, Defining Computers by TMs.

## Text Books/Reference Books:

1. An Introduction to Formal Languages and Automata, By Peter Linz, 4th edition, Jones & Bartlett Publishers, 2006
2. Theory of Automata, Formal Languages and Computation, By S. P. Eugene, Kavier, 2005, New Age Publishers, ISBN (10): 81-224-2334-5, ISBN (13) : 978-81-224-2334-1.
3. John Hopcroft and Jeffrey Ullman, *Introduction to Automata Theory, Languages, and Computation*, 2nd edition, 2001, Addison-Wesley.
4. Introduction to Languages and the Theory of Computation, By John C. Martin3rd edition, 2002, McGraw-Hill Professional.

## Course Name: Differential Equations

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** Calculus and Analytical Geometry

**Objectives:** Develop fundamental skills of solving ordinary differential equations, and developing differential equations for real-world problems.

**Course Outline:** Ordinary Differential Equations of the First Order: Geometrical Considerations, Isoclines, Separable Equations, Equations Reducible to Separable Form, Exact Differential Equations, Integrating Factors, Linear First-Order Differential Equations, Variation of Parameters. Ordinary Linear Differential Equations; Homogeneous Linear Equations of the Second Order, Homogeneous Second-Order Equations with Constant Coefficients, General Solution, Real Roots, Complex Roots, Double Root of the Characteristic Equation, Differential Operators, Cauchy Equation, Homogeneous Linear Equations of Arbitrary Order, Homogeneous Linear Equations of Arbitrary Order with Constant Coefficients, Non-homogeneous Linear Equations. Modelling of Electrical Circuits. Systems of Differential Equations. Series Solutions of Differential Equations. Partial Differential Equations: Method of Separation of variables, wave, Heat & Laplace equations and their solutions by Fourier series method.

## Reference Material:


1. Michael Greenberg, *Advanced Engineering Mathematics, 1996*, Prentice Hall publishers.
2. Erwin Kreyzig, *Advanced Engineering Mathematics*, 7th edition, 1993, John Wiley & Sons Inc.
3. Zill, Prindle, Weber and Schmidt, *A First Course in Differential Equations,* 1996, Brooks/Cole Publishing,
4. Dennis G. Zill, Michael R. Cullen. *Differential Equations with Boundary-Value Problems*, 1996, Brooks/Cole Publishing,
5. C. H .Edwards, David E. Penney, *Elementary Differential Equations With Applications,* 1993, Prentice Hall.

## Course Name: Computer Organization and Assembly Language

**Course Structure:** Lectures: 2, Labs: 1 **Credit Hours: 3**

**Prerequisites:** Digital Logic Design

**Objectives:** The main objective of this course is to introduce the organization of computer systems and usage of assembly language for optimization and control. Emphasis should be given to expose the low-level logic employed for problem solving while using assembly language as a tool. At the end of the course the students should be capable of writing moderately complex assembly language subroutines and interfacing them to any high level language.

**Course Outline:** Microprocessor Bus Structure: Addressing, Data and Control, Memory Organization and Structure (Segmented and Linear Models), Introduction to Registers and Flags, Data Movement, Arithmetic and Logic, Programme Control, Subroutines, Stack and its operation, Peripheral Control Interrupts, Interfacing with high level languages, Real-time application.

Objectives and Perspectives of Assembly Language, Addressing Modes, Introduction to the Assembler and Debugger, Manipulate and translate machine and assembly code, Describe actions inside the processing chip, Discuss operations performed by an instruction set, Write a fully documented program, Using an assembler of choice.

## Reference Material:

1. Stallings, "Computer Organization & Architecture", 7th ed, Prentice HALL, 2006.
2. Irvine, Assembly Language for Intel-based Computers, 5th ed, Prentice Hall, 2007.
3. Computer Organization and Design, The Hardware/Software Interface, 4th ed, by David A. Patterson and John L. Hennessy, 2008. Elsevier Publishers.

## Course Name: Human Resource Management

**Course Structure:** Lectures: 3 / Labs: 0 **Credit**

**Hours:** 3 **Prerequisites:** None

**Course Outline:** An overview of Human Resource Management and Human Resource Manager. The Environment of Human Resource Management, external and Internal Environment. Equal Employment Opportunity and Affirmative Action. Job Analysis: A Basic Human Resource Tool. Human Resource Planning, Recruitment, and Selection. Organization Change and Human Resource Development. Corporate Culture and Organization Development. Career Planning Development. Performance Appraisal.

**Reference Material:**

*Managing Human Resource* by Wayne F. Cascio.

## Course Name: Sociology

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours: 3**

**Course Objectives**

This course will introduce students to the discipline of Sociology, its perspective, its basic concepts and principles, its methods of analysis and its major sub-fields. Through this introduction it is expected that students will begin to think in ways that take into account the social realm of thought, including the impact of social forces, social constraints, and social structure on an individual's thoughts and behaviours. The goals of the course are to encourage students to begin to think critically about the social world, to examine various life issues with a sociological lens, to 'problematize' social issues, and to spark the sociological imagination - "the ability to see the relationship between individual experiences and the larger society" (C. Wright Mills, 1959).

**Course Contents:** Nature, scope and subject matter of Sociology, Brief historical development of Sociology, Introduction to Quranic Sociology, Society and community, Relationship with other social Sciences, Social Interaction Processes The study of social life, Exploring the global village, Sociology as a science, The Sociological imagination, The development of Sociology, Sociology, Structure and function of social institutions, Inter-relationships among various social institutions, Elements of culture, Organization of culture, cultural relativism, sub cultures, ethnocentrism, Socialization and personality, Role and status, Socialization, Culture and personality

**Recommended Texts:**

1. Horton and Hungt, (2004), Sociology, 6th edition, McGraw Hill
2. Tischler, Hnry L, (2002), Introduction to Sociology, 7th edition Horcourt
3. Macionis, John J and Plummer, Ken, (2005), Sociology, A Global International, 3rd Edition, Prentice Hall.

**Reference Material:**

1. Kendall, Diana, (2001), Sociology in our times, 32nd Edition, Wadsworth.
2. James. M. Hensline, (1997), Sociology, Needhan Heigwb, Massachusetts, USA.
3. George J. Brgjar, Michael P. Soroke, (1997), Sociology, Needhan Heigwb, Massachusetts, USA.

# Semester-6

### Course Name: Software Engineering-II

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** Data Structures, Software Engineering–I

**Objectives:** The students will study techniques for software verification, validation and testing. They would also study reliability and performance issues in software design and development.

**Course Outline:** Software verification and validation: Techniques are introduced to evaluate software correctness, efficiency, performance and reliability, integration of these techniques into a verification and validation plan. Technical reviews, software testing, programme verification, prototyping, and requirement tracing. Attitude of industry toward reliability and performance.

**Reference Material:**

*Software Engineering: A Practioner's Approach,* Roger Pressman, McGraw-Hill, 2001.

*Software Engineering,* Ian Sommerville, Addison-Wesley 2001,

### Course Name: Distributed Database Systems

**Course Structure:** Lectures: 2/Labs: 1 **Credit Hours:** 3

**Prerequisites:** Introduction to Database Systems

**Objectives:**

Students will learn the usage of different design strategies for distributed databases,

and will study query processing techniques as well as transaction management and concurrency control concepts used in such systems

### Course Outline:

Introduction to Distributed Data Processing; Distributed DBMS Architecture; Distributed Database Design: Issues, Fragmentation and Allocation; Integrity Constraints, Distributed Query Processing; Query Decomposition and Data Localization; Query Optimization; Distributed Transaction Management and Concurrency Control; Distributed DBMS Reliability and Replication Techniques; Multidatabase Systems.

## Reference Material:

1. M.T. Ozsu, P. Valduriez (eds.): Principles of Distributed Database Systems (2nd Edition), Prentice Hall, 1999
2. P. Bernstein and E. Newcomer, Principles of Transaction Processing. Morgan Kaufmann, 1997
3. M. Buretta, Data Replication. Wiley, 1997
4. R. Elmasri and S. Navathe. Fundamentals of Database Systems, Benjamin/Cummings.

## Course Name: Computer Graphics

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Object Oriented Programming , Visual Programming

**Objectives:** Study of various algorithms in computer graphics and their implementation in any programming language.

**Course Outline:** Graphics hardware. Fundamental algorithms. Applications of graphics. Interactive graphics programming — graph plotting, windows and clipping, and segmentation. Programming raster display systems, Differential Line Algorithm, panning and zooming. Raster algorithms and software — Scan-Converting lines, characters and circles. Scaling, Rotation, Translation, Region filling and clipping. Two and three dimensional imaging geometry (Perspective projection and Orthogonal projection) and transformations. Curve and surface design, rendering, shading, colour and animation.

## Reference Material:

1. Computer Graphics, Principles and Practice, J. D. Foley, A. van Dam, S. K. Feiner and J. F. Hughes, Addison-Wesley ISBN: 0-201-12110-7.
2. *Computer Graphics,* F.S.Hill, Maxwell MacMillan ISBN: 0-02-354860-6.
3. Interactive Computer Graphics: Functional, Procedural and Device-level methods; Peter Burger and Duncan. F. Gillies; Addison-Wesley, (2003)

## Course Name: Visual Programming

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Data Structures, Data and Network Security

**Objectives:** To development applications using various tools and APIs in visual programming.

**Course Outline:** Introduction to Windows programming, Use of Windows API, MFC Class hierarchy, Class Wizard, Application Wizard and Application Studio, Graphics Device Interface, Menus, document view architecture, Multiple Views, files and archiving mechanisms, converting Windows programmes to MFC, Sub-classing controls.

**Reference Material:**

*MFC from the Ground Up.*
*Windows 98 API*
*Programming. VC++ A*
*complete References.*

## Course Name: Design and Analysis of Algorithms

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** Discrete Structure, Data Structures and Algorithms

**Objectives:** Detailed study of the basic notions of the design of algorithms and the underlying data structures. Several measures of complexity are introduced. Emphasis on the structure, complexity, and efficiency of algorithms.

**Course Outline:** Introduction; Asymptotic notations; Recursion and recurrence relations; Divide-and-conquer approach; Sorting; Search trees; Heaps; Hashing; Greedy approach; Dynamic programming; Graph algorithms; Shortest paths; Network flow; Disjoint Sets; Polynomial and matrix calculations; String matching; NP complete problems; Approximation algorithms.

## Reference Material:

1. *Introduction to Algorithms /2E,* T. H. Cormen, C. E. Leiserson, and R. L. Rivest, MIT Press, McGraw-Hill, New York, NY, 2001.
2. Algorithms in C++; Robert Sedgewick

**Course Name: Marketing**

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** Students will be able to understand the evolution of marketing, environment, consumer behavior and market segmentation and be able to develop the capabilities regarding marketing approaches such as preparation of marketing research approach to set the proper marketing segments from niche level marketing to the international level of marketing.

## Course Outline:

Introduction, Marketing Process & Company Analysis, Competitor Analysis, Customer Analysis: Individual & Aggregate, Customer Analysis, Segmentation, Targeting and Positioning, Product, Services and Branding Strategies, Pricing, Integrated Marketing Communication I, Integrated Marketing Communication II, Channels of Distribution,

## Reference Material:

1) Fundamentals of Marketing 10th Edition
2) By William J Stanton and Michael J Etzel , Mc Graw Hill Inc. 1994
3) Michael J. Baker,‖ The th MarketingEdition—.Book20024
th
4) Philip Koter & Armstrong ,‖EditPrincion
th
5) Philip Kotler & Gary Armstrong,Edition—P

# Semester-7

## Course Name: Human Computer Interaction

**Course Structure:** Lectures: 3, Labs:0 **Credit Hours: 3**

**Prerequisites:** Data Structures and Algorithms

**Objectives:** This course introduces the human issues of usability and its importance. It considers the implications of human understanding on the usability of computer systems and the importance of understanding the context of use. It describes guidelines for use of different media and interface styles. Topics include Usability Design principals, standards and models, evaluation techniques. Groupware, pervasive and ubiquitous applications.

**Course Outlines:** The Human, Computer and Interaction, Usability paradigm and principles, Introduction to design basics, HCI in software process, Design rules, prototyping, evaluation techniques, task analysis, Universal design and User support and Computer Supported Cooperative Work. Introduction to specialized topics such as Groupware, pervasive and ubiquitous applications.

### Resources:

1. Human-Computer Interaction, 3/E **Alan Dix**, *Computing Dept, Lancaster University* **Janet E. Finlay**, *Leeds Metropolitan University,* **Gregory D. Abowd**, *Georgia Institute of Technology,* **Russell Beale**, *University of Birmingham* ISBN-10: 0130461091 ISBN-13: 9780130461094 Publisher: Prentice Hall
2. Designing the User Interface: Strategies for Effective Human-Computer Interaction, 4/E **Ben Shneiderman**, *University of Maryland* **Catherine Plaisant**, *University of Maryland* ISBN-10: 0321197860 ISBN-13: 9780321197863 Publisher: Addison-Wesley

## Course Name: System Programming

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Operating Systems

**Objectives:** Demonstrate mastery of the internal operation of Unix system software including assemblers, loaders, macro-processors, interpreters, inter-process communication.

**Course Outline:** System Programming overview: Application Vs. System Programming, System Software, Operating System, Device Drivers, OS Calls. Window System Programming for Intel386 Architecture: 16 bit Vs 32 bit, Programming, 32 bit Flat memory model, Windows Architecture. Virtual Machine (VM)Basics, System Virtual Machine, Portable Executable Format, Ring O Computer, Linear Executable format, Virtual Device Driver (V + D), New Executable format, Module Management, COFF obj format 16 bit. (Unix) other 32-bit O.S Programming for I 386; Unix Binaryble format (ELF), Dynamic shared

objects, Unix Kernel Programming (Ring O), Unix Device Architecture (Character & Block Devices), Device Driver Development, Enhancing Unix Kernel.

## Reference Material:

1. *The UNIX Programming Environment,* B. Kernighan & R. Pike Prentice-Hall, 1984.
2. *System Software,* Leland L. Beck*,* Addison-Wesley Longmsan, 1990, ISBN: 0-201-50945-8.

## Course Name: Compiler Construction

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Theory of Automata and Formal Languages

**Objectives:** At the end of the course students should understand the overall structure of a compiler, and will know significant details of a number of important techniques commonly used. They will be aware of the way in which language features raise challenges for compiler builders.

**Course Outline:** Compiler techniques and methodology. Organization of compilers. Lexical and syntax analysis. Parsing techniques. Object code generation and optimization, detection and recovery from errors. Contrast between compilers and interpreters.

## Reference Material:

1. Compilers: Principles, Techniques, and Tools By Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Contributor Jeffrey D. Ullman ,Addison-Wesley Pub. Co., 2nd edition,1987 Original from the University of Michigan
2. Modern Compiler Design, By Dick Grune, Henri E. Bal, Ceriel J. H. Jacobs, Koen G. Langendoen, John Wiley, 2000.
3. Modern Compiler Implementation in C, By Andrew W. Appel, Maia Ginsburg, Contributor Maia Ginsburg, Cambridge University Press, 2004.
4. Modern Compiler Design by Dick Grune, Henri E. Bal, Ceriel J. H. Jacobs, Koen G. Langendoen, 2003, John Wiley & Sons.

## Course Name: Artificial Intelligence

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Data Structures

**Objectives:** This course focuses on the set of computational tools and techniques, which mimic the human decision-making process and capability.

**Course Outline:** Introduction to Common Lisp. AI classical systems: General Problem Solver, rules, simple search, means-ends analysis. ELIZA, pattern matching, rule based translators, OPS-5. Knowledge Representation: Natural language, rules, productions, predicate logic, semantic networks, frames, objects, scripts. Search: Depth first search, breadth first search, best first search, hill climbing, min-max search, A* search. Symbolic Mathematics: student, solving

algebra problems, translating English equations, solving algebraic equations, simplification rules, re-write rules, meta-rules, Macsyma, PRESS, ATLAS. Logic Programming: Resolution, unification, horn-clause logic, Prolog, Prolog programming. Sample case studies of shells and Knowledge Based Systems. A brief appreciation of state of the art computational techniques like neural networks, genetic algorithm, fuzzy sets.

## Reference Material:

1. Artificial Intelligence by Luger, 4th edition Pearson Education.

2. Russell and Norvig, Artificial Intelligence: A Modern Aproach, 2nd ed, Pearson Education.

**Course Name**: **Psychology**

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

## Objectives

- To develop understanding of the brea
- To gain awareness of the principles study of psychological theories, concepts and research.
- To develop the ability to identifyto e cultural, social and contemporary issues.
- To understand how to critically appr evidence.
- Tobefamiliar with a range of research methods.

## Course Overview:

Psychology is —the study of the mindisto a familiarize students with a wide range of theories and research investigating human behavior. The course has been developed to be as interesting and challenging as possible. The objective is to explore how Psychology has contributed to an understanding of individual, social and cultural diversity.

In addition, a substantial portion of the course focuses on psychological testing and measuring learning outcomes.

## Required Text:

1. Santrock, J., Woloshyn, V., Gallagher, T., Di Petta, T., & Marini, Z. (2004). Educational Psychology (1st Canadian Edition). Toronto: McGraw Hill Ryerson.

2. Bernstein, D. A., Penner, L. A., Clarke-Stewart, A., & Roy, E. J. (2003). Psychology (6th ed.). Houghton Mifflin Company: Boston, MA.

3. Atkinson, R. et al. (1999) Hilgard's Introduction to Psychology. Harcourt Publishers Ltd. ISBN: 9780155068384

4. Malim, T. & Birch, A. (1998) Introductory Psychology

Palgrave ISBN: 9780333668528

5. Zimbardo, P., McDermott, M., Jansz, J. & Metaal, N. (1995). Psychology: A European Text. London: Harper Collins ISBN: 0004990021

6. Eysenck, M (Ed) (2008) Fundamentals of Psychology: ISBN: 1841693723

7. Eysenck, M (2005) Psychology: The Science of Mind and Behaviour. Hodder and Stoughton ISBN: 0340900989

8. Banyard, P. & Grayson, A. (2000) Introducing Psychological Research. Palgrave ISBN: 9780333912515

9. Coolican, H (1996) Introduction to Research Methods and Statistics in Psychology (2nd edition) Hodder & Stoughton ISBN: 9780340679371

10. Gross, R (2001) Psychology: The Science of Mind and Behaviour. Hodder and Stoughton

# Semester-8

## Course Name: Professional Practices

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** A Computing graduate as professional has some responsibilities with respect to the society. This course develops student understanding about historical, social, economic, ethical, and professional issues related to the discipline of Computing. It identifies key sources for information and opinion about professionalism and ethics. Students analyze, evaluate, and assess ethical and professional computing case studies.

**Course Outline:** Introduction, Computing Ethics, Philosophy of Ethics, Ethics and the Internet. Intellectual Copy Right, Accountability and Auditing, Social Application of Ethics.

## Resources:

1. Deborah G. Johnson, —Computer Eth edition.
2. *Professional Issues in Software Engineering*, M.F. Bott et. al.

## Course Name: Software Economics

**Course Structure:** Lectures: 3 /Labs: 0 **Credit Hours: 3**

**Prerequisites:** None

**Objectives:** Determine how new software development technologies affect the economics and risks of software development. Understand and characterize how the paradigm shift affects or replaces our current methods of software cost, schedule and risk estimation. Identify best practices and lessons learned with Web-based developments. Identify acquisition and lifecycle risks

**Course Outline:** Programming aspects, economic aspects, human relations aspects, software trends: cost, social impact, the plurality of SE Means, The GOALS Approach to Software Engineering, The Software Work Breakdown Structure (WBS), Software Maintenance, introduction to COCOMO, definitions and assumptions, development effort and schedule, phase distribution, The Raylaigh Distribution, interpolation, basic software maintenance effort estimation. Performance Models, Optimal Performance, Sensitivity Analysis, Cost-Effectiveness Models.

## Resources:

1. Boehm, Software Engineering Economics, Prentice Hall, 1981.
2. Boehm et al., Software Cost Estimation with COCOMO II, Prentice Hall, 2000.
3. Reifer, Don. Making the Software Business Case: Improvement by the Numbers, Addison Wesley, 2001.

## Road Map BS (CS) 2013-17 and 2014-18
## For Government and Private Affiliated Colleges under Semester System

### Semester-1

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | CSI-301 | Programming Fundamentals | 4 (3-1) |
| 2 | CSI- 311 | Introduction to Information and Communication Technologies | 4 (3-1) |
| 3 | ENG-321 | English for Academic Purpose (EAP) | 3 (3-0) |
| 4 | EET-321 | Basic Electronics | 3 (3-0) |
| 5 | MTH-321 | Calculus and Analytical Geometry | 3 (3-0) |
| 6 | ISL-321 | Islamic Studies | 3 (3-0) |
| | | **Total** | **20** |

### Semester-2

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 7 | CSI-302 | Object Oriented Programming | 4 (3-1) |
| 8 | CSI-304 | Discrete Structures | 3 (3-0) |
| 9 | ENG-322 | Reading ,Writing, Speaking and Listening | 3 (3-0) |
| 10 | PST-322 | Pakistan Studies | 3 (3-0) |
| 11 | MTH-322 | Linear Algebra | 3 (3-0) |
| | | **Total** | **16** |

### Semester-3

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 12 | CSI-401 | Data Structure and Algorithms | 3 (2-1) |
| 13 | CSI-403 | Digital Logic and Design | 3 (2-1) |
| 14 | CSI-405 | Introduction to Database Systems | 4 (3-1) |
| 15 | ENG-421 | Communication Skills | 3 (3-0) |
| 16 | CSI-407 | Numerical Computing | 3 (3-0) |
| 17 | STA-351 | Introduction to Statistical Theory | 3 (3-0) |
| | | **Total** | **19** |

### Semester-4

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 18 | CSI-402 | Operating Systems | 3 (2-1) |
| 19 | CSI-404 | Computer Architecture | 3 (2-1) |

| | | | |
|---|---|---|---|
| 20 | CSE-402 | Software Engineering-I | 3 (3-0) |
| 21 | CSI-406 | Computer Communications and Networks | 3 (2-1) |
| 22 | BBA-406 | Fundamental of Marketing | 3 (3-0) |
| 23 | MTH-421 | Multivariable Calculus | 3 (3-0) |
| | | **Total** | **18** |

**Semester-5**

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 24 | CSI-501 | Web Engineering | 3 (2-1) |
| 25 | CSI-503 | Theory of Automata & Formal Languages | 3 (3-0) |
| 26 | MTH-521 | Differential Equations | 3 (3-0) |
| 27 | CSI-505 | Computer Organization and Assembly Language | 3 (2-1) |
| 28 | BBA-501 | Financial Management | 3 (3-0) |
| 29 | SOC-521 | Sociology | 3 (3-0) |
| | | **Total** | **18** |

**Semester-6**

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 30 | CSE-502 | Software Engineering - II | 3 (3-0) |
| 31 | CSI-502 | Distributed Database Systems | 3 (2-1) |
| 32 | CSI-504 | Computer Graphics | 3 (2-1) |
| 33 | CSI-506 | Design and Analysis of Algorithms | 3 (3-0) |
| 34 | CSI-508 | Visual Programming | 3 (2-1) |
| 35 | BBA-506 | Human Recourse Management | 3 (3-0) |
| | | **Total** | **18** |

**Semester-7**

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 36 | CSI-601 | Human Computer Interaction | 3 (3-0) |
| 37 | CSI-603 | System Programming | 3 (2-1) |
| 38 | CSI-605 | Compiler Construction | 3 (2-1) |
| 39 | CSI-607 | Artificial Intelligence | 3 (2-1) |
| 40 | CSI-611 | Mobile and Wireless Networks | 3 (3-0) |
| | | **Total** | **15** |

**Semester-8**

| Sr # | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 41 | CSI-640 | Final year Project | 6 (0-6) |
| 42 | CSI-602 | Professional Practices | 3 (3-0) |
| 43 | PSY-421 | Psychology | 3 (3-0) |
| | | **Total** | **12** |

**Total Credit Hours 136**

# BS (CS) Session 2013-17 and 2014-18

## Semester-1

**Course Name: Programming Fundamentals**

**Course Structure:** Lectures: 3, Labs: 1 **Credit Hours: 4**

**Prerequisites:** None

**Objectives:** The course is designed to familiarize students with the basic structured programming skills. It emphasizes upon problem analysis, algorithm designing, and program development and testing.

**Course Outline:** Overview of computers and programming. Overview of language for e.g. C language C. Basics of structured and Modular programming. Basic Algorithms and problem solving, development of basic algorithms, analyzing problem, designing solution, testing designed solution. Fundamental programming constructs, translation of algorithms to programs, data types, control structures, functions, arrays, records, files, testing programs.

## Reference Material:

3. Problem Solving and Program Design in C / 6E Hanly & Koffman

   Addison-Wesley | Published: 02/06/2009 ISBN-10: 0321535421 | ISBN-13: 9780321535429

4. C How to Program, 5/E

**(Harvey & Paul) Deitel & Deitel**, ISBN-10: 0132404168 ISBN-13: 9780132404167 Publisher: Prentice Hall Copyright: 2007

## Course Name: Introduction to Information and Communication Technologies

**Course Structure:** Lectures: 3, Labs: 1 **Credit Hours: 4**

**Prerequisites:** None (first semester course)

### Objectives:

This course focuses on a breadth-first coverage of the use of computing and communication technologies to solve real life problems; including computing environments, general application software like word processing, visual presentation applications, tabular data manipulation, DBMS, WWW, Email management systems, Virus, Anti-Virus and Spam Protection; Introduction to the basic computing hardware (main building blocks), operating systems, data networks; software engineering and communication technology along with social and ethical issues. An introduction of the program of study in computing for which this course is being taught (CS, IT, SE etc.). The course attempts to provide every student a set of productivity tools that they will be able to use for the rest of their lives.

### Course Outline:

Number Systems, Binary numbers, Boolean logic, History computer system, basic machine organization, Von Neumann Architecture, Algorithm definition, design, and implementation, Programming paradigms and languages, Graphical programming, Overview of Software Engineering and Information Communication Technology, Operating system, Compiler, DBMS, Computer networks and internet, WWW, web mail applications, Computer graphics, AI, Viruses and Anti-Viruses, Use of office productivity tools, such as word processors, spreadsheets, presentation applications, etc., Social, Ethical, Professional and Legal Issues, and overview of the complete program of studies in computing and its structure.

### Suggested Text Book:

2. Introduction to Computers by Peter Norton, 6th Edition, McGraw-Hill SiE, ISBN 0-07-059374-4.

### Reference Material:

6. Computers: Information Technology in Perspective, 9/e by Larry Long and Nancy Long, Prentice Hall, 2002/ISBN: 0130929891.
7. An Invitation to Computer Science, Schneider and Gersting, Brooks/Cole Thomson Learning, 2000.
8. Information System Today by Leonard Jessup, Joseph Valacich.
9. Computers Today by Suresh K. Basandra.

10. Computer Science: An overview of Computer Science, Sherer.

## Course Name: English for Academic Purpose (EAP)

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours: 3**

**Objectives:** Enhance language skills and develop critical thinking. **Course Contents:** Basics of Grammar, Parts of speech and use of articles, Sentence structure, active and passive voice, Practice in unified sentence, Analysis of phrase, clause and sentence structure, Transitive and intransitive verbs, Punctuation and spelling

**Comprehension**

Answers to questions on a given text

**Discussion**

General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students)

**Listening**

To be improved by showing documentaries/films carefully selected by subject teachers

**Translation skills**

Urdu to English

**Paragraph writing**

Topics to be chosen at the discretion of the teacher

**Presentation skills**

Introduction

## Recommended books:

**Functional English**

a) Grammar

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492

2. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506

b) Writing

1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.

c) Reading/Comprehension

1. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

d) Speaking

## Course Name: Basic Electronics

**Course Structure:** Lectures: 3 Labs: 0 **Credit Hours:** 3

**Prerequisites:** Electric Circuits
**Objectives:** Introduction of
Electronics

**Course Outline:** *Fundamentals of Semiconductor physics:* Band theory, semiconductors (intrinsic and extrinsic), pn junction, pn junctions as a rectifier, clipper and clamper circuits, zener diode and voltage regulator, LED and LCD etc., *Transistors:* Bipolar Junction transistors, BJT biasing circuits, Q-point, BJT as a switch, BJT amplifiers, classes of amplifiers, power amplifiers, Metal oxide transistors, nMOS, pMOS and CMOS inverters circuits. Introduction to A/D and D/A conversion circuits.

### Reference Material:

*University Physics* by Freedman and Young (10 th and higher editions). *College Physics* by Resnick, Halliday and Krane (6th and higher edition).

## Course Name: Calculus and Analytic Geometry

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours:**

3 **Prerequisites:** None

**Objectives:** To provide foundation and basic ground for calculus and analytical geometry background.

**Course Outline:** Complex Numbers, DeMoivre‘s

Simple Cartesian Curves, Functions and Graphs, Symmetrical Properties, Curve Tracing, Limit and Continuity, Differentiation of Functions. Derivative as Slope of Tangent to a Curve and as Rate of Change, Application to Tangent and Normal, Linearization, Maxima/Minima and Point of Inflexion, Taylor and Maclaurin Expansions and their convergence. Integral as Anti-derivative, Indefinite Integration of Simple Functions. Methods of Integration: Integration by Substitution, by Parts, and by Partial Fractions, Definite Integral as Limit of a Sum, Application to Area, Arc Length, Volume and Surface of Revolution.

### Reference Material:

*6. Swokowski, Olinick and Pence, Calculus and Analytical Geometry, 6th*

*edition, 1994, Brooks/Cole Publishers.*

7. *Howard Anton, Calculus, 7th edition. 2002, John Wiley and Sons (WIE).*
8. William E. Boyce Richard C. Diprima, *Calculus*, John Wiley & Sons, ISBN: 0471093335.
9. Thomas Finny, Calculus and Analytical Geometry, 10th edition, John Wiley and Sons.
10. Erwin Kreyzig, Advanced Engineering Mathematics, 7th edition, 1993, John Wiley & Sons Inc.

## Course Name: Islamic Studies

## Objectives:

This course is aimed at:

1 To provide Basic information about Islamic Studies
2 To enhance understanding of the students regarding Islamic Civilization
3 To improve Students skill to perform prayers and other worships
4 To enhance the skill of the students for understanding of issues related to faith and religious life.

## Course Outlines

### Introduction to Quranic Studies

4) Basic Concepts of Quran
5) History of Quran
6) Uloom-ul -Quran

### Study of Selected Text of Holly Quran

6) Verses of Surah Al-Baqra Related to Faith(Verse No-284-286)
7) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)
8) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
9) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
10) Verses of Surah Al-Inam Related to Ihkam(Verse No-152-154)

### Study of Selected Text of Holly Quran

4) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.)
5) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
6) Verses of Surah Al-Saf Related to Tafakar,Tadabar (Verse No-1,14)

**Seerat of Holy Prophet (S.A.W) I**

4) Life of Muhammad Bin Abdullah ( Before Prophet Hood)
5) Life of Holy Prophet (S.A.W) in Makkah
6) Important Lessons Derived from the life of Holy Prophet in Makkah

**Seerat of Holy Prophet (S.A.W) II**

4) Life of Holy Prophet (S.A.W) in Madina
5) Important Events of Life Holy Prophet in Madina
6) Important Lessons Derived from the life of Holy Prophet in Madina

**Introduction To Sunnah**

7) Basic Concepts of Hadith
8) History of Hadith
9) Kinds of Hadith
10) Uloom –ul-Hadith
11) Sunnah & Hadith
12) Legal Position of Sunnah

**Selected Study from Text of Hadith**

**Introduction To Islamic Law & Jurisprudence**

6) Basic Concepts of Islamic Law & Jurisprudence
7) History & Importance of Islamic Law & Jurisprudence
8) Sources of Islamic Law & Jurisprudence
9) Nature of Differences in Islamic Law
10) Islam and Sectarianism

**Islamic Culture & Civilization**

5) Basic Concepts of Islamic Culture & Civilization
6) Historical Development of Islamic Culture & Civilization
7) Characteristics of Islamic Culture & Civilization
8) Islamic Culture & Civilization and Contemporary Issues

**Islam & Science**

4) Basic Concepts of Islam & Science
5) Contributions of Muslims in the Development of Science
6) Quranic & Science

**Islamic Economic System**

5) Basic Concepts of Islamic Economic System
6) Means of Distribution of wealth in Islamic Economics
7) Islamic Concept of Riba
8) Islamic Ways of Trade & Commerce

**Political System of Islam**

4) Basic Concepts of Islamic Political System
5) Islamic Concept of Sovereignty

6) Basic Institutions of Govt. in Islam

**Islamic History**

4) Period of Khlaft-E-Rashida
5) Period of Ummayyads
6) Period of Abbasids

**Social System of Islam**

5) Basic Concepts of Social System of Islam
6) Elements of Family
7) Ethical Values of Islam

**Reference Books:**

2) Hameed ullah EmergenceMuhammad,ofIslam‖ —, IRI, Islamabad
2) Hameed ullah MuhammaMuslimd, —Conduct of State‖
3) Hameed ullah IntroductionMuhammad,toIslam
8) Mulana Muhammad Yousaf Islahi,‖
5) Hussain Hamid Hassan, —An Introduction to theleaf Stu Publication Islamabad, Pakistan.
6) Ahmad Hasan, —PrinciplesIslamicofJurisprudence‖IIslamicResearch Institute, International Islamic University, Islamabad (1993)
7) Mir Waliullah, —Muslim Jrisprudence and the Quran Islamic Book Service (1982)
8) H.S. Bhatia, —Studies in IslamicionandLaw,DeepSociety‖&DeepRelig Publications New Delhi (1989)
9) Dr. Muhammad Zia-ul-Haq, —Introduction to Allama Sharia A Iqbal Open University, Islamabad (2001)

# Semester-2

## Course Name: Object Oriented Programming

**Course Structure:** Lectures: 3, Labs: 1 **Credit Hours:** 4

**Prerequisites:** Programming Fundamentals

**Objectives:** The course aims to focus on object-oriented concepts, analysis and software development.

**Course Outline:** Evolution of Object Oriented (OO) programming, OO concepts and principles, problem solving in OO paradigm, OO program design process, classes, methods, objects and encapsulation; constructors and destructors, operator and function overloading, virtual functions, derived classes, inheritance and polymorphism. I/O and file processing, exception handling

## Reference Material:

3. C++ How to Program, 6/E
   **(Harvey & Paul) Deitel & Deitel** ISBN-10: 0136152503 ISBN-13: 9780136152507 Publisher: Prentice Hall
4. Java How to Program, 7/E
   **(Harvey & Paul) Deitel & Deitel** ISBN-10: 0132222205 ISBN-13: 9780132222204 Publisher: Prentice Hall

## Course Name: Discrete Structures

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites: None**

**Objectives:** Introduces the foundations of discrete mathematics as they apply to Computer Science, focusing on providing a solid theoretical foundation for further work. Further, this course aims to develop understanding and appreciation of the finite nature inherent in most Computer Science problems and structures through study of combinatorial reasoning, abstract algebra, iterative procedures, predicate calculus, tree and graph structures. In this course more emphasis shall be given to statistical and probabilistic formulation with respect to computing aspects.

**Course Outline:** Introduction to logic and proofs: Direct proofs; proof by contradiction, Sets, Combinatorics, Sequences, Formal logic, Prepositional and predicate calculus, Methods of Proof, Mathematical Induction and Recursion, loop invariants, Relations and functions, Pigeonwhole principle, Trees and Graphs, Elementary number theory, Optimization and matching. Fundamental structures: Functions; relations (more specifically recursions); pigeonhole principle; cardinality and countability, probabilistic methods.

## Reference Material:

5. Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 6$^{TH}$ edition, 2006, Mcgraw Hill Book Co.
6. Richard Johnsonbaugh, *Discrete Mathematics,* 7$^{TH}$ edition, 2008, Prentice Hall Publishers.
7. Kolman, Busby & Ross, *Discrete Mathematical Structures*, 4$^{th}$ edition, 2000, Prentice-Hall Publishers.
8. Ralph P. Grimaldi, *Discrete and Combinatorial Mathematics: An Applied Introduction*, Addison-Wesley Pub. Co., 1985.

## Course Name: Reading, Writing, Speaking and Listening

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

## Objectives:

Enhance language skills and develop critical thinking

## Course Contents

**Presentation skills**

**Essay writing**
Descriptive, narrative, discursive, argumentative

**Academic writing**
How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

**Technical Report writing**

**Progress report writing**

*Note: Extensive reading is required for vocabulary building*

## Recommended books:

Technical Writing and Presentation Skills

a) Essay Writing and Academic Writing

1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
2. College Writing Skills by John Langan. Mc=Graw-Hill Higher Education. 2004.
3. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.

b) Presentation Skills

c) Reading

4. The Mercury Reader. A Custom Publication. Compiled by norther Illinois University. General Editiors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).
5. Reading and Study Skills by John Langan
6. Study Skills by Riachard Yorky

## Course Name: Pakistan Studies

## Introduction/Objectives

- Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan.
- Study the process of governance, national development, issues arising in the

modern age and posing challenges to Pakistan.

## Course Outline

1. **Historical Perspective**

   d. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah.

   e. Factors leading to Muslim separatism

   f. People and Land
      iv. Indus Civilization
      v. Muslim advent
      vi. Location and geo-physical features.

2. **Government and Politics in Pakistan**

Political and constitutional phases:

   g. 1947-58
   h. 1958-71
   i. 1971-77
   j. 1977-88
   k. 1988-99
   l. 1999 onward

3. **Contemporary Pakistan**

   f. Economic institutions and issues
   g. Society and social structure
   h. Ethnicity
   i. Foreign policy of Pakistan and challenges
   j. Futuristic outlook of Pakistan

## Books Recommended


xv. Burki, Shahid Javed. *State & Society in Pakistan,* The Macmillan Press Ltd 1980.

xvi. Akbar, S. Zaidi. *Issue in Pakistan's*Karachi:Oxford*Economy*University. Press, 2000.

xvii. S.M. Burke and Lawrence Ziring. Paki analysis. Karachi: Oxford University Press, 1993.

xviii. Mehmood, Safdar. *Pakistan Political Roots & Development.* Lahore, 1994.

xix. Wilcox, Wayne.*The Emergence of Banglades.,* Washington: American Enterprise, Institute of Public Policy Research, 1972.

xx. Mehmood, Safdar. *Pakistan Kayyun Toota,* Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.

xxi. Amin, Tahir. *Ethno - National Movement in Pakistan,* Islamabad: Institute of Policy Studies, Islamabad.

xxii. Ziring, Lawrence. *Enigma of Political Development.* Kent England: WmDawson & sons Ltd, 1980.

xxiii. Zahid, Ansar. *History & Culture of Sindh.* Karachi: Royal Book Company, 1980.

xxiv. Afzal, M. Rafique. *Political Parties in Pakistan,* Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.

xxv. Sayeed, Khalid Bin. *The Political System of Pakistan.* Boston: Houghton Mifflin, 1967.

xxvi. Aziz, K.K. *Party, Politics in Pakistan,* Islamabad: National Commission on Historical and Cultural Research, 1976.

xxvii. Muhammad Waseem, Pakistan Under Martial Law, Lahore: Vanguard, 1987.

xxviii. Haq, Noor ul. *Making of Pakistan: The Military Perspective.* Islamabad: National Commission on Historical and Cultural Research, 1993.

## Course Name: Linear Algebra

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** To provide fundamentals of solution for system of linear equations, operations on system of equations, matrix properties, solutions and study of their properties.

**Course Outline:** Vectors, Vector Spaces, Matrices & Determinants, Cofactor and Inverse, Rank, Linear Independence, Solution of system of Linear systems, Positive Definite matrix, Linear Transformations, Operations on matrices, Inner products, orthgonality and least squares, Eigenvalue & Eigenvectors. Applications to Systems of Equations and to Geometry, Singular Value Decomposition.

## Reference Material:

5. Bernard Kolman, David Hill, Elementary Linear Algebra with Applications, 9th edition, Prentice Hall PTR, 2007.
6. Gilbert Strang, Strang, Brett Coonley, Andy Bulman-Fleming, Andrew Bulman-Fleming, Strang's Linear Algebra And Its Applications, 4th edition, Brooks/Cole, 2005
7. Howard Anton, Chris Rorres, Elementary Linear Algebra: Applications Version, 9th edition, Wiley, 2005.
8. David C. Lay, Linear Algebra and Its Applications, 2nd edition, Addison-Wesley, 2000.

# Semester-3

**Course Name: Data Structures and Algorithms**

**Course Structure:**
Lectures: 2 / Labs: 1 **Credit Hours:** 3
**Prerequisites:** Object Oriented Paradigms

**Objectives:** The course is designed to teach students structures and schemes, which allow them to write programs to efficiently manipulate, store, and retrieve data. Students are exposed to the concepts of time and space complexity of computer programs.

**Course Outline:** Introduction to data structures; Arrays, Stacks, Queues, Priority Queues, Linked Lists, Trees, and Graphs. Recursion, sorting and

searching algorithms, Hashing, Storage and retrieval properties and techniques for the various data structures. Algorithm Complexity, Polynomial and Intractable Algorithms, Classes of Efficient Algorithms, Divide and Conquer, Dynamic, Greedy

**Reference Material:**

*Data Abstraction and Problem Solving with C++, 2nd ed, Frank M. Carrano, Paul Helman, Robert Veroff, Addison-Wesley, 1998.*

*Data Structures and Algorithms* (SAMS teach yourself), Lafore, Sams Publishing, 1999.

*Fundamentals of Data Structures in C++*, Horowitz, Sahni, and Mehta, Computer Science Press, 1995.

*Data Structures in JAVA*, Standish, Addison Wesley, 2000

**Digital Logic & Design**

**Course Name:**

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3
**Prerequisites:** Discrete Structures, Introduction to Computing

**Objectives:** This course introduces the concept of digital logic, gates and the digital circuits. Further, it focuses on the design and analysis combinational and sequential circuits. It also serves to familiarize the student with the logic design of basic computer hardware components.

**Course Outline:** Overview of Binary Numbers, Boolean Algebra, switching algebra, and logic gates, Karnaugh Map and Quin-McCluskey methods, simplification of Boolean functions, Combinational Design; two level NAND/NOR implementation, Tabular Minimization, Combinational Logic Design: adders, subtracters, code converters, parity checkers, multilevel NAND/NOR/XOR circuits, MSI Components, design and use of encoders, decoders, multiplexers, BCD adders, and comparators, Latches and flip-flops, Synchronous sequential circuit design and analysis, Registers, synchronous and asynchronous counters, and memories, Control Logic Design, Wired logic and characteristics of logic gate

families, ROMs, PLDs, and PLAs, State Reduction and good State Variable Assignments, Algorithmic State Machine (ASM) Charts, Asynchronous circuits, Memory systems, Functional organization, Multiprocessor and alternative architectures: Introduction to SIMD, MIMD, VLIW, EPIC; systolic architecture; interconnection networks; shared memory systems; cache coherence; memory models and memory consistency, Performance enhancements, Contemporary architectures.

**Reference Material:**

*Digital Design*, 2nd Ed., M. Morris Mano, Prentice Hall, 1991.
*Practical Digital Logic Design and Testing*, P K Lala, Prentice Hall, 1996.

## Course Name: Introduction to Database Systems

**Course Structure:** Lectures: 3, Labs: 1 **Credit Hours: 4**

**Prerequisites:** Data Structures and Algorithms

**Objectives:** The course aims to introduce basic database concepts, different data models, data storage and retrieval techniques and database design techniques. The course primarily focuses on relational data model and DBMS concepts.

**Course Outline:** Basic database concepts; Entity Relationship modelling, Relational data model and algebra, Structured Query language; RDBMS; Database design, functional dependencies and normal forms; Transaction processing and optimization concepts; concurrency control and recovery techniques; Database security and authorization. Small Group Project implementing a database. Physical database design: Storage and file structure; indexed files; b-trees; files with dense index; files with variable length records; database efficiency and tuning.

## Reference Material:

4. *Database Systems 8E,* C.J.Date, Addison Wesley Pub. Co. (2004).
5. *Database Systems: A Practical Approach to Design, Implementation and Management 5E,* R.Connolly and P.Begg, Addison-Wesley Pub. Co (2009).
6. Fundamentals of Database Systems, 5/E, Elmasri and Navathe, Addison-Wesley, ISBN: 0-201-74153-9.

## Course Name: Communication Skills

**Course Structure:** Lectures: 3 Labs: 0 **Credit Hours:** 3

## Objectives:

Enable the students to meet their real life communication needs.

## Course Contents

**Paragraph writing**
Practice in writing a good, unified and coherent paragraph

**Essay writing**
Introduction

**CV and job application**

Translation skills
Urdu to English

**Study skills**
Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

**Academic skills**
Letter/memo writing, minutes of meetings, use of library and internet

**Presentation skills**
Personality development (emphasis on content, style and pronunciation)

## Recommended books:

**Communication Skills**

a) Grammar

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.

b) Writing

1. Writing. Intermediate by Marie-Chrisitine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 019 435405 7 Pages 45-53 (note taking).

2. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).

c) Reading

1. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
2. Reading and Study Skills by John Langan
3. Study Skills by Riachard Yorky.

## Course Name: Numerical Computing

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Calculus and Analytical Geometry

**Objectives:** On completion of this unit, students will be able to demonstrate programming proficiency using structured programming techniques to implement numerical methods for solutions using computer-based programming techniques .using Matlab for all methods. The course must serve the purpose of scientific software development for science and engineering problems.

**Course Outline:** The concepts of efficiency, reliability and accuracy of a method. Minimising computational errors. Theory of Differences, Difference Operators, Difference Tables, Forward Differences, Backward Differences and Central Differences. Mathematical Preliminaries, Solution of Equations in one variable, Interpolation and Polynomial Approximation, Numerical Differentiation and Numerical Integration, Initial Value Problems for Ordinary Differential Equations, Direct Methods for Solving Linear Systems, Iterative Techniques in Matrix Algebra, Solution of non-linear equations.

## Reference Material:

7. Numerical Methods in Scientific Computing Germund Dahlquist and Åke Björck .
8. Numerical Methods for Scientific Computing : J.H. Heinbockel
9. Numerical Analysis: I.A. Khubaza
10. Numerical Analysis and Programming : Shan S Kuo
11. Numerical Analysis by Berden Fairs
12. Numerical Analysis by Gerald

## Course Name: Introduction to Statistical Theory

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** To introduce the concepts of data analysis, presentation, counting techniques, probability and decision making.

**Course Outline:** Introduction to Statistics, Descriptive Statistics, Statistics in decision making, Graphical representation of Data Stem-and Lead plot, Box-Cox plots, measures of central tendencies and dispersion, moments of frequency distribution; Counting techniques, introduction to probability, sample space, events, laws of probability, Condit application to random variable (Discrete and continuous) Binomial, Poisson, Geometric, Negative Binomial Distributions; Exponential Gamma and Normal distributions. Regression and Correlation, Estimation and testing of hypotheses, use of elementary statistical packages for explanatory Data

analysis.

### Reference Material:

4. Ronald Walpole, Myers, Myers, Ye, — Scientistsll,edition,2008, **Prentice**8 **Hall** Publisher.
5. Lay L. Devore, Probability and Statistics for Engineering and the Sciences, 2003, Duxbury Publishers.
6. G. Cowan, *Statistical Data Analysis*, 1998, Clarendon, Oxford.

# Semester-4

### Course Name: Operating Systems

**Course Structure:** Lectures: 2, Labs: 1 **Credit**

**Hours: 3 Prerequisites:** None

**Objectives:** To help students gain a general understanding of the principles and concepts governing the functions of operating systems and acquaint students with the layered approach that makes design, implementation and operation of the complex OS possible.

**Course Outline:** History and Goals, Evolution of multi-user systems, Process and CPU management, Multithreading, Kernel and User Modes, Protection, Problems of cooperative processes, Synchronization, Deadlocks, Memory management and virtual memory, Relocation, External Fragmentation, Paging and Demand Paging, Secondary storage, Security and Protection, File systems, I/O systems, Introduction to distributed operating systems. Scheduling and dispatch, Introduction to concurrency.

Lab assignments involving different single and multithreaded OS algorithms.

### Reference Material:

3. *Applied Operating Systems Concepts,* 7th Edition, Silberschatz A., Peterson, J.L., & Galvin P.C. 2004.
4. *Modern Operating Systems,* 3rd Edition, Tanenmaum A.S., 2008.

### Course Name: Computer Architecture

**Course Structure:** Lectures: 2, Labs: 1 **Credit Hours: 3**

**Prerequisites:** Digital Logic and Design

**Objectives:** Get a deeper understanding of how computers work, working knowledge of various subsystems and the general principles that affect their

performance, analyze the performance of systems and quantify the performance measurements, fundamentals of all technologies, and advanced architectural features that boost the performance of computers.

**Course Outlines:** Fundamentals of Computer Design including performance measurements & quantitative principles, principles of Instruction Set Design, Operands, addressing modes and encoding, pipelining of Processors: Issues and Hurdles, exception handling features, Instruction-Level Parallelism and Dynamic handling of Exceptions, Memory Hierarchy Design, Cache Design, Performance Issues and improvements, Main Memory Performance Issues, Storage Systems, Multiprocessors and Thread Level Parallelism. Case Studies.

## Resources:

3. *Computer Architecture: A Quantitative Approach* by Hennessy & Patterson, Morgan & Kauffman Series (2006) Fourth Edition.
4. *Computer Organization & Design* : *The Hardware/Software Interface* By Patterson & Hennessy, Morgan & Kauffman Series (2008) Fourth Edition.

## Course Name: Software Engineering-I

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours: 3**

**Prerequisites:** Object Oriented Paradigm/Programming

**Objectives:** To study various software development models and phases of software development life cycle. The concepts of project management, change control, process management, software development and testing are introduced through hands-on Team Projects.

**Course Outline:** Introduction to Computer-based System Engineering; Project Management; Software Specification; Requirements Engineering, System Modelling; Requirements Specifications; Software Prototyping; Software Design: Architectural Design, Object-Oriented Design, UML modelling, Function-Oriented Design, User Interface Design; Quality Assurance; Processes & Configuration Management; Introduction to advanced issues: Reusability, Patterns; Assignments and projects on various stages and deliverables of SDLC.

## Reference Material:

3. *Software Engineering 8E by Sommerville Addison Wesley, 2006*
4. *Software Engineering: A Practitioner's Approach /7E,* Roger Pressman, McGraw-Hill, 2009

## Course Name: Computer Communication and Networks

**Course Structure:** Lectures: 2, Labs: 1 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** To introduce students to the concept of computer communication. Analogue & digital transmission. Network Layers, Network models (OSI, TCP/IP) and Protocol Standards. Emphasis is given on the understanding of modern network concepts.

**Course Outline:** Analogue and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission, Protocol design issues. Network system architectures (OSI, TCP/IP), Error Control, Flow Control, Data Link Protocols (HDLC, PPP). Local Area Networks and MAC Layer protocols (Ethernet, Token ring), Multiplexing, Switched and IP Networks, Inter-networking, Routing, Bridging, Transport layer protocols TCP/IP, UDP. Network security issues. Programming exercises, labs or projects involving implementation of protocols at different layers.

### Reference Material:

4. Introduction to Computer Networks /4, A. S. Tanenbaum, Prentice Hall 2003
5. Computer Networks and Internets, 5/E, 2008
   Douglas E. Comer, Purdue University ISBN-10: 0136061273 ISBN-13: 9780136061274 Publisher: Prentice Hall
6. Data and Computer Communications By William Stallings Published by Macmillan Pub. Co., 8th Edition 2006

## Course Name: Fundamental of Marketing

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** Students will be able to understand the evolution of marketing, environment, consumer behavior and market segmentation and be able to develop the capabilities regarding marketing approaches such as preparation of marketing research approach to set the proper marketing segments from niche level marketing to the international level of marketing.

### Course Outline:

Introduction, Marketing Process & Company Analysis, Competitor Analysis,

Customer Analysis: Individual & Aggregate, Customer Analysis, Segmentation, Targeting and Positioning, Product, Services and Branding Strategies, Pricing, Integrated Marketing Communication I, Integrated Marketing Communication II, Channels of Distribution,

## Reference Material:


6) Fundamentals of Marketing 10th Edition
7) By William J Stanton and Michael J Etzel , Mc Graw Hill Inc. 1994
8) Michael J. Baker,‖ th EditionTheMarketing—.2002B
9) Philip Koter & Armstrong ,‖EditPr**i**ncion th
10) Philip Kotler & Gary Armstrong, —PrinciplesEdition th


## Course Name: Multivariable Calculus

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** Calculus and Analytical Geometry

**Objectives:** The goals are to develop the skills to have ground knowledge of multivariate calculus and appreciation for their further computer science courses.

**Course Outline:** Functions of Several Variables and Partial Differentiation. Multiple Integrals, Line and ke‘sSurfaceTh

Fourier Series: periodic functions, Functions of any period P-2L, Even & odd functions, Half Range expansions, Fourier Transform. Laplace Transform, Z-Transform.

## Reference Material:


5. James Stewart, Multivariable Calculus, 6th edition, 2007, Cengage Learning publishers.
6. Swokowski, Olinick and Pence, *Calculus and Analytical Geometry*, 6th edition, 1994, Thomson Learning EMEA, Ltd.
7. Bernard Kolman, William F. Trench, Elementary Multivariable Calculus, 1971, Academic Press.
8. Howard Anton, Albert Herr, Multivariable Calculus, 5th edition, 1995, John Wiley.

# Semester-5

Course Name: **Web Engineering**

**Course Structure:** Lectures: 2 Lab:1 **Credit Hours:** 3

**Prerequisites:** Fundamentals of Information Technology (required)

## Objectives:

This course will extend the WWW Technologies and Web Based Applications architecture, development, deployment and management concepts studied in the course of Fundamentals of Information Technology. The instructor is expected to cover an in-depth treatment of the web technology and applications related topics including web standards, protocols, web applications architecture, web services, search engine architectures, content management, web2, and semantic web, to explore some of the technologies used for display, data access and processing, and to give the students practice in integrating these to produce a functional web-based system.

## Course Outline:

In-depth study of World Wide Web architectures, protocols and standards (HTTP, HTML, xHTML, CGI, XML, WML, cHTML, etc.), Web Technologies and Tools (such as scripting tools) for web application development and deployment (web servers, application servers, etc.), Web Based Applications including search engines and content management, management of large scale web based information systems, Web Services, Web2, Semantic Web, and Web3, principles of web site design, practical exercise in web site development.

## Suggested Text Books:

3. Nuckles, Craig, Web Applications: Concepts and Real World Design, Wiley 2006
4. Programming the World Wide Web (4th Edition) (Paperback), by Robert W. Sebesta (Author), Paperback: 752 pages, Publisher: Addison Wesley; 4th edition (August 17, 2007), ISBN-10: 0321489691

## Reference Material:

8. Gosselin, Dan, et. al., The Web Warrior Guide to Web Design Technologies, Cengage Learning, 2003
9. Zak, Diane, et. al., The Web Warrior Guide to Web Programming, Cengage Learning, 2003
10. Leasure, T., Bob Leasure and James Leasure, The Web Warrior Guide to Web Database Technologies, Cengage Learning, 2003
11. Morrison, Mike and Joline Morrison, Database Driven Websites, 2/e, Cengage Learning, 2002
12. Web Wizard series for various technologies, Addison-Wesley
13. Jackson, J. C., Web Technologies: A Computer Science Perspective, Pearson (LPE), 2008
14. Web Application Architecture: Principles, Protocols and Practices by

Leon Shklar and Richard Rosen (Paperback - Oct 31, 2008), Paperback: 420 pages, Publisher: Wiley; 2 edition (October 31, 2008), ISBN-10: 047051860X

Web Engineering: The Discipline of Systematic Development of Web Applications by Gerti Kappel, Birgit Prýýll, Siegfried Reich, and Werner Retschitzegger (Paperback - Jul 5, 2006)

## Course Name: Theory of Automata and Formal languages

**Course Structure:** Lectures: 3 Labs: 0 **Credit Hours:** 3

**Prerequisites:** Discrete Structures

**Objectives:** The course aims to develop an appreciation of the theoretical foundations of computer science through study of mathematical & abstract models of computers and the theory of formal languages. *Theory of formal languages* and use of various abstract machines as ⎓rec be studied for identifying/validating the synthetic characteristics of programming languages. Some of the abstract mach

**Course Outline:** *Finite State Models:* Language definitions preliminaries, Regular expressions/Regular languages, Finite automata (FAs), Transition graphs (TGs), NFAs, Kleene's theore

Pumping lemma and non regular language *Grammars and PDA:* Context free grammars, Derivations, derivation trees and ambiguity, Simplifying CFLs ,

Normal form grammars and parsing, grammars *Turing Machines Theory:* Turing machines, Post machine, Variations on TM, TM encoding, Universal Turing Machine, Context sensitive Grammars, Defining Computers by TMs.

## Text Books/Reference Books:


5. An Introduction to Formal Languages and Automata, By Peter Linz, 4th edition, Jones & Bartlett Publishers, 2006
6. Theory of Automata, Formal Languages and Computation, By S. P. Eugene, Kavier, 2005, New Age Publishers, ISBN (10): 81-224-2334-5, ISBN (13) : 978-81-224-2334-1.
7. John Hopcroft and Jeffrey Ullman, *Introduction to Automata Theory, Languages, and Computation*, 2nd edition, 2001, Addison-Wesley.
8. Introduction to Languages and the Theory of Computation, By John C. Martin3rd edition, 2002, McGraw-Hill Professional.

## Course Name: Differential Equations

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** Calculus and Analytical Geometry

**Objectives:** Develop fundamental skills of solving ordinary differential equations, and developing differential equations for real-world problems.

**Course Outline:** Ordinary Differential Equations of the First Order: Geometrical Considerations, Isoclines, Separable Equations, Equations Reducible to Separable Form, Exact Differential Equations, Integrating Factors, Linear First-Order Differential Equations, Variation of Parameters. Ordinary Linear Differential Equations; Homogeneous Linear Equations of the Second Order, Homogeneous Second-Order Equations with Constant Coefficients, General Solution, Real Roots, Complex Roots, Double Root of the Characteristic Equation, Differential Operators, Cauchy Equation, Homogeneous Linear Equations of Arbitrary Order, Homogeneous Linear Equations of Arbitrary Order with Constant Coefficients, Non-homogeneous Linear Equations. Modelling of Electrical Circuits. Systems of Differential Equations. Series Solutions of Differential Equations. Partial Differential Equations: Method of Separation of variables, wave, Heat & Laplace equations and their solutions by Fourier series method.

### Reference Material:


*6.* Michael Greenberg, *Advanced Engineering Mathematics, 1996*, Prentice Hall publishers.

*7.* Erwin Kreyzig, *Advanced Engineering Mathematics*, 7th edition, 1993, John Wiley & Sons Inc.

8. Zill, Prindle, Weber and Schmidt, *A First Course in Differential Equations,* 1996, Brooks/Cole Publishing,

9. Dennis G. Zill, Michael R. Cullen. *Differential Equations with Boundary-Value Problems*, 1996, Brooks/Cole Publishing,

*10.* C. H .Edwards, David E. Penney, *Elementary Differential Equations With Applications,* 1993, Prentice Hall.


## Course Name: Computer Organization and Assembly Language

**Course Structure:** Lectures: 2, Labs: 1 **Credit Hours: 3**

**Prerequisites:** Digital Logic Design

**Objectives:** The main objective of this course is to introduce the organization of computer systems and usage of assembly language for optimization and control. Emphasis should be given to expose the low-level logic employed for problem solving while using assembly language as a tool. At the end of the course the students should be capable of writing moderately complex assembly language subroutines and interfacing them to any high level language.

**Course Outline:** Microprocessor Bus Structure: Addressing, Data and Control,

Memory Organization and Structure (Segmented and Linear Models), Introduction to Registers and Flags, Data Movement, Arithmetic and Logic, Programme Control, Subroutines, Stack and its operation, Peripheral Control Interrupts, Interfacing with high level languages, Real-time application.

Objectives and Perspectives of Assembly Language, Addressing Modes, Introduction to the Assembler and Debugger, Manipulate and translate machine and assembly code, Describe actions inside the processing chip, Discuss operations performed by an instruction set, Write a fully documented program, Using an assembler of choice.

## Reference Material:

4. Stallings, "Computer Organization & Architecture", 7th ed, Prentice HALL, 2006.
5. Irvine, Assembly Language for Intel-based Computers, 5th ed, Prentice Hall, 2007.
6. Computer Organization and Design, The Hardware/Software Interface, 4th ed, by David A. Patterson and John L. Hennessy, 2008. Elsevier Publishers.

## Course Name: Financial Management

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3 **Prerequisites:** None

**Course Outline:** Introduction to Financial Management, Concepts and Models in Valuation, The time value of money, Fundamentals of risk and portfolio analysis, Valuation of stocks and bonds, The capital Asset Pricing Model, the Arbitrage Pricing Model and other valuation models. The Cost of Capital: Capital structure and Dividend Policy, The cost of capital, Capital structure theory, Capital structure policy and optimal capital structure, Internal financing and dividends policy Capital Budgeting: The basis of capital budgeting, The determination and use of cash flow, Mutually exclusive investments and capital rationing, Annual equivalent cost and replacement decisions, Risk analysis and the optimal capital budget, Islamic guidelines for financial management: The rational of prohibition of interest, Alternate capital structure, Capital Budgeting in an Interest free economy, working Capital Management in 100% equity capital structure.

**Reference Material:** *Financial Management* by Charles H. Gibson.

## Course Name: Sociology

**Course Structure:** Lectures: 3, Labs: 0 **Credit Hours: 3**

**Course Objectives**

This course will introduce students to the discipline of Sociology, its perspective, its basic concepts and principles, its methods of analysis and its major sub-fields. Through this introduction it is expected that students will begin to think in ways that take into account the social realm of thought, including the impact of social forces, social constraints, and social structure on an individual's thoughts and behaviours. The goals of the course are to encourage students to begin to think critically about the social world, to examine various life issues with a sociological lens, to 'problematize' social issues, and to spark the sociological imagination - "the ability to see the relationship between individual experiences and the larger society" (C. Wright Mills, 1959).

**Course Contents:** Nature, scope and subject matter of Sociology, Brief historical development of Sociology, Introduction to Quranic Sociology, Society and community, Relationship with other social Sciences, Social Interaction Processes The study of social life, Exploring the global village, Sociology as a science, The Sociological imagination, The development of Sociology, Sociology, Structure and function of social institutions, Inter-relationships among various social institutions, Elements of culture, Organization of culture, cultural relativism, sub cultures, ethnocentrism, Socialization and personality, Role and status, Socialization, Culture and personality

**Recommended Texts:**

1. Horton and Hungt, (2004), Sociology, 6th edition, McGraw Hill
2. Tischler, Hnry L, (2002), Introduction to Sociology, 7th edition Horcourt
3. Macionis, John J and Plummer, Ken, (2005), Sociology, A Global International, 3rd Edition, Prentice Hall.

**Reference Material:**

4. Kendall, Diana, (2001), Sociology in our times, 32nd Edition, Wadsworth.
5. James. M. Hensline, (1997), Sociology, Needhan Heigwb, Massachusetts, USA.
6. George J. Brgjar, Michael P. Soroke, (1997), Sociology, Needhan Heigwb, Massachusetts, USA.

# Semester-6

**Course Name: Software Engineering-II**

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** Data Structures, Software Engineering–I

**Objectives:** The students will study techniques for software verification, validation and testing. They would also study reliability and performance issues in software design and development.

**Course Outline:** Software verification and validation: Techniques are introduced to evaluate software correctness, efficiency, performance and reliability, integration of these techniques into a verification and validation plan. Technical reviews, software testing, programme verification, prototyping, and requirement tracing. Attitude of industry toward reliability and performance.

**Reference Material:**

*Software Engineering: A Practioner's Approach,* Roger Pressman, McGraw-Hill, 2001.

*Software Engineering,* Ian Sommerville, Addison-Wesley 2001,

**Course Name: Distributed Database Systems**

**Course Structure:** Lectures: 2/Labs: 1 **Credit Hours:** 3

**Prerequisites:** Introduction to Database Systems

**Objectives:**

Students will learn the usage of different design strategies for distributed databases, and will study query processing techniques as well as transaction management and concurrency control concepts used in such systems

**Course Outline:**

Introduction to Distributed Data Processing; Distributed DBMS Architecture; Distributed Database Design: Issues, Fragmentation and Allocation; Integrity Constraints, Distributed Query Processing; Query Decomposition and Data Localization; Query Optimization; Distributed Transaction Management and Concurrency Control; Distributed DBMS Reliability and Replication Techniques; Multidatabase Systems.

**Reference Material:**

5. M.T. Ozsu, P. Valduriez (eds.): Principles of Distributed Database Systems (2nd

Edition), Prentice Hall, 1999
6. P. Bernstein and E. Newcomer, Principles of Transaction Processing. Morgan Kaufmann, 1997
7. M. Buretta, Data Replication. Wiley, 1997
8. R. Elmasri and S. Navathe. Fundamentals of Database Systems, Benjamin/Cummings.

**Course Name: Computer Graphics**
**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Object Oriented Programming , Visual Programming

**Objectives:** Study of various algorithms in computer graphics and their implementation in any programming language.

**Course Outline:** Graphics hardware. Fundamental algorithms. Applications of graphics. Interactive graphics programming — graph plotting, windows and clipping, and segmentation. Programming raster display systems, Differential Line Algorithm, panning and zooming. Raster algorithms and software — Scan-Converting lines, characters and circles. Scaling, Rotation, Translation, Region filling and clipping. Two and three dimensional imaging geometry (Perspective projection and Orthogonal projection) and transformations. Curve and surface design, rendering, shading, colour and animation.

**Reference Material:**

3. Computer Graphics, Principles and Practice, J. D. Foley, A. van Dam, S. K. Feiner and J. F. Hughes, Addison-Wesley ISBN: 0-201-12110-7.
4. *Computer Graphics,* F.S.Hill, Maxwell MacMillan ISBN: 0-02-354860-6.
3. Interactive Computer Graphics: Functional, Procedural and Device-level methods; Peter Burger and Duncan. F. Gillies; Addison-Wesley, (2003)

**Course Name: Visual Programming**

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Data Structures, Data and Network Security

**Objectives:** To development applications using various tools and APIs in visual programming.

**Course Outline:** Introduction to Windows programming, Use of Windows API, MFC Class hierarchy, Class Wizard, Application Wizard and Application Studio, Graphics Device Interface, Menus, document view architecture, Multiple Views, files and archiving mechanisms, converting Windows programmes to MFC, Sub-classing controls.
**Reference Material:**

*MFC from the Ground Up.*

*Windows 98 API Programming.*

*VC++ A complete References.*

## Course Name: Design and Analysis of Algorithms

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** Discrete Structure, Data Structures and Algorithms

**Objectives:** Detailed study of the basic notions of the design of algorithms and the underlying data structures. Several measures of complexity are introduced. Emphasis on the structure, complexity, and efficiency of algorithms.

**Course Outline:** Introduction; Asymptotic notations; Recursion and recurrence relations; Divide-and-conquer approach; Sorting; Search trees; Heaps; Hashing; Greedy approach; Dynamic programming; Graph algorithms; Shortest paths; Network flow; Disjoint Sets; Polynomial and matrix calculations; String matching; NP complete problems; Approximation algorithms.

### Reference Material:

3. *Introduction to Algorithms /2E,* T. H. Cormen, C. E. Leiserson, and R. L. Rivest, MIT Press, McGraw-Hill, New York, NY, 2001.
4. Algorithms in C++; Robert Sedgewick

## Course Name: Human Resource Management

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:**
3 **Prerequisites:** None

**Course Outline:** An overview of Human Resource Management and Human

Resource Manager. The Environment of Human Resource Management, external and Internal Environment. Equal Employment Opportunity and Affirmative Action. Job Analysis: A Basic Human Resource Tool. Human Resource Planning, Recruitment, and Selection. Organization Change and Human Resource Development. Corporate Culture and Organization Development. Career Planning Development. Performance Appraisal.

**Reference Material:**

*Managing Human Resource* by Wayne F. Cascio.

# Semester-7

## Course Name: Human Computer Interaction

**Course Structure:** Lectures: 3, Labs:0 **Credit Hours: 3**

**Prerequisites:** Data Structures and Algorithms

**Objectives:** This course introduces the human issues of usability and its importance. It considers the implications of human understanding on the usability of computer systems and the importance of understanding the context of use. It describes guidelines for use of different media and interface styles. Topics include Usability Design principals, standards and models, evaluation techniques. Groupware, pervasive and ubiquitous applications.

**Course Outlines:** The Human, Computer and Interaction, Usability paradigm and principles, Introduction to design basics, HCI in software process, Design rules, prototyping, evaluation techniques, task analysis, Universal design and User support and Computer Supported Cooperative Work. Introduction to specialized topics such as Groupware, pervasive and ubiquitous applications.

### Resources:

3. Human-Computer Interaction, 3/E **Alan Dix**, *Computing Dept, Lancaster University* **Janet E. Finlay**, *Leeds Metropolitan University,* **Gregory D. Abowd**, *Georgia Institute of Technology,* **Russell Beale**, *University of Birmingham* ISBN-10: 0130461091 ISBN-13: 9780130461094 Publisher: Prentice Hall
4. Designing the User Interface: Strategies for Effective Human-Computer Interaction, 4/E **Ben Shneiderman**, *University of Maryland* **Catherine Plaisant**, *University of Maryland* ISBN-10: 0321197860 ISBN-13: 9780321197863 Publisher: Addison-Wesley

## Course Name: System Programming

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Operating Systems

**Objectives:** Demonstrate mastery of the internal operation of Unix system software including assemblers, loaders, macro-processors, interpreters, inter-process communication.

**Course Outline:** System Programming overview: Application Vs. System Programming, System Software, Operating System, Device Drivers, OS Calls. Window System Programming for Intel386 Architecture: 16 bit Vs 32 bit, Programming, 32 bit Flat memory model, Windows Architecture. Virtual Machine (VM)Basics, System Virtual Machine, Portable Executable Format, Ring O Computer, Linear Executable format, Virtual Device Driver (V + D), New Executable format, Module Management, COFF obj format 16 bit. (Unix) other 32-bit O.S Programming for I 386; Unix Binaryble format (ELF), Dynamic shared objects, Unix

Kernel Programming (Ring O), Unix Device Architecture (Character & Block Devices), Device Driver Development, Enhancing Unix Kernel.

## Reference Material:

3. *The UNIX Programming Environment,* B. Kernighan & R. Pike Prentice-Hall, 1984.
4. *System Software,* Leland L. Beck*,* Addison-Wesley Longmsan, 1990, ISBN: 0-201-50945-8.

## Course Name: Compiler Construction

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Theory of Automata and Formal Languages

**Objectives:** At the end of the course students should understand the overall structure of a compiler, and will know significant details of a number of important techniques commonly used. They will be aware of the way in which language features raise challenges for compiler builders.

**Course Outline:** Compiler techniques and methodology. Organization of compilers. Lexical and syntax analysis. Parsing techniques. Object code generation and optimization, detection and recovery from errors. Contrast between compilers and interpreters.

## Reference Material:

5. Compilers: Principles, Techniques, and Tools By Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Contributor Jeffrey D. Ullman ,Addison-Wesley Pub. Co., 2nd edition,1987 Original from the University of Michigan
6. Modern Compiler Design, By Dick Grune, Henri E. Bal, Ceriel J. H. Jacobs, Koen G. Langendoen, John Wiley, 2000.
7. Modern Compiler Implementation in C, By Andrew W. Appel, Maia Ginsburg, Contributor Maia Ginsburg, Cambridge University Press, 2004.
8. Modern Compiler Design by Dick Grune, Henri E. Bal, Ceriel J. H. Jacobs, Koen G. Langendoen, 2003, John Wiley & Sons.

## Course Name: Artificial Intelligence

**Course Structure:** Lectures: 2 / Labs: 1 **Credit Hours:** 3

**Prerequisites:** Data Structures

**Objectives:** This course focuses on the set of computational tools and techniques, which mimic the human decision-making process and capability.

**Course Outline:** Introduction to Common Lisp. AI classical systems: General Problem Solver, rules, simple search, means-ends analysis. ELIZA, pattern matching, rule based translators, OPS-5. Knowledge Representation: Natural language, rules, productions, predicate logic, semantic networks, frames, objects, scripts. Search: Depth first search, breadth first search, best first search, hill

climbing, min-max search, A* search. Symbolic Mathematics: student, solving algebra problems, translating English equations, solving algebraic equations, simplification rules, re-write rules, meta-rules, Macsyma, PRESS, ATLAS. Logic Programming: Resolution, unification, horn-clause logic, Prolog, Prolog programming. Sample case studies of shells and Knowledge Based Systems. A brief appreciation of state of the art computational techniques like neural networks, genetic algorithm, fuzzy sets.

## Reference Material:

1. Artificial Intelligence by Luger, 4th edition Pearson Education.

2. Russell and Norvig, Artificial Intelligence: A Modern Aproach, 2nd ed, Pearson Education.

## Course Name: Mobile and Wireless Networks

**Course Structure:** Lectures: 3 Labs: 0 **Credit Hours:** 3

**Course Description:** This course covers fundamental techniques in design and operation of first, second, and third generation wireless networks: cellular systems, medium access techniques, radio propagation models, error control techniques, handoff, power control, common air protocols (AMPS, IS-95, IS-136, GSM, GPRS, EDGE, WCDMA, cdma2000, etc), radio resource and network management. As an example for the third generation air interfaces, WCDMA is discussed in detail since it is expected to have a large impact on future wireless networks. This course is intended for graduate students who have some background on computer networks.

**Text Books/Reference Books:**

1. W. Stallings, —Wireless Communication 2002.
2. T.S. Rappaport, —Wireless Communication Second Edition, Prentice Hall, 2002.
3. J. Schiller, —Mobile Communications‖,
4. V.K. Garg,-95CDMA—IS and cdma 2000‖, Prentice
5. J.P. Castro, —The RadioUMTSAccessNetworkTechnology- Airand Interface
Techniques for Future Mobile Systems‖, Wil
6. H. Holma and A. Toskala, —WCDMA for U Generation Mobile Communications‖, John Wi

# Semester-8

## Course Name: Professional Practices

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

**Objectives:** A Computing graduate as professional has some responsibilities with respect to the society. This course develops student understanding about historical, social, economic, ethical, and professional issues related to the discipline of Computing. It identifies key sources for information and opinion about professionalism and ethics. Students analyze, evaluate, and assess ethical and professional computing case studies.

**Course Outline:** Introduction, Computing Ethics, Philosophy of Ethics, Ethics and the Internet. Intellectual Copy Right, Accountability and Auditing, Social Application of Ethics.

## Resources:

3. Deborah G. Johnson,Ethics‖,—ComputerPearson Ed edition.
4. *Professional Issues in Software Engineering*, M.F. Bott et. al.

## Course Name: Psychology

**Course Structure:** Lectures: 3 / Labs: 0 **Credit Hours:** 3

**Prerequisites:** None

### Objectives

- To develop understandingfthebreadthofdifferentapproaches to Psychology.
- To gain awareness of the principles study of psychological theories, concepts and research.
- To develop the ability to sychologyidentifyto e cultural, social and contemporary issues.
- To understand how to critically appr evidence.
- To be familiar with a range of resea

### Course Overview:

Psychology is —the studyior"and theofaim theofcoursemindisto a familiarize

students with a wide range of theories and research investigating human behavior. The course has been developed to be as interesting and challenging as possible. The objective is to explore how Psychology has contributed to an understanding of individual, social and cultural diversity.

In addition, a substantial portion of the course focuses on psychological testing and measuring learning outcomes.

## Required Text:

1. Santrock, J., Woloshyn, V., Gallagher, T., Di Petta, T., & Marini, Z. (2004). Educational Psychology (1st Canadian Edition). Toronto: McGraw Hill Ryerson.

2. Bernstein, D. A., Penner, L. A., Clarke-Stewart, A., & Roy, E. J. (2003). Psychology (6th ed.). Houghton Mifflin Company: Boston, MA.

3. Atkinson, R. et al. (1999) Hilgard's Introduction to Psychology. Harcourt Publishers Ltd. ISBN: 9780155068384

4. Malim, T. & Birch, A. (1998) Introductory Psychology

Palgrave ISBN: 9780333668528

5. Zimbardo, P., McDermott, M., Jansz, J. & Metaal, N. (1995). Psychology: A European Text. London: Harper Collins ISBN: 0004990021

6. Eysenck, M (Ed) (2008) Fundamentals of Psychology: ISBN: 1841693723

7. Eysenck, M (2005) Psychology: The Science of Mind and Behaviour. Hodder and Stoughton ISBN: 0340900989

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