University of Swat

Department of Computer and Software Technology

Minutes of Board of Studies Meeting

Vision

"Information Technology (IT) describes the convergence of Computer Science, Management, and Information System. IT emphasizes the management and performance of information technology planning development, implementation, operation, and development of infrastructure to support the process necessary to achieve organizational objectives".

Mission

"Collection, storage, processing, dissemination and use of information with computers not confining to hardware and software, but acknowledging the importance and the goals one sets for this technology. Applying information Technology to the scientific, technological and engineering disciplines and the management techniques used in information handling and associated social, economic and cultural matters".

Aims and Objectives

1. Bachelor of Information Technology program gives the students a strong knowledge base of programming, systems analysis and design, business telecommunication, and database management with concentration in a variety of areas.
2. Areas such as Web media, internet technology, security and information assurance area and few examples of the direction they can take within our program.
3. The aim of the Degree course in Information Technology is to produce graduates who have good grounding and a wide range of knowledge of Technology.
4. The information technology graduate's preparation will train them for work in the field of the companies that produce information system and computer network, and for companies, administrations, service and laboratories that use them.
5. Apply knowledge of computing and mathematics appropriate to the discipline.
6. Analyze a problem, and identify and define the computing requirements appropriate to its solution.
7. Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
8. Function effectively on teams to accomplish a common goal.
9. Understand the professional, ethical, legal, security and social issues and responsibilities.
10. Communicate effectively with a range of audiences.
11. Analyze the local and global impact of computing on individuals, organizations, and society.

12. Recognize the need for and an ability to engage in continuing professional development.
13. Use the current techniques, skills, and tools necessary for computing practice.
14. Use and apply the latest technical concepts and practices in the core information technologies.
15. Identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems.
16. Integrate IT-based solutions into the user environment.
17. Understand the best practices and standards and their application.
18. Assist in the creation of an effective project plan.

Program Outcomes

1. Demonstrate ability to understand and contribute to the scientific, mathematical, and theoretical foundations on which computer science and information technologies are built.
2. Explain and apply appropriate information technologies and employ appropriate methodologies to help an individual or organization achieve its goals and objectives.
3. Use and apply current and emerging technical concepts and practices in information technologies.
4. Demonstrate independent, critical thinking and problem-solving competencies by being able to analyze, identify and define the requirements that must be satisfied to address problems or opportunities faced by organizations or individuals.
5. Anticipate the importance of research by being aware of basic research artifacts such as the structure of a research paper, brainstorming.
6. Demonstrate practical hands-on expertise in selection, installation, customizing and maintenance of the state-of-the-art computing infrastructure.
7. Demonstrate understanding of the social and ethical concerns of the practice of Information Technology.
8. Demonstrate the ability to work cooperatively in teams.
9. Demonstrate effective communication skills.

Program Structure of BS Information Technology:
Followings are the distribution of total credit hours:

#	Category	Credit Hours
1	**Computing Courses**	
	Core	40
	Supporting Area	12
2	**Information Technology Courses**	
	Core	21
	Electives	21
	Supporting	15
3	General Education Courses	18
4	University Elective Courses	9
	Total Credits Hours	**136**

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Computing – Core Courses (40 Credits Hours)			
Required Computing Courses			
S.NO	**Pre-req**	**Course Name**	**Cr. Hrs**
01	-	Programming Fundamentals	4 (3+1)
02	1	Object Oriented Programming	4 (3+1)
03	1	Data Structures and Algorithms	3 (2+1)
04	-	Discrete Structures	3
05	3	Digital Logic Design	4 (3+1)
06	-	Operating Systems	4 (3+1)
07	2	Database Systems	4 (3+1)
08	-	Software Engineering	3
09	-	Communications and Computing Networks	3 (2+1)
10	-	Human Computer Interaction	3 (2+1)
11	-	Final Year Project	6 (0+6)

Computing Supporting Courses(SCC) (12 Credits Hours)			
S.NO	Pre-Req	Course Name	Cr. Hrs
12	-	Calculus and Analytical Geometry	3
13	-	Probability and Statistics	3
14	-	Linear Algebra	3
15	-	Physics I	3

Computing General Education (19 Credits Hours)			
S.NO	Pre-Req	Course Name	Cr. Hrs
16		English Composition and Comprehension (English I)	3
17		Communication Skills (English II)	3
18		Technical Report and Business Writing (English III)	3
19		Islamic Studies / Ethics	2
20		Pakistan Studies	2
21		Professional Practices	3
22		Information & Communication Technologies	3 (2+1)

IT – Core Courses (21 Credits Hours)

S.NO	Pre-Req	Course Name	Cr. Hrs
23	-	Web System and Technologies	3
24	-	Multimedia Systems and Design	3 (2+1)
25	6	System and Network Administration	3
26	-	Network Security	3 (3+0)
27	-	Cloud Computing	3
28	-	System Integration and Architecture	3
29	-	Technology Management	3

IT – Supporting Courses (9 Credits Hours)

S.NO	Pre-Req	Course Name	Cr. Hrs
30	-	IT Project Management	3
31	-	Database Administration & Management	3 (2+1)
32	-	Information System	3 (3+0)

Information Technology Elective Courses(ITE) (18 Credits Hours)
Not limited to the list below

S.No	Pre-req	Course Name	Cr. Hrs
33	-	Telecommunication Systems	3
34	-	Routing & Switching	3
35	-	Network Design and Management	3
36	-	Network Programming	3
37	-	Computer Game Development	3
38	-	Multimedia Technologies	3
39	-	3D Modeling & Animation	3
40	-	Mobile Computing	3
41	-	Software Agents Technology	3
42	-	E-Commerce Application Development	3
43	-	Distributed Computing	3
44	-	Mobile Application Development	3
45	-	We Engineering	3
46	-	Data Warehousing	3
47	-	Data Mining	3
48	-	Business Intelligence and Analytics	3
49	-	Distributed Database Systems	3
50	-	Enterprise Resource Planning Systems	3
51	-	Information Systems Auditing and Assurance	3
52	-	Business Process Management	3
53	-	Knowledge Management	3
54	-	Artificial Intelligence	3

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	IT University Electives (12 Credits Hours)		
S.NO	Pre-Req	Course Name	Cr. Hrs
55	-	Principals of Accounting	3
56	-	Financial Management	3
57	-	Human Resource Management	3
58	-	Organizational Behavior	3
59	-	Principles of Psychology	3
60	-	Principles of Philosophy	3
61	-	Foreign/Regional Language	3
62	-	Entrepreneurship	3
63	-	Advance Database Systems	
64	-	Network Management	
65	-	Software Project Management	
66	-	Discrete Structures	
67	-	Database Management System	

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Proposed Scheme of Study for BS (IT)

4-Year Program (8 Semesters) (136 Credit Hours)

Course Code	Semester 1 (18 Cr. Hrs.)	Cr. Hrs.
CCC-001	Programming Fundamentals (Comp. Core)	4 (3+1)
CSC-015	Physics (Comp. Supporting)	3
CSC-012	Calculus and Analytical Geometry (Comp Supporting)	3
CGE-022	Fundamentals of ICT (General Education)	3 (2+1)
CGE-016	English Composition and Comprehension	3
CGE-019	Islamic Studies/Ethics (Gen. Edu.)	2 (2+0)
		18

Course Code	Semester 2 (18 Cr. Hrs.)	Cr. Hrs.
CCC-002	Object Oriented Programming (Comp. Core)	3
CCC-005	Digital Logic Design (Comp. Core)	3 (2+1)
CCC-004	Discrete Structures (Comp. Core)	3
UEC-051	Principles of Accounting (Uni. Elective)	3
CGE-017	Communication Skills (English-II) (Gen. Edu.)	3
CSC-013	Probability and Statistics (Comm. Supporting)	3
		18

Course Code	Semester 3 (16 Cr. Hrs.)	Cr. Hrs.
CCC-003	Data Structures and Algorithms (Comp. Core)	4(3+1)
CCC-009	Computer Communication and Networks (Comp. Core)	3
ITS-032	Information Systems (IT–Supporting)	3
CGE-018	Technical and Report Writing (English-III) (Gen. Edu.)	3
CSC-014	Linear Algebra (Comp. Supporting)	3
		16

Course Code	Semester 4 (15 Cr. Hrs.)	Cr.Hrs.
UEC-056	Organizational Behaviour (Uni. Elective)	3
CCC-008	Software Engineering (Comp. Core)	3
CCC-007	Database Systems (Comp. Core)	4 (3+1)
ITC-024	Multimedia Systems and Design (IT Core)	3 (2+1)
CGE-020	Pakistan Studies (Gen.Edu.)	2 (2+0)
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	Semester 5 (15 Cr. Hrs.)	Cr. Hrs.
ITE-033	E-Commerce Application Development (IT Elective-I)	3
CCC-006	Operating Systems (Comp. Core)	3
ITS-031	DB Administration & Management (IT–Supporting)	3
ITC-023	Web Systems and Technologies (IT Core)	3
ITC-029	Technology Management (IT Core)	3
		15
	Semester 6 (18 Cr. Hrs.)	Cr. Hrs
CCC-010	Human Computer Interaction (Comp. Core)	3
ITS-025	Systems and Network Administration (IT Core)	3
ITE-034	IT Elective II	3
ITE-035	IT Elective–III	3
ITC-028	System Integration and Architecture (IT Core)	3
UEC-055	Principles of Psychology (Uni. Elective)	3
		18

Course Code	Semester 7 (15 Cr. Hrs.)	Cr. Hrs.
ITC-026	Data & Network Security (IT Core)	3
ITE-036	IT Elective IV	3
ITE-037	IT Elective V	3
ITC-027	Cloud Computing (IT Core)	3
ITS-030	IT Project Management (IT –Supporting)	3
		15

Course Code	Semester 8 (18 Cr. Hrs.)	Cr. Hrs.
CCC-011	Finale Year Project (Comp. Core)	6
CGE-021	Professional Practices (Gen. Edu.)	3(3+0)
ITE-038	IT Elective VI	3
ITE-64500	IT Elective VII	3
ITSIS-41700	Information Systems (IT–Supporting)	3
		18

BS Information Technology, BS (IT), COURSE CONTENTS

Computing Core Courses:
Course Name: **Programming Fundamentals**
Credit Hours: **4 3+1**
Prerequisites: **None**
Objectives: To enable the students to program and learn the basic programming concepts. Analyze and explain the behavior of simple programs involving the fundamental programming constructs.
Learning Outcome: Explain Computer Programming concepts

- Ability to design algorithmic solution to problems
- Ability to convert algorithms to Python programs
- Ability to design modular Python programs using functions
- Ability to design programs with Interactive Input and Output
- Ability to design programs utilizing arithmetic expressions
- Ability to design programs utilizing repetition
- Ability to design programs utilizing decision making
- Ability to design programs utilizing arrays
- Ability to design programs utilizing classes
- Understanding Software Engineering principles
- Ability to design programs using file Input and Output
- Ability to develop recursive solutions
- Ability to test and verifying programs
- Ability to develop simple search and sort algorithms

Course Outline:
This course covers overview of Computer Programming, Principles of Structured and Modular Programming, Overview of Structured Programming Languages, Algorithms and Problem Solving, Program Development: Analyzing Problem, Designing Algorithm/Solution, Testing Designed Solution, Translating Algorithms into Programs, Fundamental Programming Constructs, Data Types. Basics of Input and Output, Selection and Decision If, If -Else, Nested If- Else, Switch Statement and Condition Operator), Repetition While and For Loop, Do -While Loops), Break Statement,

Continue Statement, Control Structures, Functions, Arrays, Pointers, Records, Files Input-Output), Testing & Debugging.

Reference Materials:

1. C How to Program by Paul Deitel and Harvey Deitel, Prentice Hall; 7 edition (March 4, 2012). ISBN-10: 013299044X

2. Programming in C by Stephen G. Kochan, Addison-Wesley Professional; 4 edition (September 25, 2013). ISBN-10: 0321776410

3. Java How to Program by Paul Deitel and Harvey Deitel, Prentice Hall; 9th edition (March, 2011

4. C++ How to Program by Paul Deitel and Harvey Deitel, Prentice Hall; 9th edition (February, 2013)

Course Name: Object Oriented Programming

Credit Hours: 3

Prerequisites: Programming Fundamentals

Objectives: To prepare object-oriented design for small/medium scale problems and to demonstrate the differences between traditional imperative design and object oriented design.

Learning Outcome:

- Describe the principles of object-oriented programming

- Apply the concepts of data encapsulation, inheritance, and polymorphism to large-scale software

- Acquire the concepts of Graphical User Interfaces Professional Skill

- Design and develop object-oriented computer programs

- Design and develop programs with Graphical User Interfaces capabilities

- Formulate problems as steps so as to be solved systematically

- Integrate robustness, reusability, and portability into large-scale software development

- Develop software with team-work in mind

Course Outline:

Evolution of Object Oriented Programming OOP), Object Oriented concepts and principles, problem solving in Object Oriented paradigm, OOP design process, classes, functions/methods, objects and encapsulation; constructors and destructors, operator and function/method overloading, association, aggregation, composition, generalization, inheritance and its types, derived classes, function/method overriding, abstract and concrete classes, virtual functions, polymorphism, exception handling.

Reference Materials:

1. Java: How to Programme, Harvey M. Deitel and Paul J. Deitel, Prentice Hall; 8 edition (March 27, 2009). ISBN-10: 0136053068

2. C++: How to Programme, Prentice Hall; 8 edition March 25, 2011). ISBN - 10: 0132662361

3. Object Oriented Programming in C++ by Robert Lafore, Sams Publishing; 4 edition (December 29, 2001). ISBN-10: 0672323087

4. Java Programming: From the Ground Up by Ralph Bravaco and Shai Simonson, McGraw-Hill Higher Education New York, 2010, ISBN 978–0– 07–352335–4

5. Beginning Java by Ivor Horton, John Wiley & Sons, Inc, 7th Edition, 2011, ISBN: 978-0-470-40414-0

Course Name: Discrete Structures

Credit Hours: 3

Prerequisites: None

Objectives: To learn the application of formal logic proofs and/or informal, but rigorous, logical reasoning to real problems. Comprehend discrete structures and their relevance within the context of computer science.

Learning Outcome:

- Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers.
- Evaluate elementary mathematical arguments and identify fallacious reasoning (not just fallacious conclusions).
- Synthesize induction hypotheses and simple induction proofs.
- Prove elementary properties of modular arithmetic and explain their applications in Computer Science, for example, in cryptography and hashing algorithms.

Course Outline:

Mathematical reasoning: introduction to logic, propositional and predicate calculus; negation disjunction and conjunction; implication and equivalence; truth tables; predicates; quantifiers; natural deduction; rules of Inference; methods of proofs; use in program proving; resolution prin-ciple; Set theory: Paradoxes in set theory; inductive definition of sets and proof by induction; Relations, representation of relations by graphs; properties of relations, equivalence relations and partitions; Partial function theory; Elementary combinatorics; counting techniques; recurrence relation; generating functions. Graph Theory: elements of graph theory, Planar Graphs, Graph Colouring, Euler graph, Hamiltonian path, trees and their applications.

Reference Materials:

1. Discrete Mathematical Structure with Application to Computer Science, J. P. Temblay and B Manohar, McGraw-Hill, 2nd Edition.

Course Name: Data Structure and Algorithms
Credit Hours: 4 3+1
Prerequisites: Discrete Structures
Course Objectives: To Teach the students how to design algorithm and analyse the complexity
Learning Outcome:

- Able to understand the concepts of data structure, data type and array data structure.
- Able to analyze algorithms and determine their time complexity.
- Able to implement linked list data structure to solve various problems.
- Able to understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-programming language.
- Able to implement and know when to apply standard algorithms for searching and sorting.
- Able to effectively choose the data structure that efficiently model the information in a problem

Course Outline:

Introduction to Data Structures and Algorithms. Complexity Analysis. Arrays. Sorting Algorithms: Insertion Sort, Selection Sort, Bubble Sort, Shell Sort, Heap Sort, Quick Sort, Merge Sort, Radix Sort, Bucket Sort. Linked Lists: Singly Linked Lists, Doubly Linked Lists, Circular List. Stacks, Queues, and Priority Queue. Recursion: Function call and Recursion Implementation, Tail Recursion, Non-tail Recursion, Indirect Recursion, Nested Recursion, Backtracking. Trees: Binary Trees, Binary Heap, Binary Search. Tree Traversal, Insertion, Deletion, and Balancing a Tree. Heap. B-Tree, B+Tree, Spanning Tree, Splay Trees. Graphs: Representation, Treversal, Shortest Path, and Cycle Detection; Isomorphic Graphs. Graph Traversal Algorithms. Hashing. Memory Management and Garbage Collection.

Reference Materials:

1. Data Structures & Problem Solving Using Java by Mark Allen Weiss, Addison-Wesley, 4th Edition October 7, 2009). ISBN -10: 0321541405 or Latest Edition)
2. Algorithms, Robert Sedgewick, Princeton University Publisher: Addison-Wesley Professional latest Edition)
3. Data Structures: Abstraction and Design Using Java by Koffman and Wolfgang, Wiley; 2nd Edition (January 26, 2010). ISBN-10: 0470128704
4. Data Structures and Algorithms in C++ by Adam Drozdek, Course Technology; 4th Edition (August 27, 2012). ISBN-10: 1133608426
5. Data Structures Using C++ by D. S. Malik, Course Technology; 2nd Edition July 31, 2009). ISBN -10: 0324782012

6. Data Structures and Other Objects Using C++ by Michael Main and Walter Savitch, Prentice Hall; 4th Edition (March 6, 2010). ISBN-10: 0132129485

Course Name: Digital Logic and Design

Credit Hours: 3

Prerequisites: Basic Electronics

Course Objectives: To introduce the basic tools for design with combinational and sequential digital logic and state machines. To learn simple digital circuits in preparation for computer science.

Learning Outcome: Upon successful completion, students will be able to:

- Realize complex logic functions utilizing programmable logic.
- Design machines for the purpose of manipulating data streams.
- Design complex digital systems.

Course Outline:

Number Systems, Logic Gates, Boolean Algebra, Combination logic circuits and designs, Simplification Methods K-Maps, Quinne, Mc-Cluskey,, Flip Flops and Latches, Asynchronous and Synchronous circuits, Counters, Shift Registers, Shift Registers Counters, Triggered devices & its types. Binary Arithmetic and Arithmetic Circuits, Memory Elements, State Machines. Introduction Programmable Logic Devices CPLD, FPGA); Lab Assignments using tools such as Verilog HDL/VHDL, MultiSim, etc.

Reference Materials:

1. Digital Fundamentals by Thomas L. Floyd, Prentice Hall; 11th edition.

2. Fundamentals of Digital Logic with Verilog Design by Stephen Brown and Zvonko Vranesic, McGraw-Hill; 3rd Edition February 12, 2013). ISBN -10: 0073380547

3. Digital Fundamentals: A Systems Approach by Thomas L. Floyd, Prentice Hall; (July 13, 2012). ISBN-10: 0132933950

4. Digital Design, by M. Morris Mano, Michael D. Ciletti, 4th Edition, Prentice Hall (2007). ISBN-10: 0131989243

5. Fundamentals of Logic Design by Jr. Charles H. Roth and Larry L Kinney, CL Engineering; 6th Edition (March 13, 2009). ISBN-10: 0495471690

Course Name: Operating Systems

Credit Hours: 3*

Pre-requisites: None

Objectives:

- To introduce the basic tools for design with combinational and sequential digital logic and state machines.
- To learn simple digital circuits in preparation for computer science.
- High-level understand what is an operating system and the role it plays.
- A high-level understanding of the structure of operating systems, applications, and the relationship between them.

Learning Outcome:

- Able to understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
- Able to understand the difference between process & thread, issues of scheduling of user level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs.
- Able to understand the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.
- Able to understand the design and management concepts along with issues and challenges of main memory, virtual memory and file system.
- Able to Able to understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems.

Course Outline:

History and Goals, Evolution of operating systems. Operating System: Services, Structure, User Interface. Virtual Machines concept, System Boot, System Calls, Types of System Calls. Processes: Concept, Scheduling, Operations on Processes, Inter-process Communication. Threading: Multithreading Models, Thread Libraries, Threading Issues, processor scheduling; deadlock prevention, avoidance, and recovery; main-memory management; virtual memory management swapping, paging, segmentation and page-replacement algorithms); Disks management and other input/output devices; file-system structure and implementation; protection and security. Case studies: Linux/Windows Operating Systems.

*Lab assignments involving different single and multithreaded OS algorithms.

Reference Materials:

1.Operating System Concepts by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, Wiley; 9th edition December 17, 2012). ISBN -10: 1118063333

2.Operating Systems: Internals and Design Principles by William Stallings, Prentice Hall; 7 edition (March 10, 2011). ISBN-10: 013230998X

3. Applied Operating Systems Concepts by Silberschatz A., Peterson, J.L., & Galvin P.C. Wiley; 8th Edition 2011). ISBN -10: 1118112733

4. Modern Operating Systems by Tanenmaum A.S., Prentice Hall; 3rd Edition 2007). ISBN -13: 978-0136006633

Course Name: Database Systems

Credit Hours: 4 3+1

Prerequisites:Programming Fundamentals

Objectives: To understand several requirement and operations that the analyst needed to analyze, design, and implement the database systems thru DBMS.

Learning Outcome

- Able to master the basic concepts and understand the applications of database systems.
- Able to construct an Entity-Relationship (E-R) model from specifications and to perform the transformation of the conceptual model into corresponding logical data structures.
- Able to understand the basic database storage structures and access techniques.
- Able to distinguish between good and bad database design, apply data normalization principles, and be aware of the impact of data redundancy on database integrity and maintainability.
- Able to construct queries and maintain a simple database using SQL.
- Able to apply database transaction management and database recovery.

Course Outline:

Basic Database Concepts, Database Architecture, DB Design Life Cycle, Schema Architecture, Conceptual, Logical and Physical Database Modelling and Design, , Entity Relationship Diagram ERD, Enhanced ERD, Relational Data Model, Mapping ERD to Relational Model, Functional Dependencies and Normalization, Relational Algebra, Structured Query Language SQL), Transaction Processing, Concurrency Control And Recovery Techniques, Query Optimization Concepts.

Reference Materials:

1. Database Systems A Practical Approach to Design, Implementation, and Management, Thomas Connolly and Carolyn Begg, Prentice Hall; 7th edition (March 10, 2011)
2. Modern Database Management by Fred McFadden, Jeffrey Hoofer, Mary Prescott, Prentice Hall; 11th Edition (July 26, 2012). ISBN-10: 0132662256
3. Fundamentals of Database Systems by R. Elmasri and S. Navathe. 6th Edition, Addison-Wesley (2010). ISBN-10: 0136086209.
4. Database Design and Relational Theory: Normal Forms and All That Jazz by C. J. Date, O'Reilly Media; 1st Edition (April 24, 2012). ISBN-10: 1449328016.
5. Modern Database Management by Fred McFadden, Jeffrey Hoofer, Mary Prescott, Prentice Hall; 11th Edition (July 26, 2012). ISBN-10: 0132662256

Course Name: Intro. to Software Engineering

Credit Hours: 3

Prerequisites: Programming Fundamentals

Course Objectives: To learn the basic concepts, enable students to know about the fundamental construct of software and the activities evolve in the development of modular and effective software. To explain the major issues in contemporary software development and maintenance, as related to complex and critical software systems. Become more aware about the practices which typically apply in software development projects from cradle to grave. See software as a part of a larger system, and be aware of the principles of systems engineering as they are relevant to the engineering of software.

Learning Outcome

- Ability to gather and specify requirements of the software projects.
- Ability to analyze software requirements with existing tools
- Able to differentiate different testing methodologies
- Able to understand and apply the basic project management practices in real life projects
- Ability to work in a team as well as independently on software projects

Course Outline:

Overview of SE, Practice & Myths; the Software Processes, Generic Process Models: Framework Activity, Task Set, Process Patterns, Process Improvement, CMM. Prescriptive Process Models: Waterfall Model, Incremental Process Model, Evolutionary Process Model. Specialized Process Models: Component Based Development; The Formal Methods Models, Agile Development. Business Information Systems: Components; Types; and Evaluating methods. SDLC: Phases; System Planning; Preliminary Investigation, SWOT Analysis; the Importance of Strategic Planning; Evaluation of Systems Requests; Requirements Engineering. Difference between Structured Analysis and Object Oriented Analysis; Difference between FDD Diagrams & UML Diagrams; Data & Process Modelling. Diagrams: Data Flow, Context, Conventions, Detailed Level DFD's; the Design Process; Architecture Design Elements, Interface Design Elements, Component-Level Design Elements, Deployments Design Elements; System Architecture, Architectural Styles; User Interface Design; WebApps Interface Design; Software Quality Assurance. Validation Testing, System Testing. Internal and External View of Testing. Project Management. Risk Management; Maintenance and Reengineering.

Reference Materials:

1. Software Engineering 8E by Ian Sommerville, Addison Wesley; 8th Edition 2006). ISBN -10: 0321313798
2. Software Engineering: A Practitioner's Approach by Roger S. Pressman, McGraw-Hill Science/Engineering/Math; 7th Edition 2009. ISBN -10: 0073375977

Course Name: **Computer Communications and Networks**

Credit Hours: **3**

Prerequisites: None

Objectives: This Course introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks. It is based around the OSI Reference Model that deals with the major issues in the bottom three (Physical, Data Link and Network) layers of the model. Students are also introduced to the areas of Network Security and Mobile Communications. This module provides the student with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in the area.

Learning Outcome: Upon completion of this module, students will be able to:

- Have a good understanding of the OSI Reference Model and in particular have a good knowledge of Layers 1-3.
- Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies;
- Have a basic knowledge of the use of cryptography and network security;
- Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols;
- Have an understanding of the issues surrounding Mobile and Wireless Networks.
- Have a working knowledge of datagram and internet socket programming

Course Outline:

Data Communication concepts, Analogue and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission. Network system architectures OSI, TCP/I P), Error Control, Flow Control, Data Link Protocols, Bridging. Local Area Networks and MAC Layer protocols, Multiplexing, Switched and IP Networks, Inter-networking, Routing. Transport layer protocols TCP, UDP and SCTP. Application Layer Protocols. Wireless LANs. Lab exercises using tools such as Wireshark, OpNet, Packet tracer etc.

Reference Materials:

1. Data Communications and Networking, by Behrouz A. Forouzan, McGraw-Hill Science; 5th edition (February 17, 2012). ISBN-10: 0073376221
2. Data and Computer Communications by William Stallings, Prentice Hall; 9th Edition (August 13, 2010. ISBN -10: 0131392050
3.Computer Networks by Andrew S. Tanenbaum and David J. Wetherall, Prentice Hall; 5th Edition (October 7, 2010. ISBN -10: 0132126958
4.Computer Networks and Internets by Douglas E. Comer, Prentice Hall; 5th Edition (April 28, 2008). ISBN-10: 0136066984

Course Name: Human Computer Interaction

Credit Hours: 3

Prerequisites:None

Objectives:

- Design, implement and evaluate effective and usable graphical computer interfaces.
- Describe and apply core theories, models and methodologies from the field of HCI.
- Describe and discuss current research in the field of HCI.
- Implement simple graphical user interfaces using the Java Swing toolkit.
- Describe special considerations in designing user interfaces for older adults.

Learning Outcome: On completion of this course according to course goals, the student should be able to:

- Understand the basics of human and computational abilities and limitations.
- Understand basic theories, tools and techniques in HCI.
- Understand the fundamental aspects of designing and evaluating interfaces.
- Practice a variety of simple methods for evaluating the quality of a user interface.
- Apply appropriate HCI techniques to design systems that are usable by people.

Course Outline:

The human and the computer and their interaction, Human psychology and ergonomics, Interaction Paradigms, Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support, ,Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialog notations and design , Models of the system, Modeling rich interaction, Groupware, Ubiquitous computing and augmented realities

Reference Materials:

1.Human-Computer Interaction by Alan Dix, Janet E. Finlay, Gregory D. Abowd, Russell Beale, Prentice Hall; 3rd Edition December 20, 2003. ISBN-10: 0130461091
2.Human-Computer Interaction: Concepts And Design by J. Preece, Y. Rogers, H. Sharp, D. Benyon, S. Holland, T. Carey, Addison Wesley; 1st Edition (April 30, 1994). ISBN-10: 0201627698.
3.Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications by Julie A. Jacko, CRC Press; 3 Edition (May 4, 2012. ISBN -10: 1439829438
4.Interaction Design: Beyond Human - Computer Interaction by Yvonne Rogers, Helen Sharp, and Jenny Preece, Wiley; 3rd Edition June 15, 2011). ISBN-10: 0470665769
5.Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules by Jeff Johnson, Morgan Kaufmann; 1st Edition June 3, 2010). ISBN -10: 012375030X.

Computing Supporting Elective Courses

Course Name: Calculus and Analytical Geometry

Credit Hours: 3

Prerequisites:None

Objectives: To enable the students to think and use the applications of calculus and analytical geometry. Map other concepts with computer science perspectives.

Learning Outcome:

- Have knowledge related to the fundamentals of calculus and analytical geometry.
- Understand the differentiation integration and their applications.
- Apply the acquired knowledge to solve problems of practical nature.

Course Outline:

Real Numbers and the Real Line, Coordinates, Lines, and Increments, Functions, Shifting Graphs, Trigonometric Functions. Limits and Continuity: Rates of Change and Limits,

Rules for Finding Limits, Target Values and Formal Definitions of Limits, Extensions of the Limit Concept, Continuity, Tangent Lines. Derivatives: The Derivative of a Function, Differentiation Rules, Rates of Change, Derivatives of Trigonometric Functions, The Chain Rule, Implicit Differentiation and Rational Exponents. Applications of Derivatives. Integration: Indefinite Integrals, Integration by Substitution, Definite Integrals, Substitution in Definite Integrals. Numerical Integration. Applications of Integrals. Transcendental Functions: Inverse Functions and Their Derivatives, Natural Logarithms, The Exponential Function, ax and logax, Growth and Decay, L'Hôpital's Rule, Relative Rates of Growth, Inverse Trigonomic Functions, Derivatives of Inverse Trigonometric Functions; Hyperbolic Functions. Conic Sections, Parametrized Curves, and Polar Coordinates. Graphing in Polar Coordinates. Polar Equations for Conic Sections. Integration in Polar Coordinates. Vectors and Analytic Geometry in Space; Vectors in the Plane Dot Products; Vector-Valued Function Cartesian Rectangular) Coordinates and Vectors in Space. Dot Pr oducts; Cross Products. Lines and Planes in Space; Cylinders and Quadric Surfaces; Cylindrical and Spherical Coordinates.

Reference Materials:
1. Calculus and Analytic Geometry by George B. Thomas and Ross L. Finney, Addison Wesley; 10th Edition (1995) ISBN-10: 0201531747
2. Calculus and Analytical Geometry by Swokowski, Olinick and Pence, 6th Edition, 1994, Brooks/Cole Publishers.
3. Calculus by Howard Anton, Irl C. Bivens, Stephen Davis, Wiley; 10th Edition (2012, ISBN -10: 0470647728
4. Calculus with Analytic Geometry: Student Solution Manual by Howard Anton, Wiley; 5th Edition (1995). ISBN-10: 0471105899

Course Name: Probability and Statistics
Credit Hours: 3
Prerequisites: None
Objectives:
To enable the students to think and use the applications of calculus and analytical geometry. Map other concepts with computer science perspectives. To understand the fundamental concepts of statistics and probability. The role of probability in evaluation in computer science in related domain research.

Learning Outcome:
- Use statistical vocabulary.
- Construct various frequency distributions of grouped and ungrouped data.
- Calculate and interpret descriptive statistics of samples and populations. (Measures of central tendency, measures of dispersion.)
- Calculate simple probabilities.
- Find the mean and variance of a probability distribution including the binomial distribution.

- Understand and calculate expected values.
- Calculate the probabilities or scores of normal distributions and the normal approximation of the binomial distribution.
- Use the Central Limit Theorem to calculate the probabilities of the mean for any distribution.
- Formulate, calculate and interpret hypotheses test for one parameter and to compare two parameters, for both large and Small samples, Z and T for one two samples.

Course Outline:

Introduction to Statistics and Data Analysis, Statistical Inference, Samples, Populations, and the Role of Probability. Sampling Procedures. Discrete and Continuous Data. Statistical Modeling. Types of Statistical Studies.

Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule. Random Variables and Probability Distributions. Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem. Discrete Probability Distributions. Continuous Probability Distributions. Fundamental Sampling Distributions and Data Descriptions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem. Sampling Distribution of S2, t -Distribution, F-Quantile and Probability Plots. Single Sample & One- and Two-Sample Estimation Problems. Single Sample & One- and Two-Sample Tests of Hypotheses. The Use of P-Values for Decision Making in Testing Hypotheses Single Sample & One - and Two-Sample Tests), Linear Regression and Correlation. Least Squares and the Fitted Model, Multiple Linear Regression and Certain, Nonlinear Regression Models, Linear Regression Model Using Matrices, Properties of the Least Squares Estimators.

Reference Materials:

1. Probability and Statistics for Engineers and Scientists by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying E. Ye, Pearson; 9th Edition January 6, 2011). ISBN -10: 0321629116

2. Probability and Statistics for Engineers and Scientists by Anthony J. Hayter, Duxbury Press; 3rd Edition (February 3, 2006), ISBN-10: 0495107573

3. Schaum's Outline of Probability and Statistics, by John Schiller, R. Alu Srinivasan and Murray Spiegel, McGraw-Hill; 3rd Edition 2008). ISBN -10: 0071544259

4.Probability: A Very Short Introduction by John Haigh, Oxford University Press (2012). ISBN-10: 0199588481

Course Name: Linear Algebra

Credit Hours: 3

Prerequisites: Calculus and Analytical Geometry

University of Swat

Department of Computer and Software Technology

Objective: The objective of the course is to provide a rigorous approach towards the solutions of linear models which involves more than one variable. The techniques discussed in this course can be implemented on a wide range of applications from physical world. The matrix algebra will be helpful in performing and understanding of matrix computations on a machine. The eigenvalues, eigenvectors, inner product spaces, orthogonality are useful concepts for the analysis of dynamical systems

Learning Outcome: On successful completion of this course unit students will be able to

- solve systems of linear equations by using Gaussian elimination to reduce the augmented matrix to row echelon form or to reduced row echelon form;
- understand the basic ideas of vector algebra: linear dependence and independence and spanning;
- be able to apply the basic techniques of matrix algebra, including finding the inverse of an invertible matrix using Gauss-Jordan elimination;
- know how to find the row space, column space and null space of a matrix, and be familiar with the concepts of dimension of a subspace and the rank and nullity of a matrix, and to understand the relationship of these concepts to associated systems of linear equations;
- be able to find the eigenvalues and eigenvectors of a square matrix using the characteristic polynomial and will know how to diagonalize a matrix when this is possible;
- be able to recognize and invert orthogonal matrices;
- be able to orthogonally diagonalize symmetric matrices;
- be able to find the change-of-basis matrix with respect to two bases of a vector space;
- be familiar with the notion of a linear transformation and its matrix.

Course Outline:

Introduction to Vectors. Solving Linear Equations. Elimination Factorization. Vector Spaces and Subspaces. Orthogonality. DeTerminants. Eigenvalues and Eigenvectors. Linear Transformations. Linear Transformation, Applications of Matrices in Engineering. Graphs and Networks, Markov Matrices, Population, and Economics. Linear Programming. Fourier Series. Linear Algebra for Functions, Linear Algebra for Statistics and Probability, Computer Graphics. Numerical Linear Algebra. Complex Vectors and Matrices. Discrete Transforms and Simple Applications. Cosine Transform, The Discrete Fourier Transform. Simplification and Factorization of the DFT Matrix. Fast Fourier Transforms. The Discrete Time Fourier Transform. The Z-Transform.

Reference Materials:

1.Introduction to Linear Algebra by Gilbert Strang, Wellesley Cambridge Press; 4th Edition (February 10, 2009). ISBN-10: 0980232716

2.Linear Algebra: A Modern Introduction by David Poole by Brooks Cole; 3rd Edition (May 25, 2010).ISBN-10: 0538735457

3.Elementary Linear Algebra with Applications by Bernard Kolman, David Hill, 9th Edition, Prentice Hall PTR, 2007. ISBN-10: 0132296543

4.Strang's Linear Algebra And Its Applications by Gilbert Strang, Strang, Brett Coonley, Andy Bulman-Fleming, Andrew Bulman-Fleming, 4th Edition, Brooks/Cole, 2005

5.Elementary Linear Algebra: Applications Version by Howard Anton, Chris Rorres, 9th Edition, Wiley, 2005.

Course Name: Basic Electronics
Credit Hours: 3
Prerequisites: None
Course Objectives: The subject aims to provide the student with:

- An understanding of basic EE abstractions on which analysis and design of electrical and electronic circuits and systems are based, including lumped circuit, digital and operational amplifier abstractions.
- The capability to use abstractions to analyze and design simple electronic circuits.
- The ability to formulate and solve the differential equations describing time behavior of circuits containing energy storage elements.
- An understanding of how complex devices such as semiconductor diodes and field-effect transistors are modeled and how the models are used in the design and analysis of useful circuits.
- The capability to design and construct circuits, take measurements of circuit behavior and performance, compare with predicted circuit models and explain discrepancies.

Learning Outcomes: Students will:

- Learn how to develop and employ circuit models for elementary electronic components, e.g., resistors, sources, inductors, capacitors, diodes and transistors;
- Become adept at using various methods of circuit analysis, including simplified methods such as series-parallel reductions, voltage and current dividers, and the node method;
- Gain an intuitive understanding of the role of power flow and energy storage in electronic circuits;
- Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis;
- Learn how the primitives of Boolean algebra are used to describe the processing of binary signals and to use electronic components such as MOSFET's as building blocks in electronically implementing binary functions;
- Learn how the concept of noise margin is used to provide noise immunity in digital circuits;

- Be introduced to the concept of state in a dynamical physical system and learn how to analyze simple first and second order linear circuits containing memory elements;
- Be introduced to the concept of singularity functions and learn how to analyze simple circuits containing step and impulse sources;
- Be introduced to the concept of sinusoidal-steady-state (SSS) and to use impedance methods to analyze the SSS response of first and second-order systems;
- Learn how to calculate frequency response curves and to interpret the salient features in terms of poles and zeros of the system function;
- Gain insight into the behavior of a physical system driven near resonance, in particular the relationship to the transient response and the significance of the quality factor Q;
- Learn how operational amplifiers are modeled and analyzed, and to design Op-Amp circuits to perform operations such as integration, differentiation and filtering on electronic signals;
- Be introduced to the concepts of both positive and negative feedback in electronic circuits;
- Learn how negative feedback is used to stabilize the gain of an Op-Amp-based amplifier and how positive feedback can be used to design an oscillator;
- Acquire experience in building and trouble-shouting simple electronic analog and digital circuits

Course Outline:

Zero Reference Level, Ohm's Law, Linear & Non-Linear Resistors, Cells in Series and Parallel. Resistive Circuits. Resistors, Inductors, Capacitors, Energy Sources. Magnetism and Electromagnetism; Theory of Solid State; P-N Junction; Forward Biased P-N Junction; Forward V/I Characteristics; Reverse Biased P-N Junction; Reverse Saturation Current; Reverse V/I Characteristics, Junction Breakdown, Junction Capacitance. Opto-electronics Devices; Spectral Response of Human Eye; Light Emitting Diode LED; Photoemission Devices, Photomultiplier Tube, Photovoltaic Devices, Bulk Type Photoconductive Cells, Photodiodes, P- N Junction Photodiode, PIN Photodiode, and Avalanche Photodiode; DC Power Supplies; Rectifiers. Filters, Voltage Multipliers, Silicon Controlled Rectifier SCR; The Basic Transistor; Transistor Biasing, Transistor Circuit Configuration; Modulation and Demodulation; Carrier Waves; Integrated Circuits.

Reference Materials:

1.Basic Electronics Solid State by B. L. Theraja, S Chand & Co Ltd, 5th Edition, 2007, ISBN-13: 978-8121925563

2.Electronic Principles by Albert Paul Malvino, 6th Edition, 1999, ISBN 0-07-115604-6

University of Swat
Department of Computer and Software Technology

Contents of General Education Elective Courses

Course Name: **Functional English English-I**
Credit Hours: **3**
Prerequisites: None
Objectives: The student should be able to know about the composition process.
Learning Outcome:
- Practice correct English in speaking and writing.
- Comply even complex English language texts.
- Exhibit sound vocabulary and skills to use English in professional life.
- Avoid common errors usually made by the learners of English as second language.

Course Outline:

Punctuation Principles. Spelling Rules. Writing Mechanics. Frequently Confused Words. Frequently Misused Words, Phrases, Synonyms, Antonyms, Idioms. General Vocabulary. Use of Articles and One, A Little/ A Few, This, That, Care, Like, Love, Hate, Prefer, Wish, All, Each, Every, Both, Neither, Either, Some, Any, No, None, etc. Interrogatives. Kins of Nouns. Prepositions. Possessive, Personal, Reflexive, and Relative Pronouns and Clauses. Classes of Verbs. Usage of May, Can, Ought, Should, Must, Have To, Need for Obligation, Must, Have, Will and Should. The Auxiliaries Dare and Used. The Gerund & The Participles. Commands, Requests, Invitations, Advice, Suggestions. The Subjunctive. The Passive Voice. Indirect Speech. Conjunctions. Purpose. Clauses: Noun Clauses; Clauses of Reason, Result, Concession, Comparison, Time. Numerals, Dates, Weights and Measures. Phrasal Verbs. Irregular Verbs. Overview of Present, Past, Future and Perfect Tenses.

Reference Materials:

1. A Practical English Grammar by A. J. Thomson and A. V. Martinent,4th Edition Oxford University Press (1986).
2. Basic English Usage by Michael Swan, Oxford Univ Pr (Sd) (January 1986). ISBN-10: 0194311872
3. Functional English In Aglobal Society: Vocabulary Building and Communicative Grammar by Nicanor L. Guintomary Ann R. Sibal Brian D. Villaverde Dept. of Languages, Literature and Humanities College of Arts and Sciences Southern Luzon State University (2012)
4. English Composition and Grammar: Complete Course by John E. Warriner, Harcourt Brace Jovanovich; Complete Course Benchmark Edition (January 1988). ISBN-10: 0153117362
5. Companion to English: Vocabulary (Learners Companion) by George Davidson, Prim-Ed Publishing (March 1, 2003). ISBN-10: 9814070904

Course Name: Communication Skills E nglish II

Credit Hours: 3

Prerequisites: None

Objectives: At the end of the course the student should be able to know about the composition process, grammer and punction use, and the way how to communicate.

Learning Outcome:

- Display intermediates to advanced level English language skills extending from the Freshman English I course.
- Express an enhanced ability in the general verbal and non-verbal English language Communication Skills which can support real life Electronic Engineering settings requiring team work and leadership skills.
- Practice basic research and writing skills associated to research work, to help them in writing research papers for the contemporary Engineering courses.
- Exhibit such supporting language techniques and personality grooming which cater to the requirements of the corporate sector.

Course Outline:

What is Communication, The Importance of Communication, Communication Skills. The Communication Process. Perspectives in Communication. Factors Affecting Communication Perspective. Language as a Representational System. Internal Representation of Our World: Visual, Auditory & inaesthetic Representational System. Elements of Communication. Communication Styles. Listening: Self-Awareness, Pseudo Listening, Active Listening, Effective Listening, Total Listing. Types of Expression. Rules of Effective Expression. Body Language. Para-language and Meta-messages. Hidden Agendas. Language Models. Communication Styles. Assertiveness. Responding to Criticism. Making Contact. The Art of Conversation. Negotiations. Prejudgment. The Power of Validation. Validation Strategies. Influencing Others. Public Speaking. Preparing Formal Oral Presentations: Design elements, elements of effective Delivery, Tension & Nerves, Handle Questions, Handling Tough Situations, Common Mistakes & Their Remedies, Dealing with Unexpected Disasters, Presentation for International Audience, Dealing People with Disabilities. Interviewing. Elements of Effective Written Communication. Building Rapports.

Reference Materials:

1. Effective Communication Skills, MTD Training & Ventus Publishing ApS. 2010) ISBN 978 -87-7681-598-1 (TB1)

2. Messages: The Communication Skills Book by Matthew McKay PhD, Martha Davis PhD, and Patrick Fanning, New Harbinger Publications; 3rd Edition (March 3, 2009). ISBN-10: 1572245921

3. Secrets of Successful Presenters: A Guide for Successful Presenters by Dr. M. A. Pasha & Dr. S. Pasha, Lambert Academic Publishing 2012. ISBN-10:3659217557

4. Communication Skills in English by Prof P N Kharu, Dr Varinder Gandhi Publisher: Laxmi. EAN: 9788131806920

5. Essential Communication Skills, Teacher Edition with Talking Points by Patty Ann, Patty Ann; 1st Edition (July 5, 2012). ASIN: B008HYUDWQ

Course Name: Technical and Report Writing English III

Credit Hours: 3

Prerequisites: None

Objectives: To enable students with technical writings, writings in business. The reports, applications, leaflets, broachers', handbooks, research papers, manuals feasibility reports and documentation is the main objectives of the course.

Learning outcome:

- Demonstrate paragraph unity, support, and coherence
- Use transitions for clarity of thought and readability
- Construct all sentence types
- Recognize and correct major grammatical errors
- Edit their writing assignments
- Give constructive peer feedback
- Use the computer for assignment submissions

Course Outline:

Characteristics of Academic, Public, Work and Electronic Communities. Myths and Realities about Writing. Effective Writing: Discovering and Planning; Purpose, Thesis, and Audience; Drafting: Drafting Collaboratively, Drafting in Digital Environments; Revising, Editing, and Proofreading. Paragraphs: Unfocused Paragraphs, Incoherent Paragraphs, Poorly Developed Paragraphs, Special-Purpose Paragraphs. Unclear, Clear and Emphatic Sentences. Reasoning Critically. Reading Critically. Arguing Persuasively & Logically. Designing Documents. Writing in Online Communities. Speaking Effectively. Academic Writing for Social and Natural Sciences: Goals of Writing, Audiences, Writing Tasks, Types of Writing: Abstract, Informative Report, Lab Report, Research Report, Project Reports Public Writing: Goals of Public Writing, Public Audiences, Public Writing Tasks, Types of Public Writing, Public Flyer, Letter to the Editor. Researching and Writing: Types of Research Writing, Developing a Research Question, Developing a Preliminary Thesis, Creating a Research File and a Timeline, Reading and Note taking, Summarizing, Paraphrasing, and Synthesizing. Writing a Position Paper.

Reference Materials:

1. Writer's Companion – The Longman by Chris M. Anson, Robert A. Schwegler and Marcia F. Muth, Pearson Longman, 4th Edition 2007. ISBN10: 0-20556-252-3

2. Technical English: Writing, Reading, and Speaking by Pickett and Laster. 8th Edition

3. The Technical Writer's Companion by Alred, Gerald, Charles T. Brusaw and Walter E.Oliu, 3rd Edition. ISBN 0-312-25978-6.

ISLAMIC STUDIES Compulsory

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.

Learning Outcome: The students are able:

- To know about the basics of the religion of Islam.
- To know about the personal words of Allah Taa'la.
- To clear their minds about the sources of Shariah.
- To awake the students about their political, social, cultural economic and religious.
- They are able to understand the legal political, economic, social, moral and spiritual aspects of Islam and to implement in their daily lives

Detail of Courses:

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 FaithVerse 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 IhkamVerse 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 Muhammad, "Emergence of Islam" , IRI, Islamabad

2) Hameed ullah Muhammad, "Muslim Conduct of State"

3) Hameed ullah Muhammad, 'Introduction to Islam

4) Mulana Muhammad Yousaf Islahi,"

5) Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law" leaf Publication Islamabad, Pakistan.

6) Ahmad Hasan, "Principles of Islamic Jurisprudence" Islamic Research Institute, International Islamic University, Islamabad (1993)

7) Mir Waliullah, "Muslim Jurisprudence and the Quranic Law of Crimes" Islamic Book Service (1982)

8) H.S. Bhatia, "Studies in Islamic Law, Religion and Society" Deep & Deep Publications New Delhi (1989)

9) Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia" Allama Iqbal Open University, Islamabad (2001)

Pakistan Studies Compulsory

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.

Learning Outcome:

- Ability to know historical perspective, politics, contemporary Pakistan and ideological background of Pakistan
- Understanding about process of governance, national development, issues arising in 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-e-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

Recommended Books:

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

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

3. S.M. Burke and Lawrence Ziring. Pakistan's Foreign policy: An Historical analysis. Karachi: Oxford University Press, 1993.

4. Mehmood, Safdar. Pakistan Political Roots & Development. Lahore, 1994.

5. Wilcox, Wayne.The Emergence of Bangladesh., Washington: American Enterprise, Institute of Public Policy Research, 1972.

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

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

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

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

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

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

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

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

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

Course Name: Professional Practices

Credit Hours: 2

Prerequisites:None

Objectives: To learn the professional approach of software development using latest technologies, security and copyright issues etc. The role of ethics in software development.

Learning Outcome: At the completion of this course, students will be able to:

- Work proficiently and effectively in small teams;
- Understand the need for lifelong learning for continuous professional development;
- Present technical material in an interesting manner for a non-technical audience;
- Explain in basic terms the ethical responsibilities of professional engineers and apply this knowledge in simple scenarios.

Course Outline:

Computing Profession, Computing Ethics, Philosophy of Ethics. The Structure of Organizations, Finance and Accounting, Anatomy of a Software House, Computer Contracts, Intellectual Property Rights, The Framework of Employee Relations Law and Changing Management Practices, Human Resource Management and IT, Health and Safety at Work, Software Liability, Liability and Practice, Computer Misuse and the Criminal Law, Regulation and Control of Personal Information. Overview of the British Computer Society Code of Conduct, IEEE Code of Ethics, ACM Code of Ethics and Professional Conduct, ACM/IEEE Software Engineering Code of Ethics and Professional Practice. Accountability and Auditing, Social Application of Ethics.

Reference Materials:

1. Professional Issues in Software Engineering by Frank Bott, Allison Coleman, Jack Eaton and Diane Rowland, CRC Press; 3rd Edition 2000). ISBN-10: 0748409513
2. Computer Ethics by Deborah G. Johnson, Pearson; 4th Edition January 3, 2009). ISBN-10: 0131112414
3.A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet 3 rd Edition) by Sara Baase, Prentice Hall; 3rd Edition 2008). ISBN-10: 0136008488
4.Applied Professional Ethics by Gregory R. Beabout, University Press of America 1993). ISBN -10: 0819193747.
5.The Dark Side of Software Engineering: Evil on Computing Projects by Johann Rost and Robert L. Glass, Wiley-IEEE Computer Society Pr; 1st Edition (2011. ISBN -10: 0470597178

University of Swat
Department of Computer and Software Technology

University Elective Courses
Course Name: Principles of Accounting
Credit Hours: 3
Prerequisites: None
Objectives: This is a basic course in financial accounting that covers the fundamental concepts and techniques of introductory accounting. Its focus includes a study of balance sheet accounting and the preparation and analysis of financial statements.

- To gain an understanding of basic accounting and the relation between GAAP and financial accounting concepts (the Conceptual Framework)
- To develop basic skills using financial accounting information, which include the accounting model and procedures used by businesses to provide financial information
- To learn the principles of accounting control, theft prevention, and safeguarding of assets
- To prepare students for careers in business and for upper-level accounting and management courses, including development of problem-solving abilities as well as oral and written communication skills

Learning Outcome:

- Apply basic computational techniques to solve quantitative financial accounting problems.
- Draw from financial information to construct a debit/credit transaction in good form
- Demonstrate knowledge of the business accounting cycle for the corporate form of business
- Identify and describe terms associated with financial accounting
- Prepare and interpret a multiple-step income statement, retained earnings statement, and classified balance sheet for a merchandising firm organized as a corporation
- Demonstrate knowledge of accounting for short-term liquid assets, long-term assets, current liabilities, long term liabilities and stock holders' equity.

Course Outline:
Introduction to Accounting, Accounting Principles, Book Keeping, Basics of Financial Statements, Adjustments to Financial Statements, The Cash Book, Bank Reconciliation, Control Accounts, Statement of Cash Flows, Financial Activities, Property, Plant and Equipment PPE), Accounting Errors, Accounting for Partnerships, Balance Sheet.

Reference Materials:
1. Fundamentals of Accounting by Wang'ombe, D. K., Focus Publishers 2008). ISBN 10: 9966-01-087-4

2.Fundamental Accounting Principles with Connect Plus by John Wild, Ken Shaw, and Barbara Chiappetta, McGraw-Hill/Irwin; 20th Edition December 27, 2010). ISBN-10: 0077505980

3.Financial & Managerial Accounting by Jan Williams, Sue Haka, Mark Bettner and Joseph Carcello, McGraw-Hill/Irwin; 16th Edition 2011). ISBN - 10: 0078111048

4.Principles of Managerial Finance by Lawrence J. Gitman and Chad J. Zutter, Prentice Hall; 13th Edition (2011). ISBN-10: 0136119468

5.Fundamentals of Financial Management by J. Van Horne and John M Wachowicz, Prentice Hall; 13th Edition (2008). ISBN-10: 0273713639.

Course Name: Principles of Management

Credit Hours: 3

Prerequisites:None

Objectives:

- Relate, discusses, understand, and present management principles, processes and procedures in consideration of their effort on individual actions.
- Participate, summarize and/or lead class discussions, case problems and situations from both the text and student experience that relate to the text material.
- Knowledge and understanding of the Principles of Management will enable the student manager and/ or employee and gain valuable insight into the workings of business and other organizations.

Learning Outcome:

- At the completion of the course requirements, the student will be able to:
- Define the concept of management and discuss why organizations are needed, why managers are necessary, and why management is a challenge.
- Describe the communications process; discuss barriers to communication and suggest remedies to overcome communications difficulties.
- Explain why planning is needed in organizations and why long-term objectives are necessary for successful planning.
- Identify and differentiate between the various tools and processes used in planning; compare the advantages and disadvantages of the participatory approach to planning.
- Identify the essential characteristics of decision making and indicate the range and types of decisions a manager is asked to make.
- Differentiate between the various types of organizational structures and patterns.
- Explain the importance of delegation in organizations and describe the relationship between authority, responsibility and accountability.
- Describe the characteristics of the informal organization and discuss the role it plays in a company.

- Discuss the relationship between the organizational structure and human resource planning and staffing.
- Discuss the importance of employee training and development and suggest major benefits that can be derived from effective training programs.
- Analyze the leadership function, recognizing leadership as the relationship between a supervisor and subordinates in an organizational environment.
- Recognize the symptoms of organizational conflict, describe its sources, and discuss the manager's role in conflict management.
- Recognize the link between planning and controlling, and the various means by which managers measure and compare performance to objectives.

Learning Outcome:

Introduction to Managers and Management, Organizational Culture and Environment, Decision Making, The Essence of Manager's Job, Planning, Organization Structure and Design, Motivation, Leadership, Communication, Controlling. The Personnel Function, Job Design and Analysis, Human Resource Planning, Recruitment and Selections/Testing and Interview. Union and Management, Compensation Administration, Health and Safety.

Reference Materials:

1. Management by Robbins, S.P. & Coulter, Mary, Prentice Hall; 10th Edition November 3, 2008). ISBN -10: 0132090716
2. Fundamentals of Management by Robbins, S.P. & DeCenzo, David A, Prentice Hall; 7th Edition (January 13, 2010). ISBN-13: 978-0132090711
3. Principles of Management by Charles W. L. Hill and Steven McShane, McGraw-Hill/Irwin; 1st Edition (2006). ISBN-10: 0073530123
4. Management by Richard L. Daft, South-Western College Pub; 10th Edition January 27, 2011). ISBN -10: 0538479531
5. Fundamentals of Management by Stephen P. Robbins, David A. DeCenzo and Mary Coulter, Prentice Hall; 7th Edition January 13, 2010). ISBN -10: 0136109829.

Course Name: Human Resources Management

Credit Hours: 3

Prerequisites: None

Objectives: After successfully completing this program, you should be able to:

- Effectively manage and plan key human resource functions within organizations
- Examine current issues, trends, practices, and processes in HRM
- Contribute to employee performance management and organizational effectiveness
- Problem-solve human resource challenges
- Develop employability skills for the Pakistanis workplace

- Develop effective written and oral communication skills

Learning Outcome:

- Produce effective written communication in business area.
- Demonstrate effective oral communication in business area.
- Recommend strategy utilizing critical thinking skills in business area.
- Recognize and resolve HR ethical issues.
- Apply knowledge of HR topics.

Course Outline:

Managing Human Resources. Understanding the External and Organizational Environments. Ensuring Fair Treatment and Legal Compliance. HR Planning for Alignment and Change. Using Job Analysis and Competency Modeling. Recruiting and Retaining Qualified Employees. Selecting Employees to Fit the Job and the Organization. Training and Developing a Competitive Workforce. Conducting Performance Management. Developing an Approach to Total Compensation. Using Performance-Based Pay to Achieve Strategic Objectives. Providing Benefits and Services for Employees' Well -Being, Risk Management. Employee Relations. Risk Management. Health, Safety, and Employee Well-Being. Understanding Unionization and Collective Bargaining.

Reference Materials:

1.Managing Human Resources by Susan E. Jackson, Randall S. Schuler and Steve Werner, South-Western College Pub; 11th Edition June 16, 2011).ISBN-10: 1111580227
2.Management of Human Resources by Gary Dessler, Carolin Rekar Munro and Nina D. Cole, Pearson Education Canada; 3rd Edition February 28, 2010). ISBN-10: 0321687140
3. Human Resource Management by Robert L. Mathis and John H. Jackson, South-Western Cengage Learning; 13th Edition August 19, 2010). ISBN - 10: 053845315X
4.Human Resource Management Applications: Cases, Exercises, Incidents, and Skill Builders by Stella M. Nkomo, Myron D. Fottler and R. Bruce McAfee, South-Western Cengage Learning; 7th Edition September 29, 2010. ISBN -10: 0538468076

Course Name: Organizational Behaviour

Credit Hours: 3

Prerequisites:None

Objectives:

- To gain a solid understanding of human behavior in the workplace from an individual, group, and organizational perspective.
- To obtain frameworks and tools to effectively analyze and approach various organizational situations.
- To integrate course materials with your own workplace experiences.
- To reflect upon your own beliefs, assumptions, and behaviors with respect to how individuals, groups, and organizations act in order to expand your options of approaches and increase your own effectiveness.

Learning Outcome: At the completion of this paper students should be able to:

- Analyse the behaviour of individuals and groups in organisations in terms of the key factors that influence organisational behaviour.
- Assess the potential effects of organisational-level factors (such as structure, culture and change) on organisational behaviour.
- Critically evaluate the potential effects of important developments in the external environment (such as globalisation and advances in technology) on organisational behaviour.
- Analyse organisational behavioural issues in the context of organizational behaviour theories, models and concepts.

Course Outline:

Introduction to OB. People-Centered Organizations and Ethical Conduct. Organizational Culture. Socialization. Mentoring. Key Individual Differences. Values. Attitudes. Job Satisfaction and Counterproductive Work Behaviors. Social Perceptions and Attributions. Foundations of Motivation. Improving Job Performance with Goals, Feedback, Rewards, and Positive Reinforcement. Group Dynamics. Developing and Leading Effective Teams. Individual and Group Decision Making. Managing Conflict and Negotiating. Communicating in the Digital Age. Leadership, Influence, Empowerment, and Politics. Organizational Design, Effectiveness, and Innovation.

Reference Materials:

1.Organizational Behavior by Robert Kreitner and Angelo Kinicki, McGraw-Hill/Irwin; 10th Edition (January 17, 2012. ISBN -10: 0078029368

2.Organizational Behavior by Stephen P. Robbins and Timothy A. Judge, Prentice Hall; 15th Edition January 16, 2012). ISBN -10: 0132834871

3.Meeting the Ethical Challenges of Leadership: Casting Light or Shadow by Craig E. Johnson, SAGE Publications, Inc; 4th Edition (February 28, 2011). ISBN-10: 1412982227

Course Name: Principles of Philosophy

Credit Hours: 3

Prerequisites: None

Objectives: Students will obtain knowledge of the main philosophical terms and categories and the ways of philosophical thinking for better interpretation of recognized reality.

Learning Outcome:

- Be able to read philosophy; that is, to identify the thesis of a piece of philosophical writing and the arguments or evidence adduced in support of that thesis.
- Be able to write philosophy; that is, to present a claim in clear terms and to defend it in a logically coherent manner.
- Be able to reconstruct and debate some foundational issues in the Western philosophical tradition.

Course Outline:

The Nature of Philosophy, Philosophical Theories: History and Back Ground, Realism and Idealism, Monism and Dualism, Rationalism, Empiricism, Criticism, and Empiricism, The Start of Modern Philosophy, Perception and Reality, Knowledge, Belief and Logic. Space, Time, Causality and Substance, Mind & Body. Knowledge, Language. Science, Morality, Politics, Law, Metaphysics.

Reference Materials:

1. An Introduction to Philosophy by Jon Nuttall, Polity; 1st Edition July 29, 2002). ISBN-10: 0745616631

2. An Introduction To Philosophy by George Stuart Fullerton, CreateSpace Independent Publishing Platform (July 18, 2011). ISBN-10: 1463688881

3. Philosophy: An Introduction to the Art of Wondering by James L. Christian, Wadsworth Publishing; 11th Edition January 26, 2011). ISBN -10: 1111298084

4. Pleasures of Philosophy by Durant, Touchstone; Revised Edition December 31, 1999. ISBN -13: 978-0671581107

5. Philosophy Basics: A Jargon-Free Guide for Beginners by Doug Erlandson, Doug Erlandson (September 15, 2011). ASIN: B005NJRTUW

Course Name: Principles of Psychology

Credit Hours: 3

Prerequisites:None

Objectives: Students acquire the knowledge and skills to enable them to take up professional activity as a psychologist. In addition to academic psychological research, students engage in diagnostic, advisory, evaluative and psychotherapeutic tasks in the health and social care sectors, education, administration, business and industry. Students acquire a scientifically based academic aptitude for choosing or independently developing theories and methodologies for analysis, verification and assessment of psychological activities. They acquire the basis of a vocational profession and an identity as a psychologist.

Learning Outcome:

- Describe key concepts, principles, and overarching themes in psychology.
- Describe applications of psychology.
- Use scientific reasoning to interpret psychological phenomena.
- Demonstrate effective writing for different purposes

Course Outline:

Basics concepts of Psychology and Research Methods. Brain and Behaviour. Human Development. Sensation and Perception. States of Consciousness. Conditioning and Learning. Memory. Cognition, Language, Creativity, and Intelligence. Motivation and Emotion. Sex, Gender, and Sexuality. Personality. Health, Stress, and Coping. Social Behaviour

Reference Materials:

1. Psychology: Modules for Active Learning by Dennis Coon and John O. Mitterer, Wadsworth Publishing; 12th Edition January 1, 2011. ISBN -10: 1111342849

2. Introduction to Psychology by James W. Kalat, Wadsworth Publishing; 9th Edition (January 1, 2010). ISBN-10: 0495810762

3. Introduction to Psychology by Rod Plotnik and Haig Kouyoumdjian, Wadsworth Publishing; 9th Edition February 25, 2010. ISBN -10: 0495903442

4. Psychology by David G. Myers, Worth Publishers; 9th Edition January 10, 2009). ISBN-10: 1429215976

Course Name: **Entrepreneurship**

Credit Hours: **3**

Pre-requisite: **None**

Objectives: To learn business idea and able to analyze domestic and international opportunities. To learn intellectual property and other legal issues, creating and starting venture.

Learning Outcome:

- Creatively analyze the business environment, opportunity recognition, and the business idea-generation process;
- Know how to acquire necessary resources and organizational matters of new venture creation process;
- Write a business plan that creates and starts a new venture

Course Outline:

Entrepreneurship and the Entrepreneurial Mind-Set. Entrepreneurial Intentions and Corporate Entrepreneurship. Entrepreneurial Strategy. Generating and Exploiting New Entries. Creativity and the Business Idea. Identifying and Analyzing Domestic and International Opportunities. Intellectual Property and Other Legal Issues for the Entrepreneur. The Business Plan. Creating and Starting the Venture. The Marketing Plan. The Organizational Plan. The Financial Plan. Sources of Capital. Informal Risk Capital, Venture Capital, and Going Public. Strategies for Growth and Managing the Implication of Growth. Succession Planning and Strategies for Harvesting and Ending the Venture.

Reference Materials:

1.Entrepreneurship by Robert Hisrich, Michael Peters and Dean Shepherd, McGraw-Hill/Irwin; 9th Edition September 27, 2012). ISBN -10: 0078029198

2.Entrepreneurship: Ideas in Action by Cynthia L. Greene, South-Western Educational Pub; 5th Edition (January 6, 2011). ISBN-10: 0538496894

3.Entrepreneurship by William D. Bygrave and Andrew Zacharakis, Wiley; 2nd Edition (October 12, 2010). ISBN-10: 0470450371

4.Entrepreneurship: Theory, Process, and Practice by Donald F. Kuratko, South-Western College Pub; 8th Edition November 14, 2 008). ISBN-10: 0324590911

5.Entrepreneurship: Successfully Launching New Ventures by Bruce R. Barringer and Duane Ireland, Prentice Hall; 4th Edition (October 27, 2011)

Information Technology Core Courses

Course Name: Web Systems and Technologies
Credit Hours: 3*
Prerequisites: Database Systems
Objectives:
The students have knowledge, skills about web technologies and application development.
Learning Outcome: At the end of this course, students should be able to:

- Discuss and contrast client-side with server-side issues
- Describe the use of server-side backend databases in web sites and web applications
- Describe and use technologies used in Web Services, including Open Source languages and packages, Proprietary languages and packages, and Enterprise Web development and Distributed Web development
- Describe the differences between types of web servers including application servers, streaming media servers and transformation servers
- Construct Web server programs with Server-side programming
- Assess, compare, and select emerging and existing Web technologies for solutions, such as XML, SOAP, WSDL, UDDI, Java, C#, EJB, .NET
- Implement a web site and integrate it with other IT applications

Course Outline:
Introduction to Web Applications, TCP/IP Application Services. Web Servers: Basic Operation, Virtual hosting, Chunked transfers, Caching support, Extensibility. SGML, HTML5, CSS3. XML Languages and Applications: Core XML, XHTML, XHTM MP. Web Service: SOAP, REST, WML, XSL. Web Services: Operations, Processing HTTP Requests, Processing HTTP Responses, Cooki Coordination, Privacy and P3P, Complex HTTP Interactions, Dynamic Content Delivery. Server Configuration. Server Security. Web Browsers Architecture and Processes. Active Browser Pages: JavaScript, DHTML, AJAX. JSON, Approaches to Web Application Development. Programing in any Scripting language. Search Technologies. Search Engine Optimization. XML Query Language, Semantic Web, Future Web Application Framework.
Reference Materials:
1.Web Application Architecture: Principles, protocols and practices by Leon Shklar and Richard Rosen, Wiley; 2nd Edition May 5, 2009. ISBN -10: 047051860X
2.Web Technologies: A Computer Science Perspective by Jeffrey C. Jackson, Prentice Hall; 1st Edition August 27, 2006). ISBN -10: 0131856030
3.Web Technologies by Uttam Kumar Roy, Oxford University Press, USA June 13, 2011). ISBN -10: 0198066228

Course Name: **Multimedia Systems and Design**

Credit Hours: **3**

Prerequisites: None

Objectives: The course introduces students with the complete process of multimedia system specifications, formats, design, testing, and prototyping, including the tools and techniques for integrating multimedia content into a product.

Learning Outcome:

- To acquire fundamentals principles of multimedia, including digitization and data compression for non-textual information
- To understand issues in representing, processing, and transmitting multimedia data
- To understand core multimedia technologies and standards
- To gain hands-on experience in image, sound and video editing and in some aspects of multimedia authoring (incorporating images, sound, video, and animation)
- To design, capture, store and integrate sound, images and video to deliver multimodal information.

Course Outline:

What is Multimedia? Multimedia Authoring Tools, Multimedia Authoring, Multimedia Production, Multimedia Presentation, Automatic Authoring, Editing and Authoring Tools- Proprietary/open Source), VRML, Making Multimedia: Handling Images, Sound, Animation and Video, Planning & Costing, Designing and Producing. Multimedia Skills and Talent, The Internet and Multimedia. Designing for the World Wide Web. Delivering Multimedia Product. Instructors can devise a Lab work plan using a multimedia Authoring tool in line with the contents of the syllabus.

Reference Materials:

1. Multimedia Making It Work, 8th Edition by Tay Vaughan, McGraw-Hill Osborne Media; 8th Edition (October 29, 2010). ISBN-10: 0071748466
2. Fundamentals of Multimedia by Z. M. Li and M. S. Drew, Prentice Hall 2004), ISBN: 0 -13-127256-X
3. Digital Multimedia by N. Chapman and J. Chapman. 2nd Edition, Wiley 2004, ISBN: 0-470-85890-7
4. The Technology of Video and Audio Streaming by David Austerberry, Focal Press; 2nd Edition (2004). ISBN-10: 0240805801
5. Multimedia Foundations: Core Concepts for Digital Design by Vic Costello, Ed Youngblood and Susan Youngblood, Focal Press; 1st Edition (2012). ISBN-10: 0240813944

Course Name: Systems and Network Administration

Credit Hours: 3

Prerequisites: Computer Communication and Networks, Operating Systems

Objectives: This course will give an overview of systems and network administration based on both Windows and Linux environments. The objective are common system administration tasks and practices and how to implement and maintain standard services like email, file sharing, DNS and similar.

Learning Outcome: Upon successful completion the student will be able to:

- Design a class A, B, or C IPv4 networking scheme and be able to subnet the network based upon requirements for number of networks and number of hosts required.
- Configure & troubleshoot services (e.g., DNS, DHCP, routing, printing) in a networked environment.
- Given a network problem, develop a plan, use internet research, define options, and provide options for further study, leading to a problem solution.

Course Outline:

Introduction To System Administration. SA Components. Server Environment Microsoft and Linux). Reliable Products, Server Hardware Costing, Maintenance Contracts and Spare Parts, Maintaining Data Integrity, Client Server OS Configuration, Providing Remote Console Access. Comparative Analysis of OS: Important Attributes, Key Features, Pros and Cons. Linux Installation and Verification, Configuring Local Services and Managing Basic System Issues. Administer Users and Groups. Software Management. Managing Network Services and Network Monitoring Tools. Boot Management and Process Management. IP Tables and Filtering. Securing Network Traffic. Advanced File Systems and Logs. Bash Shell Scripting. Configuring Servers FTP, NFS, Samba, DHCP, DNS and Apache).

Reference Materials:

1.The Practice of System and Network Administration, Second Edition by Thomas Limoncelli, Christina Hogan and Strata Chalup, Addison-Wesley Professional; 2nd Edition (2007). ISBN-10: 0321492668

2. Red Hat Enterprise Linux 6 Bible: Administering Enterprise Linux Systems by William vonHagen, 2011

3. Studyguide for Practice of System and Network Administration by Thomas A. Limoncelli, Cram101; 2nd Edition (2011. ISBN -10: 1428851755

4. Networking Systems Design and Development by Lee Chao, CRC Press; 1st Edition (December 21, 2009). ISBN-10: 142009159X (TB2

5. Windows Administration Latest Edition, Microsoft Press

6. Linux Administration Guide Latest Edition

University of Swat

Department of Computer and Software Technology

Course Name: Network Security
Credit Hours: 3
Prerequisites: System and Network Administration
Objective: To explain the policies adopted to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources. Network security involves the authorization of access to data in a network.

Learning Outcome:

- Define information security and outline its major components.
- Identify the major types of threats to information security and the associated attacks.
- Develop strategies to protect organization information assets from common attacks.
- Understand how security policies, standards and practices are developed.
- Understand the role of management in enforcing security policies, standards and practices.
- Identify the major techniques, approaches and tools used to discover network and system vulnerabilities.
- Apply foot printing, scanning, enumeration and similar techniques to discover network and system vulnerabilities.

Course Outline:

Security Concepts, Such as Confidentiality, Integrity, Authenticity, Availability etc. Symmetric and Asymmetric Cryptography and Their Uses; Key Distribution and Digital Signatures; Discretionary and Mandatory Access Control Policies for Confidentiality and Integrity. Communication Protocols for Authentication, Confidentiality and Message Integrity. Network Security; System Security, Intrusion Detection and Malicious Code. Security Models and Security Evaluation. Administration of Security. Legal Aspects of Computer Security.

Reference Materials:

1. Security in Computing by Charles P. Pfleeger and Shari Lawrence Pfleeger, Prentice Hall; 4th Edition (2006. ISBN -10: 0132390779
2. Network Security Fundamentals by Gert DeLaet and Gert Schauwers, Cisco Press; 1st Edition (September 18, 2004). ISBN-10: 1587051672
3. Network Security Bible by Eric Cole, Wiley; 2nd Edition (September 8, 2009). ISBN-10: 0470502495
4. Network Security Essentials: Applications and Standards by William Stallings, Prentice Hall; 4th Edition (March 22, 2010). ISBN-10: 0136108059

Course Name: Cloud Computing

Credit Hours: 3

Prerequisites:Internet Architecture and Protocols

Objectives: After completing this seminar, participants will be able to:

- Discuss, with confidence, what is cloud computing and what are key security and control considerations within cloud computing environments.
- Identify various cloud services.
- Assess cloud characteristics and service attributes, for compliance with enterprise objectives.
- Explain the four primary cloud category "types".
- Evaluate various cloud delivery models.
- Contrast the risks and benefits of implementing cloud computing.
- Specify security threat exposure within a cloud computing infrastructure.
- Recognize steps and processes used to perform an audit assessment of a cloud computing environment.
- Summarize specific environments that would benefit from implementing cloud computing, contrasted against those environments that might not benefit.
- Weight the impact of improperly controlled cloud computing environments on organizational sustainability.

Learning Outcome: Students will be able to:

- Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
- Discuss system virtualization and outline its role in enabling the cloud computing system model.
- Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

Course Outline:

Overview of Distributed Computing, Emergence of Cloud Computing, Global Nature of the Cloud, Cloud-Based Service Offerings, Grid Computing, Reliability of Cloud Model, Benefits of Cloud Model, Legal Issues, Key Characteristics of Cloud Computing, Challenges for the Cloud. The Evolution of Cloud Computing. Web Services Delivered from the Cloud: Communication-as-a- Service CaaS), Infrastructure -as-a-Service, Monitoring-as-a-Service MaaS), Platform -as-a-Service PaaS), Software -as-a -Service SaaS), Infrastructure as a Service IaaS), Platform as a Service PaaS), Software as a Service SaaS). Building Cloud Networks. Virtualization. Federation, Presence, Identity, and Privacy in the Cloud. Security in the Cloud. Common Standards in Cloud Computing. End-User Access to Cloud Computing. Mobile Internet Devices and the Cloud.

Reference Materials:

1.Cloud Computing Implementation, Management, and Security by John W. Rittinghouse and James F. Ransome, Taylor & Francis Group, LLC 2010). ISBN 978 -1-4398-0680-7.

2.Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton, Recursive Press (2009). ISBN-10: 0956355609.

3.Cloud Computing Bible by Barrie Sosinsky, Wiley; 1st Edition 2011). ISBN-10: 0470903562.

4.Securing the Cloud: Cloud Computer Security Techniques and Tactics by Vic (J.R.) Winkler, Syngress; 1st Edition (2011). ISBN-10: 1597495921.

Course Name: System Integration and Architecture

Credit Hours: 3

Prerequisites:None

Objectives: Upon completion of this course, students should be able:

- Define the objectives of and issues associated integration of information systems applications.
- Explain alternative strategies for systems integration.
- Identify commonly used tools for integrating information systems, describing the benefits of using each.
- Explain how Web services can aid in systems integration, identifying the underlying tools and technologies that facilitate the creation of such services.
- Discuss the characteristics of systems integration projects, emphasizing the management issues and practices associated with them.
- Identify information systems application and organization characteristics that are most likely to cause an organization to employ a systems integration company to carry out the project work.

Learning Outcome: On successful completion of this course, students should be able to:

- Explain key challenges, concepts, drivers, and strategies related to systems integration projects
- Explain and apply organizational and managerial issues related to systems integration projects
- Explain and apply key systems integration architecture, methodologies, and technologies
- Identify and assess current and emerging systems integration tools
- Define and analyze systems integration requirements using business process models
- Design feasible solutions for an integration problem that utilizes proven design solutions described in integration patterns
- Apply advanced integration technologies to implement system integration solutions

- Prepare a research paper and deliver professional presentation on fundamental concepts studied in the course

Course Outline:

Enterprise Architecture EA) and Enterprise Engineering EE). Balanced Scorecard and Strategy Maps BSSM. Using Strategy Analysis SA). Governance Analysis Using EA. Enterprise Architecture Methods. Using Business-Driven Data Mapping for Integrated Data. Strategic Modeling for Rapid Delivery of EA. Strategic Alignment, Activity and Workflow Modeling, and Business Rules. Using Business Normalization for Future Business Needs. Menu Design, Screen Design, Performance Analysis, and Process Modeling. Enterprise Application Integration Concepts. Enterprise Portal Technologies for Integration. Web Services for Real-Time Integration. Service-Oriented Architecture for Integration. Managing and Delivering EA. Future Directions in EA and Integration.

Reference Materials:

1.Enterprise Architecture for Integration: Rapid Delivery Methods and Technologies by Clive Finkelstein, Artech House Print on Demand; 1st Edition (March 31, 2006). ISBN-10: 1580537138

2.Systems Integration Systems Engineering) by Jeffrey Grady, CRC-Press; 1st Edition (September 30, 1994). ISBN-10: 0849378311

3.The Business of Systems Integration by Andrea Prencipe, Andrew Davies, Mike Hobday. Oxford University Press, USA June 30, 2005). ISBN -10: 019926323X

4.Enterprise Integration: An Architecture for Enterprise Application and Systems Integration by Fred A. Cummins, Wiley; 1st Edition February 14, 2002). ISBN-10: 0471400106.

Course Title: Technology Management

Credit Hours: 3

Prerequisites:None

Objectives: In the course, students will learn to:

- Develop an awareness of the range, scope, and complexity of technological innovation, and the issues related to managing technological change.
- Understand different approaches to managing innovation.
- Clearly identify drivers and barriers to technological innovation within an organization.
- Understand what it takes to manage technological innovation.

Learning Outcome:

Upon completion of this program

- Understand the role of non-IT managers in information systems planning, systems development, and hardware and software selection.
- Define problems and the current environment for existing business systems in the areas of accounting, finance, marketing, and manufacturing.

- Know the important business functions provided by typical business software such as Customer Relationship Management (CRM) and Enterprise Resource Planning (ERP).
- Understand the technical aspect of telecommunication systems and internet as well as their roles in business environment.
- Become familiar with the investigative methods for building and designing computer based information systems.
- Appreciate the trends, ethical, security, and globalization issues in information technology.
- Use software tools such as excel and access to analyze and solve business problems.

Course Outline:

Introduction to Technology Management, TM activities and tools, The TM framework, TM activities behind technological capabilities. TM Activities: Identification, Selection, Acquisition, Exploitation, Protection, Learning. TM Tools. TM Tools-Patent Analysis. TM Tools-Portfolio Management. TM Tools-Roadmapping. TM Tools- Value Analysis/Value Innovation. TM- Functions: Planning and Forecasting, Decision Making, Organizing, Leading Technical People.

Reference Materials:

1.Technology Management: Activities and Tools by Dilek Cetindamar, Rob Phaal, and David Probert, Palgrave Macmillan April 27, 2010). ISBN -10: 0230233341 (TB1)

2. Managing Engineering and Technology by Lucy C. Morse And Daniel L. Babcock, Prentice Hall; 5th Edition August 20, 2009). ISBN -10: 0136098096 (TB2)

3. Management of Technology: Managing Effectively in Technology-Intensive Organizations by Hans J. Thamhain, Wiley; 2nd Edition May 25, 2005). ISBN-10: 0471415510

4. Managing Information Technology by Carol V. Brown, Daniel W. DeHayes, Jeffrey A. Hoffer, Wainright E. Martin, and William C. Perkins, Prentice Hall; 7th Edition (March 18, 2011. ISBN -10: 0132146320

5.Technology Management: Activities and Tools by Dilek Cetindamar, Rob Phaal, and David Probert, Palgrave Macmillan April 27, 2010). ISBN -10: 0230233341

Contents of Information Technology Supporting Courses
Course Name: Information Systems
Credit Hours: 3
**Prerequisites:	None**
Objectives:

> • Explain to students why information systems are so important today for business and management;
> • Evaluate the role of the major types of information systems in a business environment and their relationship to each other;
> • Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business;

Learning Outcome:

> • Identify the major management challenges to building and using information systems and learn how to find appropriate solutions to those challenges;
> • Define an IT infrastructure and describe its components;
> • Learn the core activities in the systems development process;
> • Cultivate skills and experience in the development and implementation of information systems projects.

Course Outline:

Information Systems Concepts, Types, Advantages, and Global Challenges. System Development Life Cycle. System Investigation, Systems Analysis, Systems Design, Environmental Design Considerations, System Implementations, Ethical and Social Issues, Systems Operations and Maintenance. Themes in information systems development. System Development Techniques. Information Systems Development Tools and toolsets. Information Systems Development Methodologies.

Reference Materials:

1.Fundamentals of Information Systems by Ralph Stair and George Reynolds, Course Technology; 6th Edition January 1, 2011). ISBN -10: 0840062184
2.Information Systems Development: Methodologies, Techniques & Tools by David Avison and Guy Fitzgerald, McGraw-Hill; 4th Edition May 1, 2006). ISBN-10: 0077114175
3. Introduction to Information Systems: Supporting and Transforming Business by R. Kelly Rainer and Casey G. Cegielski, Wiley; 3rd Edition June 16, 2010). ISBN -10: 0470473525
4. Information Systems by Richard T. Watson, Create Space Independent Publishing Platform March 20, 2012). ISBN-10: 1475074921

Course Name: **Information Technology Project Management**
Credit Hours: **3**
Prerequisites: **Software Engineering, Technology Management**
Objectives: Upon completion of this course you will be able to:

• Understand the importance of project management certification
• Describe the project management process groups
• Describe the process of project integration management
• Describe human resource management and its role in project management

Learning Outcome: student will be able to

• Understand the importance of project scope management and use various techniques to manage scope
• Understand the importance of project time management and how to use various techniques to manage time
• Understand the importance of project quality management and how to use various techniques to manage time
• Understand project communications management and its role in project management
• Understand risk management and techniques to manage risk in projects
• Understand the importance of, and be able to conduct, project

Course Outline:

Introduction to Project Management. The Project Management and Information Technology Context. The Project Management Process Groups. Project Integration Management. Project Scope Management. Project Time Management. Project Cost Management. Project Quality Management. Project Human Resource Management. Project Communications Management. Project Risk Management. Project Procurement Management. Project Management Tools.

Reference Materials:

1. Information Technology Project Management by Kathy Schwalbe, Course Technology; 6th Edition (July 22, 2010). ISBN-10: 1111221758
2. A Guide to the Project Management Body of Knowledge, 3rd Edition PMBOK Guides), ISBN -13: 978-1930699458
3. IT Project Management: On Track from Start to Finish by Joseph Phillips, McGraw-Hill Osborne Media; 3rd Edition February 25, 2010. ISBN -10: 0071700439
4. Information Technology Project Management by Jack T. Marche, Wiley; 3rd Edition (January 6, 2009. ISBN -10: 0470371935
5. Effective Project Management: Traditional, Agile, Extreme by Robert K. Wysocki, Wiley; 6th Edition (2011). ISBN-10: 111801619X

Course Name: Internet Architecture and Protocols
Credit Hours: 3
Prerequisites: Computer Communications and Networks
Objectives:

- Present students with a study of the design, operation, and challenges of the Internet as a global network.
- Provide students with advanced insight into addressing, routing, and
- performance on the Internet, and understand recent developments such as IPv6 and mobility.
- Enhance students communication and team work skills

Learning Outcome: the student will be able to

- Understand communication and team work
- Understand design, operation and challenges of the internet as a global network
- Understand recent development such as IPV6 and mobility.

Course Outline:

Terms and Concepts. Functioning of the Internet. Review of the TCP/IP Model. Network Layer Addresses IP Addresses). DHCP. DNS Servers& Configuration. Error Recovery Operations. Internet Local Area Networks LANs). IEEE Standards. CSMA/CD, CSMA/CA) LANs. CSMA/CD Protocol Stacks. Review of Ethernet. CSMA/CD Frames. Subnetwork Access Protocol SNAP). CSMA/CD. Ethernet Layers. CSM A/CD Standards. The Token Ring Network. The Ring Configuration. FDDI. FDDI Configuration. The FDDI Layers. FDDI Backbones. Switched LANs. Fast Ethernet. Fast Ethernet and the Layered Model. Auto-Negotiation. Gigabit Ethernet. Internet Wide Area Networks W ANs). Message Switching and Packet Switching. Frame Relay. Cell Relay. Comparing WAN Technologies. X.25, Frame Relay, and ATM Virtual Circuits. Mapping IP Addresses to "Labels": Label or Tag Switching. IP and ICMP. Time-to-Live. Destination Unreachable. Redirect. Router Discovery. Pings. IPv6. TCP and UDP. Round Trip Time RTT. Nagle's Algorithm. The Slow Start. Congestion Window and Threshold Size. The User Datagram Protocol UDP). The Point -to-Point Protocol PPP) and The Layer 2 Tunneling Protocol L2TP . Routing Protocols. Autonomous Systems. Multiple Routing Protocols. Operation of Internet Operates with the Routing Protocols. Levels of Access. Peering through the Routing Protocols.

Reference Materials:

1. Internet Architecture: An Introduction to IP Protocols by Uyless D. Black, Prentice Hall PTR; 1st Edition (2000). ISBN-10: 0130199060

2. Internet Routing Architectures by Sam Halabi, Cisco Press; 2nd Edition 2000). ISBN -10: 157870233X \

3.TCP/IP Protocol Suite by Behrouz A. Forouzan, McGraw-Hill Science/Engineering/Math; 4th Edition (2009). ISBN-10: 0073376043

4. Next-Generation Internet: Architectures and Protocols by Andrei Gurtov, Cambridge University Press (2011). ISBN-10: 0521113687

Course Name: Object-Oriented Analysis and Design

Credit Hours: 3

Prerequisites:Programming Fundamentals

Objectives: After the course, students should be able

- To use an object-oriented method for analysis and design
- To know techniques aimed to achieve the objective and expected results of a systems development process
- To know different types of prototyping
- To know how to use UML for notation

Learning Outcome:

- be able to analyse information systems in real-world settings and to conduct methods such as interviews and observations
- have a general understanding of a variety of approaches and perspectives of systems development, and to evaluate other IS development methods and techniques

Course Outline:

Principles of Object Technology. OOP Review. Principles of Modeling. OOA&D Overview. OO Development Process. Requirements Engineering, Analysis, and Specification: Requirements Engineering, Use Cases, Prototyping, Class Models. Interaction Diagrams. Verification and Validation. Architectural and Detailed Design. Class Diagrams. Interaction Diagrams. State Machines and Diagrams. Implementation, Package Diagrams. Activity Diagrams. OO Patterns, Verification and Validation. Note: Students may also be introduced to Object Diagram, Component Diagram, Package Diagram, Deployment Diagram, Network Diagram.

Reference Materials:

1.Applying UML and patterns: An introduction to Object-Oriented Analysis and Design and Iterative Development by Craig Larman, Prentice Hall; 3rd

Edition (October 30, 2004). ISBN-10: 0131489062

2.Using UML: Software Engineering with Objects and Components by Perdita Stevens, Addison-Wesley; 2nd Edition February 13, 2006). ISBN -10:0321269675

3. Fundamental of Object-Oriented Design in UML by Meiler Page-Jones, Addison Wesley, 2000. ISBN: 020169946X.

4.The Unified Modeling Language User Guide by G. Booch, J. Rambaugh and I. Jakobson, Addison-Wesley Professional; 2nd Edition 2005). ISBN - 10:0321267974.

5.The Unified Modeling Language Reference Manual by James Rumbaugh, Ivar Jacobson and Grady Booch, Addison-Wesley Professional; 2nd Edition (2004. ISBN -10: 032171895X.

University of Swat

Department of Computer and Software Technology

Course Name: Database Administration & Management

Credit Hours: 3

Prerequisites: Database Systems

Objectives: At the completion of this course, students should be able to do the following:

- Construct simple and moderately advanced database queries using Structured Query Language (SQL).
- Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- Design and implement a small database project using Microsoft Access.
- Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.
- describe and discuss selected advanced database topics, such as distributed database systems and the data warehouse.

Learning Outcome:

- Understand the role of a database management system in an organization.
- Understand basic database concepts, including the structure and operation of the relational data model.
- Understand the role of the database administrator.

Course Outline:

Installation of DBMS; SQL* Plus; DBA Tools. DBMS Physical Structure & Architectural Components: Server, Instance, SGA, Shared Pool, Library Cache, Data Dictionary Cache, Large Pool, Processes. Startup and Shutdown Database. Managing Instances. Managing Files. Creating Database and Data dictionary. Managing Tablespaces. Operations with Tablespaces. Data File Management, Segments, Block. Managing Undo Data, Undo Data Statistics: Managing Tables and Users. Indexes Management, Maintaining Data Integrity, Constraints. Managing Privileges. Server Side Configuration. Client Side Configuration. Usage and Configuration of Oracle Shared Server. Backup and Recovery. Sizing Shared Pool, Sizing Buffer Cache, I/O Issues. Tuning Rollback Segments. Tuning Shared Servers, Types of Locks, Block Efficiency, Storage hierarchy, Avoiding Dynamic allocation, Statistics, PCTFREE and PCTUSED, Monitoring Index Usage.

Reference Materials:

1. Database Administration: The Complete Guide to DBA Practices and Procedures by Craig S. Mullins, Addison-Wesley Professional; 2nd Edition October 21, 2012). ISBN - 10: 0321822943

2. Database Systems: A Practical Approach to Design, Implementation and Management by Thomas M. Connolly and Carolyn E. Begg, Addison-Wesley; 5th Edition (2009). ISBN-10: 0321523067

Contents of Information Technology Elective Courses

Course Name: Telecommunication Systems

Credit Hours: 3

Prerequisites: Computer Communication and Networks

Objectives: To prepare students for further work in the area of computer networking and communications systems, providing a firm understanding of the fundamental principles and concepts involved in telecom systems.

Learning Outcome: student will be able to
- Understand computer networking
- Fundamental concept involved in telecom system

Course Outline:

Communication Channel and the Communication Network Technologies. Digital Telephony. Switching and Signaling Systems. Switching Fabric Interfaces and ICs, Optics and the Future. Cellular Systems. Fixed Wireless Access Technologies. Digital Subscriber Loop. Transmission Techniques. Telecommunication Systems Testing. Embedded Systems Design for Telecommunications.

Reference Materials:

1. Essentials of Modern Telecommunications Systems by Nihal Kularatna and Dileeka Dias, Artech House (May 2004). ISBN-10: 1580534910

2. The Irwin Handbook of Telecommunications by James Harry Green, McGraw-Hill; 5th Edition (October 26, 2005). ISBN-10: 0071452222

3. Telecommunications Essentials: The Complete Global Source for Communications Fundamentals, Data Networking and the Internet, and Next-Generation Networks by Lillian Goleniewski, Addison-Wesley Professional; 1st Edition (January 5, 2002). ISBN-10: 0201760320

4. Fundamentals of Communications Systems by Michael Fitz, McGraw-Hill Professional; 1st Edition (June 27, 2007. ISBN -10: 0071482806

Course Name: Routing & Switching

Credit Hours: 3

Prerequisites: Internet Architecture & Protocols

Objectives: This course describes the architecture, components, and operations of routers and switches in a small network. Participants learn how to configure a router and a switch for basic functionality. By the end of this course, student will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPng, single area and multi-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks.

Learning Outcome: student will be able to understand

- Architecture, component and operation of router and switches in small network
- Understand configuration and troubleshooting of routers and resolve common issues with RIPv1, RIPng etc**.**

Course Outline:

Ethernet Basic: Ethernet Layer 1, Ethernet Layer 2, Switching and Bridging Logic, SPAN and RSPAN.: VLANs, VLAN Trunking Protocols, VLAN Trunking: ISL and 802.1Q, Configuring PPPoE. Spanning Tree Protocol: 802.1d Spanning Tree Protocol, Optimizing Spanning Tree, Protecting STP, Troubleshooting Complex Layer 2 Issues. IP Addressing. IP Services. IP Forwarding Routing. EIGRP. OSPF. IGP Routing. Fundamentals of BGP Operations. BGP Routing Policies. Wide Area Network. IP Multicasting. IP Multicast Routing.

Reference Materials:

1.CCIE Routing and Switching Certification Guide by Wendell Odom, Rus Healy and Denise Donohue, Cisco Press; 4th Edition December 18, 2009). ISBN-10: 1587059800

2.Packet Guide to Routing and Switching by Bruce Hartpence, O'Reilly Media (September 3, 2011). ISBN-10: 1449306551

3.CCIE Routing and Switching v4.0 Quick Reference by Brad Ellis, Jacob Uecker and Steven Means, Cisco Press October 4, 2010). ASIN: B00452V45O

Course Name: Network Design and Management

Credit Hours: 3 Lab may be assigned or adjusted by the University

Prerequisites: Computer Communication and Networks

Objectives:

- To analyse business goal and constraint
- To Learn network communication & design

Learning outcome:

- Understand the challenges of network communication.
- Understand the basics of network communication.
- Understand the operation of the protocols that are used inside the Internet.

Course Outline:

Analyzing Business Goals and Constraints. Top-Down Network Design Methodology. Characterizing the Existing Internetwork. Designing a Network Topology. Designing Models for Addressing and Numbering. Selecting Switching and Routing Protocols. Developing Network Security Strategies. Developing Network Management Strategies. Physical Network Design. Selecting Technologies and Devices for Enterprise Networks. Testing Network Design. Optimizing Network Design. Documenting Network Design. Network Management Standards & Models. SNMP Management. SNMP Management. Broadband Network Management.

Reference Materials:

1. Top-Down Network Design by Priscilla Oppenheimer, Cisco Press; 3rd Edition (September 3, 2010). ISBN-10: 1587202832 (TB1)
2. Network Management: Principles and Practice by Mani Subramanian; Timothy A. Gonsalves; N. Usha Rani, Pearson Education India (2010. ISBN-10: 81-3172-759-9
3. Networking Systems Design and Development by Lee Chao, CRC Press; 1st Edition (December 21, 2009). ISBN-10: 142009159X (TB2)
4.Networks: Design and Management by Steven Karris, Orchard Publications (August 2002). ISBN-10: 0970951140
5. Network Warrior by Gary A. Donahue, O'Reilly Media; 2nd Edition (May 13, 2011). ASIN: B004W8ZL3W.

Course Name: Network Programming

Credit Hours: 3

Prerequisites: Operating Systems

Objectives:

- Create client and server applications using the "Sockets" API.
- Be able to compare, contrast, and critique various networking APIs.

Learning out come

- To understand Network programing and server application
- Will be able to compare, contrast and critique various networking APIs.

Course Outline:

The Network Programming course is aimed at developing Network programming concepts and skills in general. Unix Programming Environment, TCP Protocol suite, Socket Programming , UDP and TCP Sockets, I/O Multiplexing including Non- blocking I/O, Advanced Socket Options, Name and Address Conversions, IPv4 and IPv6 Interoperability, Unix Domain Protocols, Broadcasting and Multicasting, Routing and Communication, Pipes and FIFO's Message Queues, Mutexes and Locks, Semaphores, POSIX Shared Memory, Doors and RPC (Remote Procedure Calls).

Reference Materials:

1. UNIX Network Programming Volume I by Richard Steven, Prentice Hall; 2nd Edition (September 4, 1998). ISBN-10: 0130810819
2. Windows System Programming by Johnson M. Hart, Addison-Wesley Professional; 4 Edition (February 26, 2010. ISBN -10: 0321657748
3. The Linux Programming Interface: A Linux and UNIX System Programming Handbook by Michael Kerrisk, No Starch Press; 1st Edition October 28, 2010). ISBN - 10: 1593272200
4. Linux Kernel Development by Robert Love, Addison-Wesley Professional; 3rd Edition (July 2, 2010). ISBN-10: 0672329468
5. System Software: An Introduction to Systems Programming 3 rd Edition) by Leland L. Beck, Addison Wesley (1996. ASIN: B0084YEE WO.

Course Name: Computer Game Development

Credit Hours: 3
Prerequisites: Data Structures & Algorithms
Objectives: at the completion of this course, you will be able to:

- Discuss the history of electronic game development.
- Distinguish between the different game platforms and player modes.
- Distinguish between the different game goals and genres.
- Discuss various aspects of gameplay that can be used to design game interaction.
- Discuss the design and use of levels.
- Evaluate the game industry and market.
- Discuss the future of game design.

Learning Outcome:

- Define elements related to game strategy, theory, and gameplay.
- Apply story and character development to games.
- Discuss the use of the interface for game design.
- Use audio to enrich the game atmosphere.
- Identify the distinct roles and responsibilities of game development team members.
- Discuss the production and management of the game design process.
- Analyze games.
- Use game design software.
- Develop game design documentation.
- Design games.

Course Outline:

Introduction to Game Development, Platform and Player Modes, What Is The Framework? Goals And Genres? What Are The Possibilities? Player Elements, Player Motivation, Geographic, Psychographics. Demographics, Gender, Generation, Rating, Applying Player Market to Platform. Story and Character Development: Classic Charters, Traditional Story Structure, Story Element. Plot, Game Story Devices, Game Characters. Character Development Element, Point-of-view, Visual Character Development, Verbal Character Development, Movement. Visual Character Development, Verbal Character Development, Movements, Character Description, Game Storytelling and Documentation. Gameplay: Rules to Play, Interactivity Modes, Game theory, Challenges, Balance. Levels: Level Design, Structure, Time, Space. Interface: Playe-Centerd Design, Interface & Game Feature, Interface Types, Usability. Audio: Importance of Game Audio, Sound Effect, Voiceover, Music. Company Role, Team Roles, Tools, Business Side of Game Development. Production and Management, Development Phases, Game Documentation.

Reference Materials:
1. Game Development Essentials by Jeannie Novak, Delmar Cengage Learning; 3rd Edition (August 17, 2011). ISBN-10: 1111307652
2. Game Development Essentials: An Introduction by Jeannie Novak, Delmar Cengage Learning; 3rd Edition (2011). ISBN-10: 1111307652
3. Game Development Essentials: Mobile Game Development by Kimberly Unger and Jeannie Novak, Delmar Cengage Learning; 1st Edition (2011). ISBN-10: 1418052655
4. Game Development Essentials: Game Interface Design by Kevin Saunders and Jeannie Novak, Delmar Cengage Learning; 2nd Edition 2012). ISBN-10: 1111642885
5. Game Development Essentials: Online Game Development by Rick Hall and Jeannie Novak, Delmar Cengage Learning; 1st Edition (2008). ISBN-10: 1418052671

Course Title: Multimedia Technologies

Credit Hours: 3

Prerequisites: none

Objectives: This course will give an overview of systems and network administration based on both Windows and Linux environments.

- The objective are common system administration tasks and practices and how to implement and maintain standard services like email, file sharing, DNS and similar.
- The course is primarily dealing with the Linux and Windows operating systems and especially with Linux-based servers and Window-based clients, but some information about the most fundamental differences between various Linux systems will be provided.
- In labs focus is on how to install, setup and maintain Linux server machine and to perform various system administration and security related tasks on those machines.

Learning Outcome:
- Define multimedia to potential clients.
- Identify and describe the function of the general skill sets in the multimedia industry.
- Identify the basic components of a multimedia project.
- Identify the basic hardware and software requirements for multimedia development and playback.

Course Outline:
What is Multimedia? Text, Multimedia Authoring and Tools, Multimedia Authoring, Multimedia Production, Multimedia Presentation, Automatic Authoring; Editing and Authoring Tools- Adobe Premiere, Macromedia Director, Macromedia Flash, Dreamweaver, VRML, Handling Images, Sound, Making Animation and Video, Making Multimedia, Multimedia Skills, Planning and Costing, Designing and Producing, Content and Talent, The Internet and Multimedia, Designing for the World Wide Web, Delivering

Multimedia Product. Instructors need to devise a content delivery and Lab work plan using a multimedia Authoring tool in line with the contents of the textbook.

Reference Materials:

1.Multimedia Making It Work 8th Edition by Tay Vaughan, McGraw-Hill Osborne Media; 8th Edition (October 29, 2010). ISBN-10: 0071748466

2.Fundamentals of Multimedia by Z. M. Li and M. S. Drew, Prentice Hall 2004), ISBN: 0-13-127256-X

3. Digital Multimedia by N. Chapman and J. Chapman. 2nd Edition, Wiley 2004, ISBN: 0-470-85890-7

4.The Technology of Video and Audio Streaming by David Austerberry, Focal Press; 2nd Edition (2004). ISBN-10: 0240805801

5. Multimedia Security: WaTermarking, Steganography, and Forensics by Frank Y. Shih, CRC Press; 1st Edition (2012), ISBN-10: 1439873313

Course Name: 3D Modeling & Animation

Credit Hours: 3*

Prerequisites:Multimedia Systems and Design

Objectives: course will introduce students to 2D and 3D, animation planning, storyboard development, and identify various applications of 3D graphics and animation, such as Students will apply surface materials to 3D models

Learning Outcome:

- Employ industry standard software to create 3D imagery and animations.
- Demonstrate the ability to create 3D objects.
- Demonstrate the ability to create 3D animations.
- Illustrate concepts using 3D objects and animations.

Course Outline:

Introduction to 3D Modeling & Animation, History of Computer Graphics and Special Effects. Polygons, Polygon Meshes, Extruding, Controlling Edges and Edges Loop, Subdividing and Simplifying, Combining Meshes, Polygon Count, Normals, UV Coordinates. NURBS, Advantages and Disadvantages of NURBS. Subdivision Surfaces. Deforming, Sculpting and Special Selections, Morph Targets, Lattices and Curves, Specialized Deformers, Managing Soft and Rigid Bodies. Managing Animation. Coloring, Shaders, Ray Tracing, Photon Mapping. Working with Textures, Shading, UV Mapping, Paining in 3D, Changing Geometry, Seamless Reporting Pattern, Multiple Maps. Light Effect. Virtual Camera, Faking Camera Effects, Matching Virtual Cameras to Real One, Cameras and Image Planes, Animating the Camera, Camera Views, Camera Movements. Environments, Rendering. Procedures and Graphs. Scripting. Animation Tools.

Reference Materials:

1.3D Art Essentials: The Fundamentals of 3D Modeling, Texturing, and Animation by Ami Chopine, Focal Press; 1st Edition (March 23, 2011). ISBN-10: 0240814711

2. 3D Modeling, Animation, and Rendering: An Illustrated Lexicon, Colour Edition by Michael E. Mortenson, Create Space Independent Publishing Platform 2010). ISBN -10: 1453728481

3.The Complete Guide to Blender Graphics: Computer Modeling and Animation by John M. Blain, A K Peters/CRC Press; 1st Edition 2012). ISBN-10: 1466517034

4.Digital Modeling by William Vaughan, New Riders; 1st Edition 2012). ISBN-10: 0321700899

5.Blender Game Engine: Beginner's Guide by bacone Victor kuller, Packt Publishing (2012). ISBN-10: 1849517029

Course Name: Mobile Computing
Credit Hours: 3
Prerequisites:Internet Architecture & Protocols, Web Systems and Technologies
Objectives: This course introduces the basic concepts and principles in mobile computing. This includes the major techniques involved, and networks & systems issues for the design and implementation of mobile computing systems and applications.

Learning Outcome:

To understand the key components and technologies involved and to gain hands-on experiences in building mobile applications.

Course Outline:

Introduction to Mobile Computing, Architecture of Mobile Software Applications, Mobile Development Frameworks and Tools. Creating Consumable Web Services for Mobile Devices. Memory Management. Mobile Applications. Mobile User-Interface Design. Dynamic Linking. Concurrency. Managing Resources. Introduction to Mobile Application Development with Android. Introduction to Mobile Application Development with IOS. Introduction to Mobile Application Development with Windows Phone. Introduction to Mobile Application Development with Blackberry.

Reference Materials:

1.Programming Mobile Devices: An Introduction for Practitioners by Tommi Mikkonen, Wiley; 1st Edition (March 19, 2007). ISBN-10: 0470057386.

2.Professional Mobile Application Development by Jeff McWherter & Scott Gowell, Wrox; 1st Edition (September 4, 2012). ISBN-10: 1118203909

3.Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML by Reza B'Far and Roy T. Fielding, Cambridge University Press (2004). ISBN-10: 0521817331.

4.Fundamentals of Mobile and Pervasive Computing by Frank Adelstein, Sandeep KS Gupta, Golden Richard III and Loren Schwiebert, McGraw-Hill Professional; 1st Edition (2004 . ISBN-10: 0071412379.

Course Name: Software Agents Technology

Credit Hours: 3

Prerequisites: Web Systems and Technologies

Objectives: The aim of this course is to introduce the concepts, techniques and applications of software agents.

Learning Outcome: By the end of the course the students are expected to be able

to understand the nature, concepts and techniques of the agent technology and its standards and to evaluate current software agent systems.

Course Outline:

Basics of Intelligent Agents. Intelligent Agents Application. Desktop Agents. Internet Agents. Web search Agents, Information Filtering Agents, Personalized Newspaper, Offline Delivery Agents, URL-minder, Bargain Finder. Intranet Agents. Mobile Agents. Technology of Intelligent Agents. Agent Machinery. Agent Content. Agent Access. Agent Security. Developing Agent Applications.

Reference Materials:

1. Intelligent Agent Source book by Caglayan, Alper, John Wiley and Sons Ltd (1997). ISBN: 9780471153276

2. Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence by Gerhard Weiss, The MIT Press (July 31, 2000. ISBN -10: 0262731312

3. Design of Agent-Based Models by Tomas Salamon, Tomas Bruckner September 1, 2011). ISBN -10: 8090466117

4. Intelligent Software Agents: Foundations and Applications by Walter Brenner, Rüdiger Zarnekow, Hartmut Wittig and A.S. Rudd, Springer, July 31, 2012). ISBN -10: 3642804861

5. Agent Technology for E-Commerce by Maria Fasli, Wiley; 1st Edition March 6, 2007). ISBN -10: 0470030305.

Course Name: E-Commerce Applications Development

Credit Hours: 3

Prerequisites: Web Technologies

Objectives: Develop, deploy, and maintain electronic commerce (e-commerce) applications.

Learning Outcome:

- Understand the process of setting up an interactive web site, displaying product catalogue, deploying
- shopping carts, handling credit card transaction
- Identify e-business models.
- Describe issues of concern in the design and development of an e-commerce.
- Discuss the techniques and technologies used to process online payments.
- Understand the process of maintaining security on the E-commerce site.

- Have knowledge in XML technology related to Business-to-Business E-commerce.
- Discuss the issues facing businesses that are considering worldwide marketing of their products and services.
- Discuss how the "digital divide" is impacting on our society and impact of the Internet on education.

Course Outline:

An overview of e-Commerce & Models, Planning an e-Commerce Framework, Managing Products and Categories, Product Variations and User Uploads, Enhancing the User Experience, The Shopping Basket, The Checkout and Order Process, Shipping and Tax, Discounts, Vouchers, and Referrals, Checkout, Taking Payment for Orders, User Account Management, Administration: Dashboard, Managing Products and Categories, Managing Orders, Customers, Refunds, Voucher Codes, Shipping, Deploying, Security, and Maintenance, SEO.

Reference Materials:

1.PHP 5 E-commerce Development by Michael Peacock, Packt Publishing January 20, 2010). ISBN -10: 184719964X

2.Introduction to E-Commerce by Jeffrey F. Rayport, McGraw-Hill, 2nd Edition (2007. ISBN -10: 0071232664

3.E-Commerce by Kenneth Laudon and Carol Guercio Traver, Prentice Hall; 8th Edition (2011). ISBN-10: 0138018812

4.e-Business and e-Commerce How to Program by Harvey M. Deitel, Paul J. Deitel and Tem R. Nieto, Prentice Hall; 1st Edition 2000). ISBN -10: 013028419X

5.The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-based Business by Janice Reynolds, Cmp Books 2000). ISBN -10: 157820061X