Road Map BS (Computer Science) Session 2023-27

SR.NO.	CODE	COURSE_TITLE	DOMAIN	CRHRS
Semester 1				
1	**CCC-301**	Programming Fundamentals	Core	4(3-1)
2	**CSI-303**	Discrete Structures	GER	3(3-0)
3	**CSI-321**	Introduction to Computing Applications	GER	3(2-1)
4	**MTH-323**	Calculus and Analytic Geometry	GER	3(3-0)
5	**ENG-321**	Functional English	GER	3(3-0)
6	***THQ-311**	Translation of The Holy Quran-I	GER	1(1-0)
7	****MTH-111**	Basic Mathematics-I	Deficiency Course	3(3-0)
				16(14-2)
Semester 2				
1	**CCC-302**	Object Oriented Programming	Core	4(3-1)
2	**CCC-304**	Database Systems	Core	4(3-1)
3	**CCC-306**	Digital Logic Design	Core	3(2-1)
4	**MTH-324**	Multivariable Calculus	Math	3(3-0)
5	**MTH-424**	Linear Algebra	Math	3(3-0)
6	****MTH-112**	Basic Mathematics-II	Deficiency Course	3(3-0)
				17(14-3)
Semester 3				
1	**CCC-401**	Data Structures	Core	4(3-1)
2	**CCC-403**	Information Security	Core	3(2-1)
3	**CCC-404**	Software Engineering	Core	3(3-0)
4	**CCC-405**	Computer Networks	Core	3(2-1)
5	**CSI-415**	Advanced Programming	Domain Elective	3(2-1)
6	**STA-328**	Probability and Statistics	Math	3(3-0)
7	***THQ-411**	Translation of The Holy Quran-II	GER	1(1-0)
				19(15-4)
Semester 4				
1	**CSI-406**	Theory of Automata	Domain Core	3(3-0)
2	**CSI-418**	Advance Database Management Systems	Domain Core	3(2-1)
3	**CCC-402**	Computer Organization and Assembly Language	Core	3(2-1)
4	**PHY-321**	Applied Physics	GER	3(2-1)
5	**ENG-426**	Expository Writing	GER	3(3-0)
6	**ISL-321**	Islamic Studies	GER	2(2-0)
				17(14-3)
Semester 5				
1	**CCC-503**	Operating Systems	Core	3(2-1)
2	**CSI-507**	Computer Architecture	Domain Core	3(2-1)
3	**CSI-509**	Digital Image Processing	Domain Core	3(2-1)
4	**CCC-501**	Analysis of Algorithms	Core	3(3-0)
5	**CSI-513**	Mobile Application Development	Domain Elective	3(2-1)
6	**BAM-301**	Introduction to Management	GER	3(3-0)
7	***THQ-511**	Translation of The Holy Quran-III	GER	1(1-0)

				18(13-5)
Semester 6				
1	**CCC-502**	Artificial Intelligence	Core	3(2-1)
2	**CSI-504**	Parallel and Distributed Computing	Domain Core	3(2-1)
3	**CSI-506**	Numerical Computing	Domain Elective	3(2-1)
4	**CSI-508**	Compiler Construction	Domain Core	3(2-1)
5	**CSI-512**	Web Engineering	Domain Elective	3(2-1)
6	**CSI-514**	Cyber Security	Domain Elective	3(2-1)
				18(12-6)
Semester 7				
1	**CSI-603**	Introduction to Data Science	Domain Elective	3(2-1)
2	**BAM-601**	Entrepreneurship	GER	3(3-0)
3	**CSI-608**	HCI & Computer Graphics	Domain Core	3(2-1)
4	***THQ-611**	Translation of The Holy Quran-IV	GER	1(1-0)
5	**ENG-422**	Technical Writing	EN	3(3-0)
6	**BAM-302**	Principles of Marketing	SS	3(3-0)
7	**CSI-631**	Final Year Project - I	Core	2(0-2)
				17(14-3)
Semester 8				
1	**CSI-606**	Professional Practices	GER	2(2-0)
2	**SOC-407**	Community Development	GER	2(2-0)
3	**PST-506**	Constitutional Developments in Pakistan	GER	3(3-0)
4	**CSI-632**	Final Year Project - II	Core	4(0-4)
				11(7-4)

* Non-Credit Course

** Deficiency Course (Non-Credit) for students who have not studied Mathematics at HSSC.

Grand Total= 133

Semester-1

Course Name: Discrete Structures	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites:	
Objectives: Introduces the foundations of discrete mathematics as they apply to computer Science, focusing on providing a solid theoretical foundation for further work. Further, this course aims to develop understanding and appreciation of the finite nature inherent in most Computer Science problems and structures through study of combinatorial reasoning, abstract algebra, iterative procedures, predicate calculus, tree and graph structures. In this course more emphasis shall be given to statistical and probabilistic formulation with respect to computing aspects	
Course Outline: Introduction to logic and proofs: Direct proofs; proof by contradiction, Sets, Combinatorics, Sequences, Formal logic, Prepositional and predicate calculus, Methods of Proof, Mathematical Induction and Recursion, loop invariants, Relations and functions, Pigeonwhole principle, Trees and Graphs, Elementary number theory, Optimization and matching. Fundamental structures: Functions; relations (more specifically recursions); pigeonhole principle; cardinality and countability, probabilistic methods	
Reference Material: 1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6TH edition, 2006, Mcgraw Hill Book Co. 2. Richard Johnsonbaugh, Discrete Mathematics, 7TH edition, 2008, Prentice Hall Publishers. 3. Kolman, Busby & Ross, Discrete Mathematical Structures, 4th edition, 2000, Prentice-Hall Publishers. 4. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction, Addison-Wesley Pub. Co., 1985	

Course Name: Programming Fundamentals	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: None	
Objectives: The course is designed to familiarize students with the basic structured programming skills. It emphasizes upon problem analysis, algorithm designing, and program development and testing.	
Course Outline: Overview of computers and programming. Overview of language for e.g. C language C. Basics of structured and Modular programming. Basic Algorithms and problem solving, development of basic algorithms, analyzing problem, designing solution, testing designed solution. Fundamental programming constructs, translation of algorithms to programs, data types, control structures, functions, arrays, records, files, testing programs	
Reference Material: **1.** Problem Solving and Program Design in C / 6E Hanly & Koffman Addison-Wesley | Published: 02/06/2009 ISBN-10: 0321535421 | ISBN-13: 9780321535429 **2.** C How to Program, 5/E (Harvey & Paul) Deitel & Deitel, ISBN-10: 0132404168 ISBN-13: 9780132404167 Publisher: Prentice Hall Copyright: 2007	

Course Name: Introduction to Computing Applications

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

Prerequisites: None (first semester course)

Objectives:

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

Course Outline:

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

Suggested Text Book:

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

Reference Material:

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

Course Name: Calculus and Analytic Geometry	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: None	
Objectives: To provide foundation and basic ground for calculus and analytical geometry background.	
Course Outline: Complex Numbers, DeMoivre's Theorem and its Applications, Simple Cartesian Curves, Functions and Graphs, Symmetrical Properties, Curve Tracing, Limit and Continuity, Differentiation of Functions. Derivative as Slope of Tangent to a Curve and as Rate of Change, Application to Tangent and Normal, Linearization, Maxima/Minima and Point of Inflexion, Taylor and Maclaurin Expansions and their convergence. Integral as Anti-derivative, Indefinite Integration of Simple Functions. Methods of Integration: Integration by Substitution, by Parts, and by Partial Fractions, Definite Integral as Limit of a Sum, Application to Area, Arc Length, Volume and Surface of Revolution.	
Reference Material: 1. Swokowski, Olinick and Pence, Calculus and Analytical Geometry, 6th edition, 1994, Brooks/Cole Publishers. 2. Howard Anton, Calculus, 7th edition. 2002, John Wiley and Sons (WIE). 3. William E. Boyce Richard C. Diprima, Calculus, John Wiley & Sons, ISBN: 0471093335. 4. Thomas Finny, Calculus and Analytical Geometry, 10th edition, John Wiley and Sons. 5. Erwin Kreyzig, Advanced Engineering Mathematics, 7th edition, 1993, John Wiley & Sons Inc.	

FUNCTIONAL ENGLISH

UGE Policy V 1.1 : General Education Course

Credits: 03
Pre-Requisite: Nil
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 1 - 3 Semesters
Type: General Education
Fields: All

DESCRIPTION

This course is designed to equip students with essential language skills for effective communication in diverse real-world scenarios. It focuses on developing proficiency in English language usage: word choices, grammar and sentence structure. In addition, the course will enable students to grasp nuanced messages and tailor their communication effectively through application of comprehension and analytical skills in listening and reading. Moreover, the course encompasses a range of practical communication aspects including professional writing, public speaking, and everyday conversation, ensuring that students are equipped for both academic and professional spheres. An integral part of the course is fostering a deeper understanding of the impact of language on diverse audiences. Students will learn to communicate inclusively and display a strong commitment to cultural awareness in their language use. Additionally, the course will enable them to navigate the globalized world with ease and efficacy, making a positive impact in their functional interactions.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Apply enhanced English communication skills through effective use of word choices, grammar and sentence structure.
2. Comprehend a variety of literary / non-literary written and spoken texts in English.
3. Effectively express information, ideas and opinions in written and spoken English.
4. Recognize inter-cultural variations in the use of English language and to effectively adapt their communication style and content based on diverse cultural and social contexts.

SYLLABUS

1. **Foundations of Functional English:**
   - Vocabulary building (contextual usage, synonyms, antonyms and idiomatic expressions)
   - Communicative grammar (subject-verb-agreement, verb tenses, fragments, run-ons, modifiers, articles, word classes, etc.)
   - Word formation (affixation, compounding, clipping, back formation, etc.)
   - Sentence structure (simple, compound, complex and compound-complex)
   - Sound production and pronunciation
2. **Comprehension and Analysis:**
   - Understanding purpose, audience and context
   - Contextual interpretation (tones, biases, stereotypes, assumptions, inferences, etc.)
   - Reading strategies (skimming, scanning, SQ4R, critical reading, etc.)
   - Active listening (overcoming listening barriers, focused listening, etc.)
3. **Effective Communication:**
   - Principles of communication (clarity, coherence, conciseness, courteousness, correctness, etc.)
   - Structuring documents (introduction, body, conclusion and formatting)

- Inclusivity in communication (gender-neutral language, stereotypes, cross-cultural communication, etc.)
- Public speaking (overcoming stage fright, voice modulation and body language)
- Presentation skills (organization content, visual aids and engaging the audience)
- Informal communication (small talk, networking and conversational skills)
- Professional writing (business e-mails, memos, reports, formal letters, etc.)

PRACTICAL REQUIREMENT

As part of the overall learning requirements, students will also be exposed to relevant simulations, role-plays and real-life scenarios and will be required to apply skills acquired throughout the course in the form of a final project.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "Understanding and Using English Grammar" by Betty Schrampfer Azar.
2. "English Grammar in Use" by Raymond Murphy.
3. "The Blue Book of Grammar and Punctuation" by Jane Straus.
4. "English for Specific Purposes: A Learning-Centered Approach" by Tom Hutchinson and Alan Waters.
5. "Cambridge English for Job-hunting" by Colm Downes.
6. "Practical English Usage" by Michael Swan.
7. "Reading Literature and Writing Argument" by Missy James and Alan P. Merickel.
8. "Improving Reading: Strategies, Resources, and Common Core Connections" by Jerry Johns and Susan Lenski.
9. "Comprehension: A Paradigm for Cognition" by Walter Kintsch.
10. "Communication Skills for Business Professionals" by J.P. Verma and Meenakshi Raman.

Semester-2

Course Name: Digital Logic and Design	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: Discrete Structures, Introduction to Computing	
Objectives: This course introduces the concept of digital logic, gates and the digital circuits. Further, it focuses on the design and analysis combinational and sequential circuits. It also serves to familiarize the student with the logic design of basic computer hardware components.	
Course Outline: Overview of Binary Numbers, Boolean Algebra, switching algebra, and logic gates, Karnaugh Map and Quin-McCluskey methods, simplification of Boolean functions, Combinational Design; two level NAND/NOR implementation, Tabular Minimization, Combinational Logic Design: adders, subtracters, code converters, parity checkers, multilevel NAND/NOR/XOR circuits, MSI Components, design and use of encoders, decoders, multiplexers, BCD adders, and comparators, Latches and flip-flops, Synchronous sequential circuit design and analysis, Registers, synchronous and asynchronous counters, and memories, Control Logic Design, Wired logic and characteristics of logic gate families, ROMs, PLDs, and PLAs, State Reduction and good State Variable Assignments, Algorithmic State Machine (ASM) Charts, Asynchronous circuits, Memory systems, Functional organization, Multiprocessor and alternative architectures: Introduction to SIMD, MIMD, VLIW, EPIC; systolic architecture; interconnection networks; shared memory systems; cache coherence; memory models and memory consistency, Performance enhancements, Contemporary architectures	
Reference Material: 1. Digital Design, 2nd Ed., M. Morris Mano, Prentice Hall, 1991. 2. Practical Digital Logic Design and Testing, P K Lala, Prentice Hall, 1996	

Course Name: Database Systems	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: Data Structures and Algorithms	
Objectives: The course aims to introduce basic database concepts, different data models, data storage and retrieval techniques and database design techniques. The course primarily focuses on relational data model and DBMS concepts.	
Course Outline: Basic database concepts; Entity Relationship modelling, Relational data model and algebra, Structured Query language; RDBMS; Database design, functional dependencies and normal forms; Transaction processing and optimization concepts; concurrency control and recovery techniques; Database security and authorization. Small Group Project implementing a database. Physical database design: Storage and file structure; indexed files; b-trees; files with dense index; files with variable length records; database efficiency and tuning.	
Reference Material: 1. Database Systems 8E, C.J.Date, Addison Wesley Pub. Co. (2004). 2. Database Systems: A Practical Approach to Design, Implementation and Management 5E, R.Connolly and P.Begg, Addison-Wesley Pub. Co (2009). 3. Fundamentals of Database Systems, 5/E, Elmasri and Navathe, Addison-Wesley, ISBN: 0-201-74153-9.	

Course Name: Object Oriented Programming	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: Programming Fundamentals	
Objectives: The course aims to focus on object-oriented concepts, analysis and software development.	
Course Outline: Evolution of Object Oriented (OO) programming, OO concepts and principles, problem solving in OO paradigm, OO programme design process, classes, methods, objects and encapsulation; constructors and destructors, operator and function overloading, virtual functions, derived classes, inheritance and polymorphism. I/O and file processing, exception handling	
Reference Material: 1. C++ How to Program, 6/E **(Harvey & Paul) Deitel & Deitel** ISBN-10: 0136152503 ISBN-13: 9780136152507 Publisher: Prentice Hall 2. Java How to Program, 7/E **(Harvey & Paul) Deitel & Deitel** ISBN-10: 0132222205 ISBN-13: 9780132222204 Publisher: Prentice Hall	

Course Name: Multivariate Calculus	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: Calculus and Analytical Geometry	
Objectives: The goals are to develop the skills to have ground knowledge of multivariate calculus and appreciation for their further computer science courses	
Course Outline: Functions of Several Variables and Partial Differentiation. Multiple Integrals, Line and Surface Integrals. Green's and Stoke's Theorem. Fourier Series: periodic functions, Functions of any period P-2L, Even & odd functions, Half Range expansions, Fourier Transform. Laplace Transform, Z-Transform.	
Reference Material: 1. James Stewart, Multivariable Calculus, 6th edition, 2007, Cengage Learning publishers. 2. Swokowski, Olinick and Pence, Calculus and Analytical Geometry, 6th edition, 1994, Thomson Learning EMEA, Ltd. 3. Bernard Kolman, William F. Trench, Elementary Multivariable Calculus, 1971, Academic Press. 4. Howard Anton, Albert Herr, Multivariable Calculus, 5th edition, 1995, John Wiley	

Course Name: Linear Algebra	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: None	
Objectives: To provide fundamentals of solution for system of linear equations, operations on system of equations, matrix properties, solutions and study of their properties.	
Course Outline: Vectors, Vector Spaces, Matrices & Determinants, Cofactor and Inverse, Rank, Linear Independence, Solution of system of Linear systems, Positive Definite matrix, Linear Transformations, Operations on matrices, Inner products, orthgonality and least squares, Eigenvalue & Eigenvectors. Applications to Systems of Equations and to Geometry, Singular Value Decomposition.	
Reference Material: 1. Bernard Kolman, David Hill, Elementary Linear Algebra with Applications, 9th edition, Prentice Hall PTR, 2007. 2. Gilbert Strang, Strang, Brett Coonley, Andy Bulman-Fleming, Andrew Bulman-Fleming, Strang's Linear Algebra And Its Applications, 4th edition, Brooks/Cole, 2005 3. Howard Anton, Chris Rorres, Elementary Linear Algebra: Applications Version, 9th edition, Wiley, 2005. 4. David C. Lay, Linear Algebra and Its Applications, 2nd edition, Addison-Wesley, 2000.	

Semester-3

Course Name: Information Security	
Course Structure: Lectures: 3 / Labs: 0	**Credit Hours:** 3
Prerequisites: Data Communication and Computer Networks	
Objectives:	
Course Outline: Basic notions of confidentiality, integrity, availability; authentication models; protection models; security kernels; Encryption, Hashing and Digital 33 Signatures; audit; intrusion detection and response; database security, host based and network-based security issues operational security issues; physical security issues; personnel security; policy formation and enforcement; access controls; information flow; legal and social issues; identification and authentication in local and distributed systems; classification and trust modeling; risk assessment	
Reference Material: 1. Computer Security: Art and Science, Matthew Bishop 2. Cryptography and Network Security by William Stalling 6th Edition, 2012 3. Principles of Information Security 3rd E by Michael E. Whitman and Herbert J. Mattord	

Course Name: Software Engineering	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: Object Oriented Paradigm/Programming	
Objectives: To study various software development models and phases of software development life cycle. The concepts of project management, change control, process management, software development and testing are introduced through hands-on Team Projects.	
Course Outline: Introduction to Computer-based System Engineering; Project Management; Software Specification; Requirements Engineering, System Modelling; Requirements Specifications; Software Prototyping; Software Design: Architectural Design, Object-Oriented Design, UML modelling, Function-Oriented Design, User Interface Design; Quality Assurance; Processes & Configuration Management; Introduction to advanced issues: Reusability, Patterns; Assignments and projects on various stages and deliverables of SDLC.	
Reference Material: 1. Software Engineering 8E by Sommerville Addison Wesley, 2006 2. Software Engineering: A Practitioner's Approach /7E, Roger Pressman, McGraw-Hill, 2009	

Course Name: Data Structures	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: Object Oriented Paradigms	
Objectives: The course is designed to teach students structures and schemes, which allow them to write programs to efficiently manipulate, store, and retrieve data. Students are exposed to the concepts of time and space complexity of computer programs	
Course Outline: Introduction to data structures; Arrays, Stacks, Queues, Priority Queues, Linked Lists, Trees, and Graphs. Recursion, sorting and searching algorithms, Hashing, Storage and retrieval properties and techniques for the various data structures. Algorithm Complexity,	

Polynomial and Intractable Algorithms, Classes of Efficient Algorithms, Divide and Conquer, Dynamic, Greedy

Reference Material:

1. Data Abstraction and Problem Solving with C++, 2nd ed, Frank M. Carrano, Paul Helman, Robert Veroff, Addison-Wesley, 1998.
2. Data Structures and Algorithms (SAMS teach yourself), Lafore, Sams Publishing, 1999.
3. Fundamentals of Data Structures in C++, Horowitz, Sahni, and Mehta, Computer Science Press, 1995.
4. Data Structures in JAVA, Standish, Addison Wesley, 2000

Course Name: Advanced Programming

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

Prerequisites: Object Oriented Paradigms

Course Outline:

Visual Programming Basics; Introduction to Events; Fundamentals of Event-driven Programming, message handling, user interfaces, graphics device interface, painting and drawing, windows management, input devices, resources, string and menu resource, dialogs and windows controls, common controls, dynamic link libraries, threads and synchronization, network programming, Building Class Libraries at the Command Line, Class Libraries, Using References, Assemblies, Private Assembly Deployment, Shared Assembly Deployment, Configuration Overview, Configuration Files, Programmatic Access to Configuration, Using SDK Tools for Signing and Deployment, Metadata, Reflection, Late Binding, Directories, Files, Serialization, Attributes, Memory Management and Garbage Collection, Threading and Synchronization, Asynchronous Delegates, Application Domains, Marshal by Value, Marshal by Reference, Authentication and Authorization, Configuring Security, Code Access Security, Code Groups, Evidence, Permissions, Role-Based Security, Principals and Identities, Using Data Readers, Using Data Sets, Interacting with XML Data, Tracing Event Logs, Using the Boolean Switch and Trace Switch Classes, Print Debugging Information with the Debug Class, Instrumenting Release Builds with the Trace Class, Using Listeners, and Implementing Custom Listeners

Reference Material:

1. Visual C#: How to Program, Deitel and Deitel, 6/e Edition, Prentice Hall / Pearson Education, 2017.
2. Programming in C# .NET, J.C. Bradley, A.C. Millspaugh, McGraw-Hill, 2014
3. Microsoft Visual C# 2013 Step by Step (Step by Step Developer), Sharp, J., 1st Edition (2013), Microsoft Press.

Course Name: Computer Networks	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: None	
Objectives: To introduce students to the concept of computer communication. Analogue & digital transmission. Network Layers, Network models (OSI, TCP/IP) and Protocol Standards. Emphasis is given on the understanding of modern network concepts.	
Course Outline: Analogue and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission, Protocol design issues. Network system architectures (OSI, TCP/IP), Error Control, Flow Control, Data Link Protocols (HDLC, PPP). Local Area Networks and MAC Layer protocols (Ethernet, Token ring), Multiplexing, Switched and IP Networks, Inter-networking, Routing, Bridging, Transport layer protocols TCP/IP, UDP. Network security issues. Programming exercises, labs or projects involving implementation of protocols at different layers.	
Reference Material: 1. Introduction to Computer Networks /4, A. S. Tanenbaum, Prentice Hall 2003 2. Computer Networks and Internets, 5/E, 2008 Douglas E. Comer, Purdue University ISBN-10: 0136061273 ISBN-13: 9780136061274 Publisher: Prentice Hall 3. Data and Computer Communications By William Stallings Published by Macmillan Pub. Co., 8th Edition 2006	

Course Name: Probability and Statistics	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: None	
Objectives: To introduce the concepts of data analysis, presentation, counting techniques, probability and decision making.	
Course Outline: Introduction to Statistics 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, FQuantile and Probability Plots. Single Sample & One- and Two-Sample Estimation Problems. Single Sample & One- and Two-Sample Tests of Hypotheses. The Use of PValues for Decision Making in Testing Hypotheses (Single Sample & One- and TwoSample 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 Material: 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	

Semester- 4

Course Name: Theory of Automata	
Course Structure: Lectures: 3 Labs: 0	**Credit Hours:** 3
Prerequisites: Discrete Structures	
Objectives: The course aims to develop an appreciation of the theoretical foundations of computer science through study of mathematical & abstract models of computers and the theory of formal languages. Theory of formal languages and use of various abstract machines as 'recognizers' and parsing will be studied for identifying/validating the synthetic characteristics of programming languages. Some of the abstract machines shall also study as 'Transducers'.	
Course Outline: Finite State Models: Language definitions preliminaries, Regular expressions/Regular languages, Finite automata (FAs), Transition graphs (TGs), NFAs, Kleene's theorem, Transducers (automata with output), Pumping lemma and non regular language Grammars and PDA: Context free grammars, Derivations, derivation trees and ambiguity, Simplifying CFLs , Normal form grammars and parsing, Decidability, Chomsky's hierarchy of grammars Turing Machines Theory: Turing machines, Post machine, Variations on TM, TM encoding, Universal Turing Machine, Context sensitive Grammars, Defining Computers by TMs.	
Text Books/Reference Books: 1. An Introduction to Formal Languages and Automata, By Peter Linz, 4th edition, Jones & Bartlett Publishers, 2006 2. Theory of Automata, Formal Languages and Computation, By S. P. Eugene, Kavier, 2005, New Age Publishers, ISBN (10): 81-224-2334-5, ISBN (13) : 978-81-224-2334-1. 3. John Hopcroft and Jeffrey Ullman, Introduction to Automata Theory, Languages, and Computation, 2nd edition, 2001, Addison-Wesley. 4. Introduction to Languages and the Theory of Computation, By John C. Martin3rd edition, 2002, McGraw-Hill Professional.	

Course Name: Advance Database Management Systems	
Course Structure: Lectures: 2 Labs: 1	**Credit Hours:** 3
Prerequisites: Database Systems	
Objectives: Advanced Database Management Systems is an extension to "Database Systems" course. The aim of the course is to enhance the previous knowledge of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies, and showing the need for distributed database technology to tackle deficiencies of the centralized database systems. Moreover, it focuses to introduce the basic principles and implementation techniques of distributed database systems, and expose emerging research issues in database systems and application development	
Course Outline: Introduction to advance data models such as object relational, object oriented. File organizations concepts, Transactional processing and Concurrency control techniques, Recovery techniques, Query processing and optimization, Database Programming (PL/SQL, T-SQL or similar technology), Integrity and security, Database Administration (Role management, managing database access, views), Physical database design and tuning, Distributed database systems, Emerging research trends in database systems, MONGO DB, NO SQL (or similar technologies)	
Text Books/Reference Books: 1. Database Systems: A Practical Approach to Design, Implementation, and Management, 6th Edition by Thomas Connolly and Carolyn Begg 2. Database Management Systems, 3rd Edition by Raghu Ramakrishnan, Johannes Gehrke 3. Database System Concepts, 6th Edition by Avi Silberschatz, Henry F. Korth and S. Sudarshan. 4. Database Systems: The Complete Book, 2nd Edition by Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom	

Course Name: Computer Organization and Assembly Language	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: Digital Logic Design	
Objectives: The main objective of this course is to introduce the organization of computer systems and usage of assembly language for optimization and control. Emphasis should be given to expose the low-level logic employed for problem solving while using assembly language as a tool. At the end of the course the students should be capable of writing moderately complex assembly language subroutines and interfacing them to any high level language.	
Course Outline: Microprocessor Bus Structure: Addressing, Data and Control, Memory Organization and Structure (Segmented and Linear Models), Introduction to Registers and Flags, Data Movement, Arithmetic and Logic, Programme Control, Subroutines, Stack and its operation, Peripheral Control Interrupts, Interfacing with high level languages, Real-time application. Objectives and Perspectives of Assembly Language, Addressing Modes, Introduction to the Assembler and Debugger, Manipulate and translate machine and assembly code, Describe actions inside the processing chip, Discuss operations performed by an instruction set, Write a fully documented program, Using an assembler of choice.	
Reference Material: 1. Stallings, "Computer Organization & Architecture", 7th ed, Prentice HALL, 2006. 2. Irvine, Assembly Language for Intel-based Computers, 5th ed, Prentice Hall, 2007. 3. Computer Organization and Design, The Hardware/Software Interface, 4th ed, by David A. Patterson and John L. Hennessy, 2008. Elsevier Publishers.	

Course Name: Applied Physics	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: None	
Objectives: The course introduces students with the basic concept of Physics and electronics. Students are also taught Physics laws and other associate topics to prepare them for the advanced level courses in this area. The focus of the course on electric force and its applications and related problems, conservation of charge, charge quantization, Electric fields due to point charge and lines of force and many other useful topics	
Course Outline: Electric force and its applications and related problems, conservation of charge, charge quantization, Electric fields due to point charge and lines of force. Ring of charge, Disk of charge, A point charge in an electric field, Dipole in a n electric field, The flux of vector field, The flux of electric field, Gauss' Law, Application of Gauss' Law, Spherically symmetric charge distribution, A charge isolated conductor, Electric potential energy, Electric potentials, Calculating the potential from the field and related problem Potential due to point and continuous charge distribution, Potential due to dipole, equipotential surfaces, Calculating the field from the potential , Electric current, Current density, Resistance, Resistivity and conductivity, Ohm's law and its applications, The Hall effect, The magnetic force on a current, The Biot- Savart law, Line of B, Two parallel conductors, Amperes' s Law, Solenoid, Toroids, Faraday's experiments, Faraday's Law of Induction, Lenz's law, Motional emf, Induced electric field, Induced electric fields, The basic equation of electromagnetism, Induced Magnetic field, The displacement current, Reflection and Refraction of light waves, Total internal reflection, Two source	

interference, Double Slit interference, related problems, Interference from thin films, Diffraction and the wave theory, related problems, Single-Slit Diffraction, related problems, Polarization of electromagnetic waves, Polarizing sheets, related problems.
Reference Material: 1. Fundamentals of Physics (Extended), 10th edition, Resnick and Walker 2. Narciso Garcia, Arthur Damask, Steven Schwarz., "Physics for Computer Science Students", Springer Verlag, 1998

EXPOSITORY WRITING

UGE Policy V 1.1 : General Education Course

Credits: 03
Pre-Requisite: Functional English
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 2 - 4 Semesters
Type: General Education
Fields: All

DESCRIPTION

Expository Writing is a sequential undergraduate course aimed at refining writing skills in various contexts. Building upon the foundation of the pre-requisite course, Functional English, this course will enhance students' abilities of producing clear, concise and coherent written texts in English. The course will also enable students to dissect intricate ideas, to amalgamate information and to express their views and opinions through well-organized essays. The students will further be able to refine their analytical skills to substantiate their viewpoints using credible sources while adhering to established ethical writing norms. Additionally, the course will highlight the significance of critical thinking enabling students to produce original and engaging written texts.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Understand the essentials of the writing process integrating pre-writing, drafting, editing and proof reading to produce well-structured essays.
2. Demonstrate mastery of diverse expository types to address different purposes and audiences.
3. Uphold ethical practices to maintain originality in expository writing.

SYLLABUS

1. **Introduction to Expository Writing:**
   - Understanding expository writing (definition, types, purpose and applications)
   - Characteristics of effective expository writing (clarity, coherence and organization)
   - Introduction to paragraph writing
2. **The Writing Process:**
   - Pre-writing techniques (brainstorming, free-writing, mind-mapping, listing, questioning and outlining etc.)
   - Drafting (three stage process of drafting techniques)
   - Revising and editing (ensuring correct grammar, clarity, coherence, conciseness etc.)
   - Proof reading (fine-tuning of the draft)
   - Peer review and feedback (providing and receiving critique)
3. **Essay Organization and Structure:**
   - Introduction and hook (engaging readers and introducing the topic)
   - Thesis statement (crafting a clear and focused central idea)
   - Body Paragraphs (topic sentences, supporting evidence and transitional devices)
   - Conclusion (types of concluding paragraphs and leaving an impact)
   - Ensuring cohesion and coherence (creating seamless connections between paragraphs)
4. **Different Types of Expository Writing:**
   - Description

- Illustration
- Classification
- Cause and effect (exploring causal relationships and outcomes)
- Process analysis (explaining step-by-step procedures)
- Comparative analysis (analyzing similarities and differences)

5. **Writing for Specific Purposes and Audiences:**
   - Different types of purposes (to inform, to analyze, to persuade, to entertain etc.)
   - Writing for academic audiences (formality, objectivity, and academic conventions)
   - Writing for public audiences (engaging, informative and persuasive language)
   - Different tones and styles for specific purposes and audiences
6. **Ethical Considerations:**
   - Ensuring original writing (finding credible sources, evaluating information etc.)
   - Proper citation and referencing (APA, MLA, or other citation styles)
   - Integrating quotes and evidences (quoting, paraphrasing, and summarizing)
   - Avoiding plagiarism (ethical considerations and best practices)

PRACTICAL APPLICATIONS AND CAPSTONE PROJECT

As part of the overall learning requirements, students will be required to build a writing portfolio having a variety of expository texts and present the same at the end of the course showcasing proficiency in expository writing.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "The St. Martin's Guide to Writing" by Rise B. Axelrod and Charles R. Cooper.
2. "They Say / I Say: The Moves That Matter in Academic Writing" by Gerald Graff and Cathy Birkenstein.
3. "Writing Analytically" by David Rosenwasser and Jill Stephen.
4. "Style: Lessons in Clarity and Grace" by Joseph M. Williams and Joseph Bizup.
5. "The Elements of Style" by William Strunk Jr. and E.B. White.
6. "Good Reasons with Contemporary Arguments" by Lester Faigley and Jack Selzer.
7. "Writing to Learn: How to Write - and Think - Clearly About Any Subject at All" by William Zinsser.
8. "The Norton Field Guide to Writing" by Richard Bullock, Maureen Daly Goggin, and Francine Weinberg.
9. "The Art of Styling Sentences" by Ann Longknife and K.D. Sullivan.
10. "Writing Today" by Richard Johnson-Sheehan and Charles Paine.

ISLAMIC STUDIES

UGE Policy V 1.1 : General Education Course

Credits: 02
Pre-Requisite: Nil
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 1 - 4 Semesters
Type: General Education
Fields: All

DESCRIPTION

This course is designed to provide students with a comprehensive overview of the fundamental aspects of Islam, its beliefs, practices, history and influence on society. It will further familiarize the students with a solid foundation in understanding Islam from an academic and cultural perspective. Through this course, students will have an enhanced understanding of Islam's multifaceted dimensions which will enable them to navigate complex discussions about Islam's historical and contemporary role, fostering empathy, respect, and informed dialogue.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Demonstrate enhanced knowledge of Islamic foundational beliefs, practices, historical development, spiritual values and ethical principles.
2. Describe basic sources of Islamic law and their application in daily life.
3. Identify and discuss contemporary issues being faced by the Muslim world including social challenges, gender roles and interfaith interactions.

SYLLABUS

1. **Introduction to Islam:**
   - Definition of Islam and its core beliefs.
   - The Holy Quran (introduction, revelation and compilation).
   - Hadith and Sunnah (compilation, classification, and significance).
   - Key theological concepts and themes (Tawhid, Prophethood, Akhirah etc.).
2. **Sirah of the Holy Prophet (Peace Be Upon Him) as Uswa-i-Hasana:**
   - Life and legacy of the Holy Prophet PBUH.
   - Diverse roles of the Holy Prophet PBUH (as an individual, educator, peace maker, leader etc.).
3. **Islamic History and Civilization:**
   - World before Islam.
   - The Rashidun Caliphate and expansion of Islamic rule.
   - Contribution of Muslim scientists and philosophers in shaping world civilization.
4. **Islamic Jurisprudence (Fiqh):**
   - Fundamental sources of Islamic jurisprudence.
   - Pillars of Islam and their significance.
   - Major schools of Islamic jurisprudence.
   - Significance and principles of Ijtihad.
5. **Family and Society in Islam:**
   - Status and rights of women in Islamic teachings.
   - Marriage, family, and gender roles in Muslim society.
   - Family structure and values in Muslim society.
6. **Islam and the Modern World:**
   - Relevance of Islam in the modern world (globalization, challenges and prospects).

- Islamophobia, interfaith dialogue, and multiculturalism.
- Islamic viewpoint towards socio-cultural and technological changes.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "The Five Pillars of Islam: A Journey Through the Divine Acts of Worship" by Muhammad Mustafa Al-Azami.
2. "The Five Pillars of Islam: A Framework for Islamic Values and Character Building" by Musharraf Hussain.
3. "Towards Understanding Islam" by Abul A' la Mawdudi.
4. "Islami Nazria e Hayat" by Khurshid Ahmad.
5. "An Introduction to Islamic Theology" by John Renard.
6. "Islamic Civilization Foundations Belief & Principles" by Abul A' la Mawdudi.
7. "Women and Social Justice: An Islamic Paradigm" by Dr. Anis Ahmad.
8. "Islam: Its Meaning and Message" by Khurshid Ahmad.

Note: This course is compulsory for Muslim and optional for non-Muslim undergraduate students. Non-Muslim students can opt for any course of at least the same or more credits in subjects such as religious studies, ethics, theology, comparative religion, Christian ethics, etc.

Semester- 5

Course Name: Operating Systems	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: None	
Objectives: To help students gain a general understanding of the principles and concepts governing the functions of operating systems and acquaint students with the layered approach that makes design, implementation and operation of the complex OS possible.	
Course Outline: History and Goals, Evolution of multi-user systems, Process and CPU management, Multithreading, Kernel and User Modes, Protection, Problems of cooperative processes, Synchronization, Deadlocks, Memory management and virtual memory, Relocation, External Fragmentation, Paging and Demand Paging, Secondary storage, Security and Protection, File systems, I/O systems, Introduction to distributed operating systems. Scheduling and dispatch, Introduction to concurrency. Lab assignments involving different single and multithreaded OS algorithms.	
Reference Material: 1. Applied Operating Systems Concepts, 7th Edition, Silberschatz A., Peterson, J.L., & Galvin P.C. 2004. 2. Modern Operating Systems, 3rd Edition, Tanenmaum A.S., 2008.	

Course Name: Computer Architecture	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites:	
Course Outline: The design of computer systems and components. Processor design, instruction set design, and addressing; control structures and microprogramming; memory management, caches, and memory hierarchies; and interrupts and I/O structures. Pipelining of processor Issues and Hurdles, exception handling, Parallelism, Multiprocessor Systems	
Reference Material: 1. Computer Architecture: A Quantitative Approach by Hennessy & Patterson, Morgan & Kauffman Series (2006) 4th Edition. 2. Computer Organization & Design: The Hardware/Software Interface By Patterson & Hennessy, Morgan & Kauffman Series (2008) 4th Edition	

Course Name: Digital Image Processing	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites:	
Course Outline: The human visual system, electromagnetic system, working and components inside digital camera, pixels, image representation, sampling, quantization, mathematics of image formation, convolution, camera projection, point-based image processing, Fourier theory, image filtering in spatial and frequency domain, wavelets, image registration, morphological operations, color models, multispectral images, feature detection, image segmentation, Pattern recognition, etc	
Reference Material: 1. Gonzalez R. C., Woods R. E., Eddins S. L., Digital Image Processing Using Matlab, Pearson Education, 2nd edition, 2009. 2. Gonzalez R. C., Woods R. E., Digital Image Processing, Pearson Education, 3rd edition, 2008. 3. Understanding Digital Signal Processing by Richard G. Lyons, Prentice Hall; 3rd edition, 2010.	

Course Name: Analysis of Algorithms	
Course Structure: Lectures: 3 / Labs: 0	**Credit Hours:** 3
Prerequisites: Discrete Structure, Data Structures and Algorithms	
Objectives: Detailed study of the basic notions of the design of algorithms and the underlying data structures. Several measures of complexity are introduced. Emphasis on the structure, complexity, and efficiency of algorithms.	
Course Outline: Introduction; Asymptotic notations; Recursion and recurrence relations; Divide-and-conquer approach; Sorting; Search trees; Heaps; Hashing; Greedy approach; Dynamic programming; Graph algorithms; Shortest paths; Network flow; Disjoint Sets; Polynomial and matrix calculations; String matching; NP complete problems; Approximation algorithms.	
Reference Material: 1. Introduction to Algorithms /2E, T. H. Cormen, C. E. Leiserson, and R. L. Rivest, MIT Press, McGraw-Hill, New York, NY, 2001. 2. Algorithms in C++; Robert Sedgewick	

Course Name: Mobile Application Development	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Web Technologies	
Objectives:	
Course Outline: What is Android? Installing and Configuring the Android SDK Manager, Creating Android Application, Anatomy of an Android Application. Eclipse. Fragments, Calling Built-In Applications Using Intents, Displaying Notifications. Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Creating the User Interface. Listening for UI Notifications. Views, User Preferences. Persisting Data. Sharing Data. Sending SMS Messages. Getting Feedback. Sending E-mail. Displaying Maps, Consuming Web Services Using HTTP, Accessing Web Services. Creating Services. Threading. Android games Development, Publishing Android Applications. Handling Telephone Calls, Fonts	
Reference Material: 1. Beginning Android 4 Application Development by Wei-Menge Lee, John Wiley & Sons, 2012 2. Beginning Android 4 by Grant Allen, Apress, (2011), ISBN: 1430239840. 3. Beginning Android games by Mario Zechner, Apress, (2011), ISBN:1430230428 4. Pro Android 4 by Satya Komatineni and Dave MacLean, (2012), ISBN:1430239301 Apress 5. Professional Android 4 Application Development by Reto Meier, Wiley, (2012), ISBN:1118237226	

Course Name: Introduction to Management	
Course Structure: Lectures: 3 / Labs: 0	**Credit Hours:** 3

Overall Aims of the Course

Course Description:

This is an introductory course about the management of organizations. It provides instructions on principles of management that have general applicability to all types of enterprises; basic management philosophy and decision making; principles involved in planning, organizing, leading, and controlling; and recent concepts in management. The principles learned in this course will allow the student to effectively work with and through others in an organization. The course will also encourage the students to explore and inquire the applicability of western management principles and theories in local settings. Besides, the course will discuss the Islamic perspective of managing businesses and organizations.

This course will cover the basic managerial functions of planning, organizing, leading, and controlling, We will also try to learn the evolution of management and best practices which are being used in today's modern era.

Course Objectives:

Theoretical Objectives: To understand the book and case studies mentioned in the book Management by Stephen P. Robbins and Mary Coulter

Practical Objectives: To understand and present practices of Management in any organization.

Learning Outcomes:

On completion of this course, the student should be able to:

1. Hold informed conversations with functional specialists and understand how to draw effectively on their expertise in managing organizations.
2. Understand the relevance of the western management principles and theories, for local settings.
3. Understand the Islamic perspective of managing businesses and organizations.
4. Apply course concepts and theory in a practical context.
5. Integrate several of the disciplines studied.
6. Demonstrate empirical investigative skills by producing an in-depth analysis of a management situation usually presented through case studies, resulting in recommendations for a programme of action.
7. Recognize the need to take a holistic approach to performance improvement rather than a narrowly functional approach.

Class Format & Weekly Work Plan:

Principles of Management is a theoretical course; thus, the majority of our classes will be focused on concepts and practical example discussion.

Our weekly class Instructions and discussions will follow this format:

1st – 2nd Week

Chapter – 1: Managers and You in the Workplace. Management History Module. What are management and a manager? Four functions of a manager? Ten roles of a manager by Henry Mintzberg. Layers of management. Skills required by managers. Importance of innovation, diversity, and customers for a manager. Early History of management. Early theories and approaches to management; the classical approach, behavioral approach, quantitative

5th Week – 6th Week

Chapter 8: Foundations of Planning. Define the nature and purposes of planning. Classify the types of goals organizations might have and the plans they use. Compare and contrast approaches to goal-setting and planning. Discuss contemporary issues in planning. **(Page 232-245)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Seminar 1

7th Week – 8th Week

Chapter 9: Managing Strategy. Define strategic management and explain why it's important. Explain what managers do during the six steps of the strategic management process. Describe the three types of corporate strategies. Describe competitive advantage and the competitive strategies organizations use to get it. Discuss current strategic management issues. **(Page 252-265)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Mid Semester Examination

10th Week – 11th Week

Chapter – 11: Designing Organizational Structure. Describe six key elements in organizational design. Contrast mechanistic and organic structures. Discuss the contingency factors that favor either the mechanistic model or the organic model of organizational design. Describe traditional organizational design options. Discuss organizing for flexibility in the twenty-first century. **(Page 306-324)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

12th Week – 13th Week

Chapter – 16: Motivating Employees. What is motivation? Early theories of motivation. Maslow's Hierachy of Needs theory, McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory. Contemporary theories of motivation. Goal-setting theory, Reinforcement theory, Designing motivating jobs, Equity theory, Expectancy theory, Integrating contemporary theories of motivation. Current issues in motivation. **(Page 448-468)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Case study: Redefining norms in a conservative culture

14th Week – 15th Week

Chapter – 17: Being an Effective Leader. Define leader and leadership. Compare and contrast early theories of leadership. Describe the three major contingency theories of leadership. Describe contemporary views of leadership. Compare the various theories of leadership for their validity. Discuss twenty-first century issues affecting leadership. **(Page 480-500)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Seminar 2

16th Week

Chapter – 18: Monitoring and Controlling. Explain the nature and importance of control. Describe the three steps in the control process. Explain how organizational and employee performance are measured. Describe tools used to measure organizational performance. Discuss contemporary issues in control. **(Page 516-535)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Final Semester Examination

Weekly Course Objectives		
Week	**Module**	**Intended Learning Objectives**
1 - 2	**Managers and You in the Workplace.**	• To understand management History Module. What are management and a manager? • To explain four functions of a manager? • To explain ten roles of a manager by Henry Mintzberg. • To understand layers of management. Skills required by managers. • To understand importance of innovation, diversity, and customers for a manager. • To understand early History of management. • To understand early theories and approaches to management; the classical approach, behavioral approach, quantitative approach, contingency approach and contemporary approaches
3 - 4	**Making Decisions**	• To explain the manager's role as a decision maker. • To explain the 8-step process of decision making, Explain the four ways managers make decisions, Evidence based and intuitive decision making, • To classify decisions and decision-making conditions. • To describe how biases affect decision making and Know how to recognize when you're using decision-making errors and biases and what to do about it.
5 - 6	**Foundations of Planning**	• To define the nature and purposes of planning. • To define the nature and purposes of planning. • To identify the key contingency factors in planning. • To compare and contrast approaches to objective setting. • To discuss contemporary issues in planning.
7 - 8	**Managing Strategy**	• To define strategic management and explain why it's important. • To explain what managers do during the six steps of the strategic management process? • To describe the three types of corporate strategies. • To describe competitive advantage and the competitive strategies organizations use to get it. • To discuss current strategic management issues.
10 - 11	**Designing Organizational Structure**	• To describe six key elements in organizational design. • To contrast mechanistic and organic structures. • Discuss the contingency factors that favor either the mechanistic model or the organic model of organizational design. • To describe traditional organizational design options. • To discuss organizing for flexibility in the twenty-first century. • To develop your skill at acquiring and using power and Know how to stay connected and "in the loop" when working remotely
12 - 13	**Motivating Employees**	• To define motivation • To compare and contrast early theories of motivation. • To compare and contrast early theories of motivation. • To discuss current issues in motivation
14 - 15	**Being an Effective Leader**	• To discuss current issues in motivation • To compare and contrast early theories of leadership.

		• To describe the three major contingency theories of leadership. • To describe the three major contingency theories of leadership. • To describe the three major contingency theories of leadership. • To describe twenty-first century issues affecting leadership.
16	**Monitoring and Controlling**	• To explain the nature and importance of control. • To describe the three steps in the control process • To explain how organizational and employee performance are measured. • To describe tools used to measure organizational performance. • To discuss contemporary issues in control

Required Learning Resources	
Textbook **(Student must buy this book)** (Author, Title, Publisher, Edition)	• Stephen P. Robbins & Mary Coulter, Management, Pearson Publisher, 15th Edition.
Reference Book(s): (Author, Title, Publisher, Edition)	• Griffin, T.O., Management, Houghton Mifflin Company, Boston, USA, 8th Edition. • Daft, R. L. & Marcic, D., Understanding Management, Dallas: South–Western Cengage, 12th Edition. • Oliver Laasch, Principles of Management, Sage publisher, 2nd Edition.
Facilities Required for Teaching and Learning	
White Board / Multimedia (In case of Physical Classes) Zoom Online Meetings (In case of Online classes)	

Semester- 6

Course Name: Artificial Intelligence	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Data Structures	
Objectives: This course focuses on the set of computational tools and techniques, which mimic the human decision-making process and capability.	
Course Outline: Introduction to Common Lisp. AI classical systems: General Problem Solver, rules, simple search, means-ends analysis. ELIZA, pattern matching, rule based translators, OPS-5. Knowledge Representation: Natural language, rules, productions, predicate logic, semantic networks, frames, objects, scripts. Search: Depth first search, breadth first search, best first search, hill climbing, min-max search, A* search. Symbolic Mathematics: student, solving algebra problems, translating English equations, solving algebraic equations, simplification rules, re-write rules, meta-rules, Macsyma, PRESS, ATLAS. Logic Programming: Resolution, unification, horn-clause logic, Prolog, Prolog programming. Sample case studies of shells and Knowledge Based Systems. A brief appreciation of state of the art computational techniques like neural networks, genetic algorithm, fuzzy sets.	
Reference Material: 1. Artificial Intelligence by Luger, 4th edition Pearson Education. 2. Russell and Norvig, Artificial Intelligence: A Modern Aproach, 2nd ed, Pearson Education.	

Course Name: Parallel and Distributed Computing	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Data Communications and Computer Networks	
Objectives:	
Course Outline: Why use parallel and distributed systems? Why not use them? Speedup and Amdahl's Law, Hardware architectures: multiprocessors (shared memory), networks of workstations (distributed memory), clusters (latest variation). Software architectures: threads and shared memory, processes and message passing, distributed shared memory (DSM), distributed shared data (DSD). Possible research and project topics, Parallel Algorithms, Concurrency and synchronization, Data and work partitioning, Common parallelization strategies, Granularity, Load balancing, Examples: parallel search, parallel sorting, etc. Shared-Memory Programming: Threads, Pthreads, Locks and semaphores, Distributed-Memory Programming: Message Passing, MPI, PVM. Other Parallel Programming Systems, Distributed shared memory, Aurora: Scoped behavior and abstract data types, Enterprise: Process templates. Research Topics	
Reference Material: 1. B. Wilkinson and M. Allen, Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers, 1/e, Prentice Hall, 1999. 2. W. Stevens, Advanced Programming in the Unix Environment, Addison Wesley, 1993	

Course Name: Numerical Computing	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Calculus and Analytical Geometry	
Objectives: On completion of this unit, students will be able to demonstrate programming proficiency using structured programming techniques to implement numerical methods for solutions using computer-based programming techniques .using Matlab for all methods. The course must serve the purpose of scientific software development for science and engineering problems.	
Course Outline: The concepts of efficiency, reliability and accuracy of a method. Minimising computational errors. Theory of Differences, Difference Operators, Difference Tables, Forward Differences, Backward Differences and Central Differences. Mathematical	

Preliminaries, Solution of Equations in one variable, Interpolation and Polynomial Approximation, Numerical Differentiation and Numerical Integration, Initial Value Problems for Ordinary Differential Equations, Direct Methods for Solving Linear Systems, Iterative Techniques in Matrix Algebra, Solution of non-linear equations.

Reference Material:

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

Course Name: Compiler Construction

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

Prerequisites: Theory of Automata and Formal Languages

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

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

Reference Material:

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

Course Name: Web Engineering

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

Prerequisites: Fundamentals of Information Technology (required)

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

Course Outline:

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

Reference Material:

Suggested Text Books:

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

Reference Material:

1. Gosselin, Dan, et. al., The Web Warrior Guide to Web Design Technologies, Cengage Learning, 2003
2. Zak, Diane, et. al., The Web Warrior Guide to Web Programming, Cengage Learning, 2003
3. Leasure, T., Bob Leasure and James Leasure, The Web Warrior Guide to Web Database Technologies, Cengage Learning, 2003
4. Morrison, Mike and Joline Morrison, Database Driven Websites, 2/e, Cengage Learning, 2002
5. Web Wizard series for various technologies, Addison-Wesley
6. Jackson, J. C., Web Technologies: A Computer Science Perspective, Pearson (LPE), 2008
7. Web Application Architecture: Principles, Protocols and Practices by Leon Shklar and Richard Rosen (Paperback - Oct 31, 2008), Paperback: 420 pages, Publisher: Wiley; 2 edition (October 31, 2008), ISBN-10: 047051860X
8. Web Engineering: The Discipline of Systematic Development of Web Applications by Gerti Kappel, Birgit Prýýll, Siegfried Reich, and Werner Retschitzegger (Paperback - Jul 5, 2006)

Course Name: Cyber Security

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

Prerequisites: Information Security

Objectives: This course provides students an introduction to common cyber security threats, vulnerabilities, and risks related to web applications, networks, software and mobile applications. The course provides basic concepts and terminology used in the information and cyber security fields. Moreover, it will also enable students to differentiate between the various forms of malware and how they affect computers and networks

Course Outline:

Introduction to Cyber security; Networks and the Internet; cyber threat landscape; understanding security; information security Principles (Confidentiality, Integrity, Availability); Information Security Terminology; Who are the attackers; Advanced Persistent Threat (APT); Malware, types of malware; Attacks using malware; Malware Attack Lifecycle: Stages of Attack; Social engineering attacks; types of payload; Industrial Espionage in Cyberspace; Basic cryptography; Web application attacks; Database security; Cyber kill chain; Privacy and anonymity; Network security; Software security; Mobile device security; Mobile app security; Cyber Terrorism and Information Warfare; Introduction to Digital Forensics; Digital Forensics Categories

Reference Material:

1. Computer Security Fundamentals by Chuck Easttom, 4th edition or latest
2. Security+ Guide to Network Security Fundamentals, by Mark Ciampa, 5th Edition
3. Security in Computing by C.P. Pfleeger, Prentice-Hall, 4th Edition or Latest

Semester- 7

Course Name: Introduction to Data Science	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Artificial Intelligence	
Objectives: Data Science is the study of the generalizable extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science along with a good understanding of the craft of problem formulation to engineer effective solutions. The aim of this course is to: Introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset. Explain the significance of exploratory data analysis in data science. Identify common approaches used for Feature Generation as well as Feature Selection, and finally discuss the Ethical and Privacy issues. Programming language Python has been proposed for the practical work of this course	
Course Outline: Introduction: What is Data Science? Big Data and Data Science hype, Datafication, Current landscape of perspectives, Skill sets needed; Statistical Inference: Populations and samples, Statistical modeling, probability distributions, fitting a model, Intro to Python; Exploratory Data Analysis and the Data Science Process; Basic Machine Learning Algorithms: Linear Regression, k-Nearest Neighbors (k-NN), k-means, Naive Bayes; Feature Generation and Feature Selection; Dimensionality Reduction: Singular Value Decomposition, Principal Component Analysis; Mining Social-Network Graphs: Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighborhood properties in graphs; Data Visualization: Basic principles, ideas and tools for data visualization; Data Science and Ethical Issues: Discussions on privacy, security, ethics, Next-generation data scientists	
Reference Material: 1. Foundations of data science, Blum, A., Hopcroft, J., & Kannan, R., Vorabversion eines Lehrbuchs, 2016. 2. An Introduction to Data Science, Jeffrey S. Saltz, Jeffrey M. Stanton, SAGE Publications, 2017. 3. Python for everybody: Exploring data using Python 3, Severance, C.R., CreateSpace Independent Pub Platform. 2016. 4. Doing Data Science, Straight Talk from the Frontline, Cathy O'Neil and Rachel Schutt, O'Reilly. 2014. 5. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services, John Wiley & Sons, 2015	

Course Name: Entrepreneurship	
Course Structure: Lectures: 3 / Labs: 0	**Credit Hours:** 3
Prerequisites:	
Objectives:	
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 146 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 Material: 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, 2008). ISBN-10: 0324590911
5. Entrepreneurship: Successfully Launching New Ventures by Bruce R. Barringer and Duane Ireland, Prentice Hall; 4th Edition (October 27, 2011)

Course Name: HCI & Computer Graphics	
Course Structure: Lectures: 3 / Labs: 0	**Credit Hours:** 3
Prerequisites: Software Engineering	
Objectives:	
Course Outline: Contexts for HCI, Psychology of usable things, Processes for User-Centered Design, Metrics and Measures for Evaluation, Usability heuristics and principles of Usability testing, Physical capabilities, Cognitive and social models for interaction design, Principles of good interaction design, Accessibility, Principles of GUI, Visual design elements, Data gathering, Task analysis, Prototyping, Help and user documentation, Internationalization, Usability inspection methods, Usability testing methods, New Interaction Technologies, Usability in practice, Visual Design and Typography, Icon Design, Ubiquitous, Augmented and Virtual Reality	
Reference Material: 1. Designing the User Interface: Strategies for Effective Human-Computer Interaction, Ben Shneiderman and Catherine Plaisant, 6th Ed, Pearson Inc, 2016. 2. Designing Interactive Systems: A Comprehensive Guide to HCI, UX and Interaction Design, Benyon, D. 3rd Ed., Pearson. 2013 3. About Face: The Essentials of Interaction Design, Alan Cooper, Robert Reimann, David Cronin, Christopher Noessel, 4th Ed, Wiley, 2014	

Course Name: Technical Writing	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites:	
Objectives:	
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. Presentation skills: Speaking Effectively. Interviews , telephonic, face to face, different kinds of interviews. Techniques and strategies for making and delivering a presentation, use of AV aids 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, Technical report, short and long report, progressive report. Business letters of different kinds, good news, bad news, invitations, adjustments, resignation, letter for joining. Cover letter. CV and Resume with different types. 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, proposal for a research, Developing a Preliminary Thesis, Creating a Research File and a Timeline, Reading and Note taking, Summarizing, Paraphrasing, and Synthesizing. Writing a Position Paper
Reference Material: 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. 4. Mecnakshi Raman & Sangeeta Technical Communication

Course Name: Principals of Marketing	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3

Overall Aims of the Course

Course Description:

This course is designed to provide students with an understanding of the principles of Marketing. There will be a focus on the management of the marketing activities and how marketing relates to overall organizational functioning, including the management of exchange processes between business units and consumers and between firms. It will include topics such as environmental analysis, industry and competitor analysis, objective setting, marketing strategies, market mix components, and finally implementation and control mechanisms. Additionally, the course will provide opportunities for the practical implementation of the concepts covered and the development of problem solving skills by means of face-to-face seminars and tutorials, online learning and a marketing practice simulation. Marketing is the business function that identifies customer needs and wants, determines which target markets the organization can serve best, and designs appropriate products, services, and programs to serve these markets. It guides the entire organization. The goal of marketing is to create customer satisfaction by building value-based relationships with customers, in conjunction with other internal and external business units.

Course Objectives are:

- Understand the role of marketing within society and within an economic system
- To understand how organizations identify customers and their wants/needs.
- To recognize and suggest applications of the marketing concept.
- To comprehend marketing decisions, based upon the combination of product, price, promotion, and distribution elements. In this course, you will study consumer and industrial markets and understand the value of the marketing mix in the marketing planning process.

- To understand marketing is carried out by an organization to meet the requirements of domestic and international buyers, both households and businesses, within the bounds of ethics and the legal environment.
- To apply key frameworks and methods, and develop analytical skills to solve marketing problems.
- To provide you with a firm foundation in marketing theory and marketing lexicon.
- Another course objective is to relate the impact of marketing and its integration with your own major or field of interest.

  The most important element you will acquire from this course is not a list of formulas, definitions, and properties. It is the gain of a cognitive approach to synthesize information about various alternatives to economic decisions

Learning Outcomes:

On completion of this course, the student will be able to

- Understand the fundamental principles of marketing
- Explain marketing concepts and ideas in their own words
- Develop an organization's marketing strategy and implementation as part of a simulation
- Think strategically about marketing issues
- Develop an argument and express themselves clearly in written and oral communication
- Consider ethical issues

Class Format:

Our weekly class Instructions and discussions will follow this format:

Weekly Course Objectives		
Week	**Module**	**In This Chapter, We Will Address the Following Questions.**
1 - 2	**Chapter – 1: (Page 04 –29 of TEXT BOOK) Marketing's Value To Consumers, Firms And Society**	▪ Know what marketing is and why you should learn about it. ▪ Understand the difference between marketing and macro marketing. ▪ Understand what a market driven economy is and how it adjusts the macro-marketing system. ▪ Understand what customer value is and why it is important to customer satisfaction. ▪ Understand the important new terms.

3	**Chapter – 2: Marketing Concepts and Definitions Management Philosophy (Page 30 – 55) TEXT BOOK**	▪ How does marketing affect customer value? ▪ How strategic planning is carried out at different levels of the organization? ▪ What does a marketing plan include? ▪ Know what the marketing concept is –and how it should guide a firm or nonprofit major organization. ▪ Relationship Marketing Establishing Profitable Customer Relations
4 - 5	**Chapter – 3: (Page 56 –85 of TEXT BOOK) Evaluating Opportunities In The Changing Marketing Environment**	▪ Know the variables that shape the environment of marketing strategy planning. ▪ Understand why company objectives are important in guiding marketing strategy planning. ▪ Understand how the economic and technological environments can affect strategy planning. ▪ Know how elements of the political and legal environment affect marketing strategy planning. ▪ Understand the cultural and social environment and how demographic trends affect strategy planning. ▪ Understand how to screen and evaluate marketing strategy opportunities.
6 –7	**Chapter – 4: (Page 86 –114 of TEXT BOOK) Focusing Marketing Strategy With Segmentation And Positioning**	▪ Know about defining generic markets and product markets. ▪ Know what market segmentation is and how to segment product markets in to submarkets. ▪ Recognize how some computer aided methods are used in segmenting. ▪ Know dimensions that may be useful for segmenting markets. Know what positioning is and why it is useful.
8	**Chapter – 5: (Page 115 – 141 of TEXT BOOK)** **The MKT Environments**	▪ Internal and External Analysis of the Company ▪ See why business and organizational purchase decisions often involve multiple influences. ▪ The Competition Competitor Analysis-introduction
10 - 11	**Chapter – 6: (Page 142 – 166 of TEXT BOOK)** **Business and Organizational Customers and Their Buying Behavior**	▪ Describe who the business and organization buyers are. ▪ See why business and organizational purchase decisions often involve multiple influences. ▪ Understand the different types of buyer seller relationships and their benefits and limitations. ▪ Know about the number and distribution of manufacturers and why they are important customer group. ▪ Know how buying by service firms, retailers, wholesalers and governments similar to-and different from-buying by manufacturers.
12 - 13	**Chapter – 8: (Page 196 – 223 of TEXT BOOK)**	▪ Understand what "product" really means. ▪ Know the key difference between goods and services. ▪ Understand the importance of packaging in strategy planning.

	Elements of Product Planning for Goods and Services	▪ Understand the role of warranties in strategy planning. ▪ Know the differences among various consumer and business product classes. ▪ Understand how product classes can help a marketing manager plan marketing strategies.
14 – 15	**Chapter – 10: (Page 253 – 277 of TEXT BOOK)** **Place and Development of Channel Systems**	▪ Understand what product classes suggest about place objectives. ▪ Understand why some firms use direct channel systems while others work with intermediaries and indirect systems. ▪ Know how to channel members in vertical marketing systems shift and share functions to meet customer needs. ▪ Know how multichannel distribution and reverse channels operate. ▪ Know the main approaches firms use to reach customers in international markets
16	**Chapter – 13: (Page 328 – 355 of TEXT BOOK)** **Promotion - Introduction to Integrated Marketing Communication**	▪ Know the advantages and disadvantages of the promotion methods a marketing manager can use in strategy planning. ▪ Understand the importance of promotion objectives. ▪ Know how the traditional communication process affects promotion planning. ▪ Understand how customer initiated interactive communication is different. ▪ Understand how promotion blends typically vary over the adoption curve and product life cycle
17	**Chapter – 16: (Page 418 – 445 of TEXT BOOK)** **Pricing Objectives and Policies**	▪ Understand how pricing objectives should guide strategy planning for pricing decisions. ▪ Know what a marketing manager should consider when setting the price level for a product in the early stages of product life cycle. ▪ Understand the many possible variations of a price structure, including discounts, allowances, and who pays transportation costs. ▪ Understand the value pricing concept and its role in obtaining a competitive advantage and offering target customers superior value.

Required Learning Resources	
Text Book(s): (Title, Author, Edition, Publisher)	"Basic Marketing: A Marketing Strategy Planning Approach" By William D. Perreault, Jr., Joseph P. Cannon, E. Jerome McCarthy, (19th Edition) McGraw-Hill Irwin Publisher.
Reference Book(s): (Title, Author, Edition, Publisher)	''Principles of Marketing" By Philip Kotler, Gary Armstrong, Agnihotri, Ehsan ul Haque, (13th Edition): A south Asian Perspective, Pearson Publisher.

Semester- 8

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

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

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

Resources:

1. Deborah G. Johnson, "Computer Ethics", Pearson Education (2001) 3rd edition.
2. *Professional Issues in Software Engineering*, M.F. Bott et. al.

Department of Sociology

GC University Faisalabad

Dated: 13/11/2023 No: GCUF/SOC/2023/2008

Tel: 041-9201412

The Chairperson
Department of Computer Science
Government College University
Faisalabad,

Subject: PROVISION OF COURSE CONTENTS

Dear Sir,
It is stated that according to above mentioned subject the following outline is officially approved by the higher education commission of Pakistan for the course of community development soc-407 is as follows

COMMUNITY DEVELOPMENT

Course Objectives:
The course aims at acquainting the students with the basic concepts of community development, approaches, strategies and theories. The emphasis will be placed on community mobilization and organization. The course will also focuses on participatory models of community development as well.

Course Contents:

Introduction
a. Meaning and definition of community.
b. Meaning and definition of community development.
c. Objectives of community development.
d. Basic principles of community development.
e. Functions of community development worker.

Philosophy of Community Development
a. Elements of Community Development.
b. Philosophy of Community Development.
c. Limitation in Community Development

Early Community Development Programmes of Pakistan
a. The V-AID programme.
b. The Basic Democracy (B.D's) System.
c. The Integrated Rural Development Programme (IRDP)
d. The People's Works Programme (PWP)
e. Rural Works Programme (RWP)

Community Organization

a. Community Organization, Meaning and Definitions
b. Difference Between Community Development and Community Organization.
c. Aims and Objectives of Community Organization.
d. Philosophy of Community Organization.
e. Assumptions Pertaining Community Life.
f. Role of Community Organizer.

Community Participation

a. Community Participation, Meaning and Definitions.
b. Types of Community Participations.
c. Causes of lack of Community Participation.

Techniques of Community Development

a. Meaning and definitions
b. Social mobilization
c. Barriers in Social Mobilization
d. Social Organization
e. Resource Mobilization

Planning and Social Planning

a. Meaning and Definition.
b. Kinds of Planning
c. Principles of Planning
d. Importance of Planning
e. Basic steps in Planning
f. Social Planning
g. Various steps for Social Planning
h. Importance of Social Planning

Development Through NGOs

a. Meaning of NGO/CSO's
b. Features of NGO/CSO's
c. Growth of NGO'S in Pakistan
d. Role of NGOs in Community Development.

Recommended Books:

1. Alam A. (2004). Community Development. Peshawar, Saif Printing Press,
2. Grosser, Chales, F. (1973). New Direction in Community Organization. London, Pareger Publisher.
3. Khalid, SM (2001). Social Work Theory and Practice. Karachi, Millat Publication.
4. Leapiere, R.A.B. (2001). Community Work, National Council of Social Services, 26 Bedford Square. King, Co
5. Mozirow, Jack, (2001). Dynamics of Community Development New York The Fleare Crow Press
6. Pearlman, R. et al (1996). Community Organization and Social Planning. New York, Horcout, Brueo And Company

7. Peter, H (2001). Community Organization. London, Roultedge and Kagan Paul.
8. Rafique. Z.R. (1985). Techniques and Methods In Community Development. Department of Social Work, University of Peshawar.
9. Ross, Murry, G. (2002). Case Histories in Community Organization. New York, Harper Brother.

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DEPARTMENT OF PAKISTAN STUDIES

GOVERNMENT COLLEGE UNIVERISTY FAISALABAD

Course Title = Constitutional Developments in Pakistan

Course Code = PST -506

Course Description

The aim of the course is to explain the students with the nature and direction of the constitutional development of Pakistan.

The course is designed with the aim to assess the intellectual capacities and learning abilities of the participants and measurably improve upon these as a first step. The course will facilitate understanding of major concepts, definitions, trends, and debates prevalent on the topic of Constitutional Development in Pakistan. Constitutional history of Pakistan has all the major components of constitutional systems of the established democracies as inherited from the British period. In case of Pakistan specifically, constitutional disruptions, strained civil and military relations, military coups, tensions between the judiciary and the executive, and ambiguities over the role of Islam in the state have marred the process of Constitutional development. The course will introduce the students to relevant concepts, debates and discussions of the topic.

Learning Objectives

By the end of this course students will able to;

a) To develop critical thinking for understanding Constitutional development in Pakistan;

b) To develop knowhow, methods, and processes for analysis of Constitutional Law;

c) To enable to design, organize, and conduct surveys, interviews that involve the citizens;

d) To develop understanding of the legal and constitutional structure of the state;

e) To develop comprehension of the interconnectivity between the Constitutional provisions and political practice;

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f) To expose students, inter alia, to basic concepts of federalism, rule of law, separation of powers, social justice, and electoral process, etc.

Learning Methodology

The course will primarily depend on lecture-discussions. Efforts will be made to develop critical and analytical abilities of the participant students. A great deal has been written and published related to the issues of Constitutional Development in Pakistan. Recommended text and reference books have been selected for the basic facts and quality of analysis that they offer to the reader. Important chapters shall be identified and discussed.

SYLLABUS

Introduction to the Constitution of Pakistan

- Definition and importance of a constitution.
- Ideological factors that shaped the constitution (s) of Pakistan (Objectives
- Resolution 1949).
- Overview of constitutional developments in Pakistan.
- Basic Concepts—Rule of Law and the 1973 Constitution.
- An Overview of the Constitution of Pakistan.

Constitutional Amendments:

- Procedures for amending the constitution.
- Notable constitutional amendments and their implications.
- General Principles of Constitutional Law.
- Brief history and the essential features of the 1973 Constitution of Pakistan.

Constitution and state structure:

- Structure of Government (executive, legislature, and judiciary).
- Distribution of powers between federal and provincial governments.
- Nature and scope of the Rule of Law

Reference Books

- Afzal, M. Rafique, Pakistan, History and Politics 1947-1971 Oxford: The University Press, 2001.
- Allen Megrath, The Destruction of Pakistan's Democracy. Karachi: Oxford University Press, 1994.
- Feldman Herbert. From Crisis to Crisis, 1962-1969. London: Oxford University Press, 1972.
- The End of the Beginning: Pakistan 1969-1971. London: Oxford University, Press, 1975.
- Revolution in Pakistan: A Study of the Martial Law Administration. London: Oxford University Press, 1967.
- Gauhar, Altaf. Ayub Khan: Pakistan's First Military Ruler. Lahore: Sangi-Meel Publications, 1993.
- Jahan, Rounag. Pakistan Failure in National Integration. New York: Columbia University Press,
- Jalal Ayesha. Democracy and Authoritarianism in South Asia: A Comparative and Historical Perspective. London: Cambridge University Press, 1995.
- Khan, Hamid. Constitutional and Political History of Pakistan. Karachi: Oxford University Press, 2001.
- Khan Muhammad Ayub, Friends Not Masters: A Political Autobiography. London: Oxford University Press, 1967.
- Khan, Tamizuddin,. The Test of time: My Life and Days. Dhaka: The University Press Ltd, 1989.
- Noor, Feroz Khan. From Memory. Lahore: Ferozsons, 1966.
- Rashiduzzaman, M. Pakistan: A Study of Government and Politics. Dacca: The University Press, 1967.
- Salamat, Zarina. Pakistan 1947-58, An Historical Review. Islamabad, NIHCR 1992.
- Sayeed, Khalid. B. Pakistan: The formative Phase. Oxford: Oxford University Press, 1968.
- Politics in Pakistan: The Nature and Direction of Change. New York: Practer, 1980.

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- Talbot, Ian. Pakistan: A Modern History. Lahore: Vanguard Books, 1999.
- Waseem, Mohammad. Politics and the State in Pakistan. Islamabad: NIHCR, 1994.
- Yousaf, Hamid. Pakistan in Search of Democracy, 1947-1977. Lahore: Afroasia, 1980
- Ziring, Lawrence, Pakistan in the Twentieth Century: A Political History. Karachi: Oxford University Press, 1997.

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