UNIVERSITY OF SARGODHA
OFFICE OF THE REGISTRAR
(ACAD BRANCH)

NOTIFICATION

On the recommendations of Academic Council made in its 24th (1/2025) meeting held on 26.08.2025, the Syndicate in its 72nd (4/2025) meeting held on 12.09.2025 has approved the revised curriculum of BS Computer Science (5th Semester Intake) for main campus and affiliated colleges for implementation w.e.f. **Fall 2025** (Annex-'A').

(WAQAR AHMAD)
Additional Registrar (General)

No. SU/Acad/25/ 1193

Dated: 05.11.2025

Distribution:

- Chairman, Department of Computer Science
- Controller of Examinations
- Director Academics

C.C:

- Dean Faculty of Computing & Information Technology
- Director, QEC
- Additional Registrar (A & R) *{With the request to forward the notification alongwith curriculum to all Principals of affiliated colleges concerned}*
- Secretary to the Vice-Chancellor
- PA to Registrar
- Notification File

Curriculum

of

BS Computer Science 5th Semester Intake

for

Main Campus and Affiliated Colleges

Department of Computer Science

University of Sargodha

(Applicable from Fall 2025)

Table of Contents

Underlying Principles of Computer Science Degree Programs

Computing (a nucleus of all activities including technical, academic, professional and development practices relating to computers) provides a wide range of choices on how an individual might focus his or her professional life. This document provides an overview of the different kinds of degree programs in Computing that are currently available and for which curriculum standards are now available. It is believed that this report may be an essential source for university faculty, administrators, students, parents and professionals who need to be aware of Computing as a broad based discipline that crosses the boundaries between science, engineering, and professional practice. In reality, computing consists of several disciplines. Various questions are naturally critical including: what are the different kinds of Computing degree programs or how are they similar and how are they different? The variety of degree programs in Computing presents prospective students, educators, and administrators with important choices where they may focus their efforts.

The following sections of the report also provide a complete detail of the proposed curricula pertaining to the Computer Science BS program. All details regarding the scheme of study, course content with CLOs, and overall structure of the degree programs are presented in this document. Computing is a dynamic field and accordingly a good care has been taken to design a flexible structure that will maintain currency with the latest scientific and technological advancements in the field. Moreover, it seems that Computing is a discipline that incorporates scientific, engineering, and creative features. A reasonable emphasis has been given to formal scientific and engineering areas to enhance the level of formalization in the degree programs. Technology can play an important role in the implementation of Computing programs. As a result, all programs are structured on essential dimensions including scientific knowledge, technology, and design skills.

Curriculum for BS Computer Science 5th Semester Intake

BS Computer Science 5th Semester Program's Rationale

Computer Science is the systematic study of the feasibility, structure, expression, and mechanization of the methodical processes (or algorithms) that underlie the acquisition, representation, processing, storage, communication of, and access to information, whether such information is encoded in bits and bytes in a computer memory or transcribed in genes and protein structures in a human cell.

Computer Science spans a wide range, from its theoretical and algorithmic foundations to cutting-edge developments in robotics, computer vision, intelligent systems, bioinformatics, image processing, computational biology, computational lenses, and other exciting areas. Computer scientists develop new programming approaches for software development, devise new ways to use computers and develop effective ways to solve computing problems. While other disciplines produce graduates with more immediately

relevant job-related skills, computer science offers a comprehensive foundation for research and innovation.

Recent developments in computer hardware, software and communication technologies have offered new exciting opportunities and challenges for creation of innovative learning environments for Computer Science and its curricula design. The challenge of getting all newly emerging technologies incorporated into the curriculum is becoming pivotal for the effectiveness of curricula. There is a need for curricula structures that are really able to meet the challenges of 21st century knowledge driven complex work places. The key rationale behind the BS Computer Science 5th Semester IntakeComputer Science program is to prepare a curriculum that provide integration of all components and the foundations that allow accessing all of the new knowledge and technology to fulfill the vision of future.

Objectives

BS COMPUTER SCIENCE 5TH SEMESTER INTAKE Program is committed to create, expand, disseminate and teach the computer science body of knowledge through academics, applications and research which positively impact society locally, nationally, and internationally.

BS COMPUTER SCIENCE 5TH SEMESTER INTAKE program aims to develop students' critical professional thinking and intuition. The program's curriculum provides a balanced mixture of learning experiences to make the graduates capable of sound professional decisions. As a result, the successful graduates will be able to assume responsible positions in business, government, and education at the research, development, and planning levels. The program also provides an excellent foundation for further formal learning and training. The program is also expected to provide environments to put into practice, the principles and techniques learnt during the course of implementation of the program's curriculum. Some of the key objectives of the program are listed below:

- The program should provide a broad understanding of the field through introducing concepts, theory, techniques, and through intensive education/training in focused areas of Computer Science.
- The program should encourage students to develop and use abstract models in addition to apply respective technology in practical situations.
- The program should promote students' special communication skills both orally and in writing. They must be able to produce well-organized reports/presentations/projects, which clearly delineate objectives, methods of solution, results, and conclusions for a complex task.
- The program should provide formal foundations for higher learning and education.
- The program should be dynamic and flexible enough to maintain its body of knowledge in line with the latest scientific and technological developments in the field.
- The program should provide professional orientation to prepare students for industry.

Curricula Consideration

During the revision of the Computing Curricula two major guidelines have been considered (ACM and Seoul Accord). However, in some cases the main focus of these guidelines is mostly traditional Computer Science programs.

Association of Computing Machinery (ACM) - Guidelines

Association of Computing Machinery (ACM), USA is the largest body in the world for computer scientists. Its membership is spread over the entire globe. It has a pool of highly reputed professionals which meet after a few years to assess the directions being taken by the computing discipline. In view of its assessment, it identifies knowledge areas and also their relative importance in the years to come. Thus, ACM shows the path to follow to the computing academia and professionals all over the world. Computing curricula are designed keeping in view following identified knowledge areas of ACM [ref # ACM 2013 curriculum report]. It has been tried to reasonably cover all knowledge areas without compromising the flexibility needed for a national model curriculum. The mapping of these key knowledge areas with the courses are given in the table below.

- AL - Algorithms and Complexity
- AR - Architecture and Organization
- CN - Computational Science
- DS - Discrete Structures
- GV - Graphics and Visual Computing
- HCI - Human-Computer Interaction
- IAS - Information Assurance and Security
- IM - Information Management
- IS - Intelligent Systems
- NC - Networking and Communications
- OS - Operating Systems
- PBD - Platform-based Development
- PD - Parallel and Distributed Computing
- PL - Programming Languages
- SDF - Software Development Fundamentals
- SE - Software Engineering
- SF - Systems Fundamentals
- SP - Social Issues and Professional Issues

The following knowledge areas have been addressed with the major computing courses.

Knowledge Areas in ACM CS 2013 Curriculum

	Knowledge Area	CS 2013		ACM 2013 Subjects Taught in Various Universities	NCEAC Revised 2023 Subjects in Core
		Tier-1	Tier-2		
1	AL-Algorithms and Complexity	19	9	Algorithms; Algorithms and Data Structures;	Data structures, Analysis of Algorithms, Theory of Automata

				Algorithm Design and Analysis	
2	AR-Architecture and Organization	0	16	Intro to Computer Architecture; DLD; Computer Engineering	DLD, Computer Org & Assembly Language, Computer Architecture
3	CN-Computational Science	1	0	eScience; Modeling and Simulation; Computer Graphics	HCI & Computer Graphics; (Elective: Numerical Analysis)
4	DS-Discrete Structures	37	4	Discrete Mathematics; Mathematical Foundations of CS; Probability for CS; Discrete Structures 1; Discrete Str 2	Discrete Structures, Probability & Statistics
5	GV-Graphics and Visualization	2	1	Computer Graphics; Computer Graphics	HCI & Computer Graphics; (Elective: Computer Graphics)
6	HCI-Human-Computer Interaction	4	4	Human Computer Interaction	HCI & Computer Graphics
7	IAS-Information Assurance and Security	3	6	Computer Systems Security	Information Security; (Elective: Cyber Security)
8	IM-Information Management	1	9	Database Systems	Database Systems; Adv Database Management Sys
9	IS-Intelligent Systems	0	10	Artificial Intelligence Programming; Artificial Intelligence	Artificial Intelligence
10	NC-Networking and Communication	3	7	Introduction to Computer Networking; Computer Networks	Computer Networks

Outcome Based Education (OBE) System and Seoul Accord:

Keeping in view the latest transformation from knowledge-based education philosophy to Outcome based education (OBE) system, the OBE model based on Seoul Accord has also been considered. Computing programs prepare students to attain educational

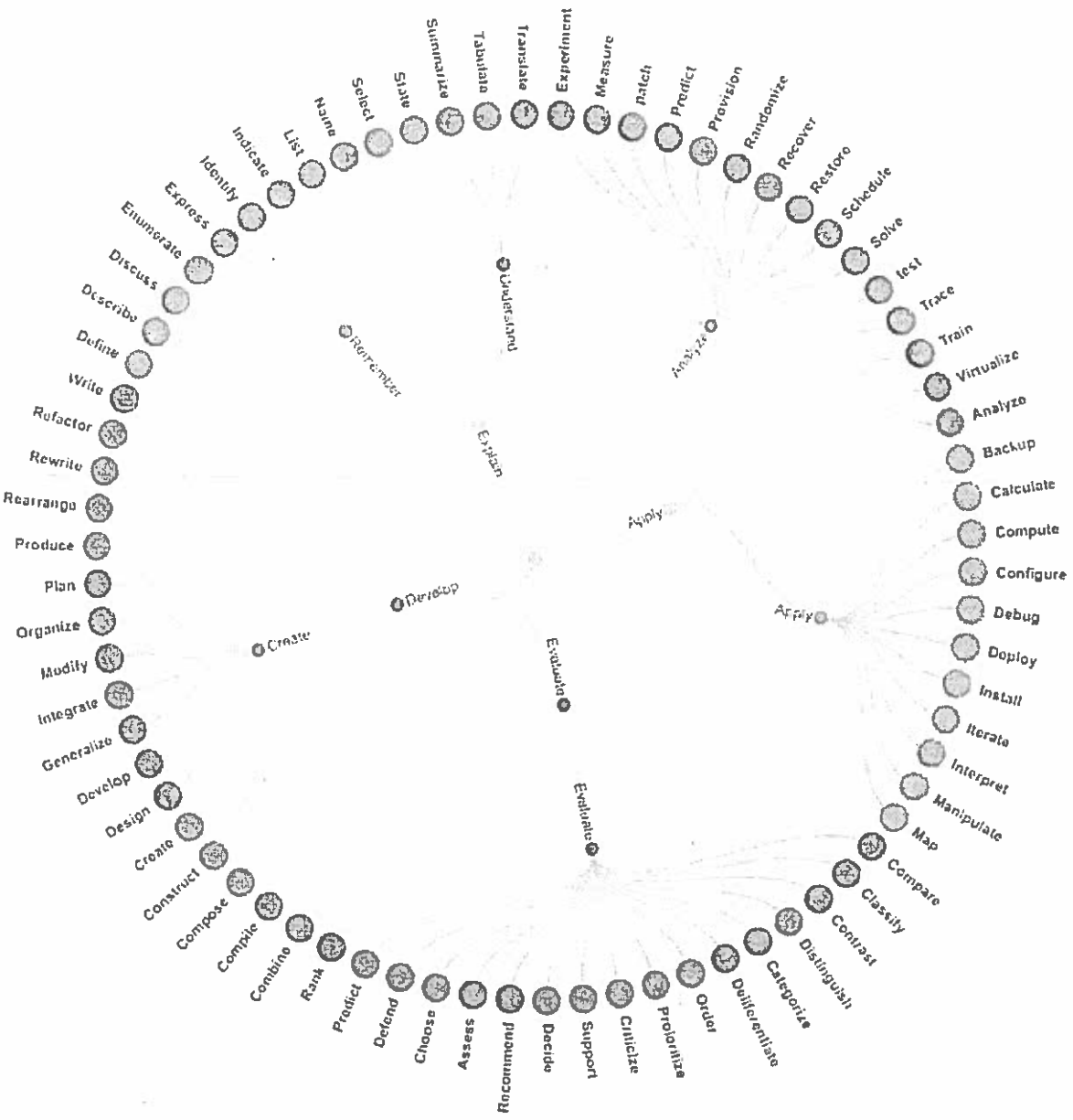
objectives by ensuring that students demonstrate achievement of the following outcomes (derived from Graduate Attributes define by Seoul Accord www.seoulaccord.org).

S#	Program Learning Outcomes (PLOs)	Computing Professional Graduate
1	Academic Education	To prepare graduates as computing professionals
2	Knowledge for Solving Computing Problems	Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
3	Problem Analysis	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
4	Design/ Development of Solutions	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
5	Modern Tool Usage	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
6	Individual and Team Work	Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.
7	Communication	Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
8	Computing Professionalism and Society	Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
9	Ethics	Understand and commit to professional ethics, responsibilities, and norms of professional computing practice

10	Life-long Learning	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional

Bloom's Taxonomy

Revised Bloom's Taxonomy	Skill level with applicable verbs
Remember	**Explain:** define, describe, discuss, enumerate, express, identify, indicate, list, name, select, state, summarize, tabulate, translate
Understand	
Apply	**Apply:** backup, calculate, compute, configure, debug, deploy, experiment, install, iterate, interpret, manipulate, map, measure, patch, predict, provision, randomize, recover, restore, schedule, solve, test, trace, train, virtualize
Analyze	**Evaluate:** analyze, compare, classify, contrast, distinguish, categorize, differentiate, discriminate, order, prioritize, criticize, support, decide, recommend, assess, choose, defend, predict, rank
Evaluate	
Create	**Develop:** combine, compile, compose, construct, create, design, develop, generalize, integrate, modify, organize, plan, produce, rearrange, rewrite, refactor, write



Program's Outcome

The program will produce Computer Scientists of great character, competence, vision and drive equipped with up-to-date knowledge, marketable skills, valuable competencies, unique expertise, globally compatible dispositions and culturally and professionally acceptable values to take on appropriate professional roles in computer science domain or proceed to further or higher education or training.

Program's Structure

The structure of BS Computer Science 5th Semester Intake program meets the needs of students with formal computing experience and relevant skills. The students are expected to learn theoretical and practical understanding of the entire field of Computer Science. The program structure is dynamic and provides basis for various

options including Breadth-Based, Depth-Based, and Integrated Breadth & Depth-Based specializations. Student may choose a particular option, which is the most appropriate to their planned future career. Followings are the program's details:

Degree Requirement

Minimum credit hours shall be 60 for the BS Computer Science 5th Semester Intake. Deficiency courses may be offered to the students by the department.

Duration

The program shall comprise of minimum four semesters/terms spread over two calendar years with two semesters/terms a year as per the rules of the University.

Eligibility Criteria

1. Maximum age limit 26 years at the time of admission.
2. ADP/ ADS Specialization in (Computer Science or Computing relevant) of two years (Semester system) with minimum CGPA of 2.5. Minimum credit hours should not be less than 72.
3. ADP/B.Sc of two years (Annual System) minimum marks obtained should not be less than 45%. ADP/B.Sc with (Computer Studies out of 200 + Mathematics out of 200) Minimum.
4. In addition to the above mentioned eligibilities, the applicant must have one of the following combination in his/her Intermediate (HSSC) examination along with at least 50% passing marks.
   i. Pre-Engineering
   ii. Pre-Medical
   iii. General Science
      a. Mathematics, Statistics, Physics
      b. Mathematics, Statistics, Economics
      c. Mathematics, Statistics, Computer
      d. Mathematics, Physics, Computer
      e. Mathematics, Economics, Computer
   iv. A-Levels (with equivalence of mentioned above by IBCC).

Assessment & Evaluation

University's semester and examination rules & regulations shall be followed for assessment & evaluation.

Distribution of Courses

The distribution of total credit hours for BS COMPUTER SCIENCE 5th Semester Intake is given as follows:

BS Computer Science 5th Semester Intake			
Category	**Major Areas**	**Credit Hours**	**Courses**
General education	General Education Requirement	15	08
Major courses	Computing core	15	05
	Domain core	18	06
	Domain elective	09	03
Interdisciplinary courses	Mathematics & supporting	03	01
		60	**23**

Mapping of BS Computer Science Program on the Generic Structure

Computing Core Courses – 15 Credit Hours (05 Courses)					
Sr#	**Sem#**	**Code**	**Pre-Req**	**Course Title**	**CH (Theory-Lab)**
1	5	CMPC-6201		Operating Systems	3 (2-3)
2	7	CMPC-6101		Analysis of Algorithms	3 (3-0)
3	7	CMPC-6702		Final Year Project - I	2 (0-6)
4	8	CMPC-6703	CMPC-6702	Final Year Project - II	4 (0-12)
5	5	CMPC-5208		Computer Networks	3 (2-3)

Domain Core – 18 Credit Hours (6 Courses)					
Sr #	**Sem#**	**Code**	**Pre-Req**	**Course Title**	**CH (Theory-Lab)**
1	4	CSDC-5102		Advanced Database Management Systems	3 (3-0)
2	5	CSDC-6201		HCI & Computer Graphics	3 (3-0)
3	5	CSDC-6202		Computer Architecture	3 (3-0)
4	6	CSDC-6203		Compiler Construction	3 (3-0)
5	5	DSDC-5201		Introduction to Data Science	3 (3-0)
6	6	ITDC-6204		Parallel & Distributed Computing	3 (3-0)

Domain Elective – 09 Credit Hours (3 Courses)					
Sr #	Sem#	Code	Pre-Req	Course Title	CH (Theory-Lab)
3	5/6/7	CSDE-6501		MERN Stack Development	3 (3-0)
3	5/6/7	CSDE-6502		Django Web Framework	3 (3-0)
3	5/6/7	SEDC-6202		Software Project Management	3 (3-0)

Mathematics & Supporting Courses – 03 Credit Hours (1Courses)					
Sr#	Sem#	Code	Pre-Req	Course Title	CH (Theory-Lab)
1	3	MATH-5103		Probability & Statistics	3 (3-0)

General Education Requirement – 13 Credit Hours (06 Courses)					
Sr#	Sem#	Code	Pre-Req	Course Title	CH (Theory-Lab)
1	8	URCG-5122		Ideology and Constitution of Pakistan	2 (2-0)
2	8	URCS-6101		Professional Practices	2 (2-0)
3	8	URCG-5125		Civics and Community Engagement	2 (2-0)
4	7	URCG-5124		Entrepreneurship	2 (2-0)
5	7	ENGL-6101	URCG-5118	Technical & Business Writing	3 (3-0)
6	5	URCA-5101		Introduction to Management	2 (2-0)
7	6	URCG-5129		Understanding of Holy Quran-I	1 (0-1)
8	8	URCG-5130		Understanding of Holy Quran-II	1 (0-1)
9	6	URCG-5131		Ethics-I	1 (0-1)
10	8	URCG-5132		Ethics-II	1 (0-1)

Course Coding Scheme

Level	Course Type
5	Foundation, Core Level 1 Courses
5	Foundation, Core Level 1 Courses
6	Core Level 2 + Specialization Level 1
6	Specialization Level 2

Code	Discipline
CMPC	Computing Core
CSDC	Computer Science Domain Core
CSDE	Computer Science Domain Elective
ITDC	Information Technology Domain Core
ITDE	Information Technology Domain Elective
SEDC	Software Engineering Domain Core
SEDE	Software Engineering Domain Elective
AIDC	Artificial Intelligence Domain Core
AIDE	Artificial Intelligence Domain Elective
DSDC	Data Science Domain Core
DSDE	Data Science Domain Elective
URCP	Pakistan Studies
URCI	General Science
MATH	
ENGL	
URCC	
URCQ	
URCS	
URCE	
URCA	
URCF	
URCW	
URCT	

Scheme of Studies for BS Computer Science 5th Semester Intake for Main Campus (60Credit Hours)

Semester V

S#	Code	Pre-requisite	Course Title	Domain	CH (Theory-Lab)
1	CMPC-6201		Operating Systems	Core	3 (2-3)
2	CMPC-5208		Computer Networks	Core	3 (2-3)
2	CSDC-6201		HCI & Computer Graphics	Domain Core	3 (3-0)
3	CSDC-6202		Computer Architecture	Domain Core	3 (3-0)
4	CSDC-6203		Compiler Construction	Domain Core	3 (3-0)
5	DSDC-5201		Introduction to Data Science	Domain Core	3 (3-0)
6	URCA-5101		Introduction to Management	GER	2 (2-0)
				Total Credit Hours	**20 (18-06)**

Semester VI

S#	Code	Pre-requisite	Course Title	Domain	CH (Theory-Lab)
1	CSDC-5102		Advance Data Base Management System	Domain Core	3 (3-0)
2	ITDC-6204		Parallel & Distributed Computing	Domain Core	3 (3-0)
3	SEDC-6202		Domain Elective-I	Domain Elective	3 (3-0)
4	CSDE-6501		Domain Elective-II	Domain Elective	3 (3-0)
5	CSDE-6502		Domain Elective-III	Domain Elective	3 (3-0)
6	URCG-5129		Understanding of Holy Quran/Fehm-e-Quran-I OR	GER	1 (0-1)
7	URCG-5131		Ethics-I	GER	1(0-1)
				Total Credit Hours	**16 (16-1)**

Semester VII

S#	Code	Pre-requisite	Course Title	Domain	CH (Theory-Lab)
1	CMPC-6702		Final Year Project - I	Core	2 (0-6)
2	CMPC-6101		Analysis of Algorithms	Core	3 (3-0)
3	MATH-5103		Probability & Statistics	MATH	3 (3-0)
4	ENGL-6101	URCG-5118	Technical & Business Writing	GER	3 (3-0)
5	URCG-5124		Entreprencurship	GER	2 (2-0)
				Total Credit Hours	13 (11-6)

Semester VIII

S#	Code	Pre-requisite	Course Title	Domain	CH (Theory-Lab)
1	CMPC-6703	CMPC-6702	Final Year Project - II	Core	4 (0-12)
2	URCG-5122		Ideology and Constitution of Pakistan	GER	2 (2-0)
3	URCS-6101		Professional Practices	GER	2 (2-0)
4	URCG-5125		Civics and Community Engagement	GER	2 (2-0)
5	URCG-5130		Understanding of Holy Quran/Fehm-e-Quran-II OR	GER	1 (0-1)
6	URCG-5132		Ethics-11	GER	1(0-1)
				Total Credit Hours	11 (7-13)

Scheme of Studies for BS Computer Science 5th Semester Intake for Affiliated Colleges (60 Credit Hours)

Semester V

S#	Code	Pre-requisite	Course Title	Domain	CH (Theory-Lab)
1	CMPC-6201		Operating Systems	Core	3 (2-3)
2	CMPC-5208		Computer Networks	Core	3 (2-3)
2	CSDC-6201		HCI & Computer Graphics	Domain Core	3 (3-0)
3	CSDC-6202		Computer Architecture	Domain Core	3 (3-0)
4	CSDC-6203		Compiler Construction	Domain Core	3 (3-0)
5	DSDC-5201		Introduction to Data Science	Domain Core	3 (3-0)
6	URCA-5101		Introduction to Management	GER	2 (2-0)
				Total Credit Hours	20 (18-06)

Semester VI

S#	Code	Pre-requisite	Course Title	Domain	CH (Theory-Lab)
1	CSDC-5102		Advance Data Base Management System	Domain Core	3 (3-0)
2	ITDC-6204		Parallel & Distributed Computing	Domain Core	3 (3-0)
3	SEDC-6202		Software Project Management	Domain Elective	3 (3-0)
4	CSDE-6501		MERN Stack Development	Domain Elective	3 (3-0)
5	CSDE-6502		Django Web Framework	Domain Elective	3 (3-0)
6	URCG5129		Understanding of Holy Quran/Fehm-e-Quran-I OR	GER	1 (0-1)
7	URCG-5131		Ethics-I	GER	1(0-1)
				Total Credit Hours	**16 (16-1)**

Semester VII

S#	Code	Pre-requisite	Course Title	Domain	CH (Theory-Lab)
1	CMPC-6702		Final Year Project - I	Core	2 (0-6)
2	CMPC-6101		Analysis of Algorithms	Core	3 (3-0)
3	MATH-5103		Probability & Statistics	MATH	3 (3-0)
4	ENGL-6101	URCG-5118	Technical & Business Writing	GER	3 (3-0)
5	URCG-5124		Entrepreneurship	GER	2 (2-0)
				Total Credit Hours	**13 (11-6)**

Semester VIII

S#	Code	Pre-requisite	Course Title	Domain	CH (Theory-Lab)
1	CMPC-6703	CMPC-6702	Final Year Project - II	Core	4 (0-12)
2	URCG-5122		Ideology and Constitution of Pakistan	GER	2 (2-0)
3	URCS-6101		Professional Practices	GER	2 (2-0)
4	URCG-5125		Civics and Community Engagement	GER	2 (2-0)
5	URCG-5130		Understanding of Holy Quran/Fehm-e-Quran-II OR	GER	1 (0-1)
6	URCG-5131		Ethics-II	GER	1(0-1)
				Total Credit Hours	**11 (7-13)**

Computing Core Courses

CMPC-6201 Operating Systems	
Credit Hours:	3 (2-1)
Contact Hours:	2-3
Pre-requisites:	Data Structures

Course Introduction:

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.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand the characteristics of different structures of the Operating Systems and identify the core functions of the Operating Systems	C2 (Understand)
CLO-2	Analyze and evaluate the algorithms of the core functions of the Operating Systems and explain the major performance issues with regard to the core functions	C5 (Evaluate)
CLO-3	Demonstrate the knowledge in applying system software and tools available in modern operating systems.	C3 (Demonstrate)

Course Outline:

Operating systems basics, system calls, process concept and scheduling, inter-process communication, multithreaded programming, multithreading models, threading issues, process scheduling algorithms, thread scheduling, multiple-processor scheduling, synchronization, critical section, synchronization hardware, synchronization problems, deadlocks, detecting and recovering from deadlocks, memory management, swapping, contiguous memory allocation, segmentation & paging, virtual memory management, demand paging, thrashing, memory-mapped files, file systems, file concept, directory and
disk structure, directory implementation, free space management, disk structure and scheduling, swap space management, system protection, virtual machines, operating system security

Reference Materials (or use any other standard and latest books):

1. Modern Operating Systems, 5th edition by Andrew S. Tanenbaum, 2022
2. Operating Systems: Three Easy Pieces,byRemzi H Arpaci-Dusseau and Andrea C Arpaci-Dusseau,1st Edition, 2018
3. Operating Systems Concepts, 9th edition by Abraham Silberschatz,2012
4. Operating Systems, Internals and Design Principles, 9th edition by William Stallings, 2017

CMPC-6101Analysis of Algorithms	
Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	

Course Introduction:

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.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Explain what is meant by "best", "expected", and "worst" case behavior of an algorithm	C2 (Understand)
CLO-2	Identify the characteristics of data and/or other conditions or assumptions that lead to different behaviors.	C3 (Apply)
CLO-3	Determine informally the time and space complexity of simple algorithms	C3 (Solve)
CLO-4	List and contrast standard complexity classes	C4 (Examine)
CLO-5	Use big O, Omega, Theta notation formally to give asymptotic upper bounds on time and space complexity of algorithms	
CLO-6	Use of the strategies(brute-force, greedy, divide-andconquer, and dynamic programming) to solve an appropriate problem	
CLO-7	Solve problems using graph algorithms, including single source and all-pairs shortest paths, and at least one minimum spanning tree algorithm	
CLO-8	Trace and/or implement a string-matching algorithm	

Course Outline:

Introduction; role of algorithms in computing, Analysis on nature of input and size of input Asymptotic notations; Big-O, Big Ω, Big Θ, little-o, little-ω, Sorting Algorithm analysis, loop invariants, Recursion and recurrence relations; Algorithm Design Techniques, Brute Force Approach, Divide-and-conquer approach; Merge, Quick Sort, Greedy approach; Dynamic programming; Elements of Dynamic Programming, Search trees; Heaps; Hashing; Graph algorithms, shortest paths, sparse graphs, String matching; Introduction to complexity classes.

Reference Materials (or use any other standard and latest books):

1. Introduction to Algorithms (3rd edition) by Thomas H. Corman, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein
2. Algorithm Design, (1st edition, 2013/2014), Jon Kleinberg, Eva Tardos,
3. Algorithms, (4th edition, 2011), Robert Sedgewick, Kevin Wayne

CMPC-6702 Final Year Project-I	
Credit Hours:	2 (0-6)
Contact Hours:	0-6
Pre-requisites:	None

Course Introduction:

This course marks a crucial phase in the undergraduate program, providing students with a unique opportunity for hands-on research and/or project development.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Undertake problem identification, formulation and solution.	C2 (Understand)
CLO-2	Define project scope and set milestones.	C3 (Apply)
CLO-3	Attain proficiency in creating comprehensive project documentation.	C3 (Apply)
CLO-4	Cultivate effective teamwork and collaboration skills, fostering ability to work with team members towards shared objectives.	-

Course Outline:

1. Project Proposal
2. Introduction Software Requirement Specification
3. Software Function Specification
4. Design Documentation

CMPC-6703 Final Year Project-II	
Credit Hours:	4 (0-12)
Contact Hours:	0-12
Pre-requisites:	Final Year Project-I

Course Introduction:

Final Year Project-II represents the culmination of the undergraduate program, where students bring their projects to completion. Students engage in refining their projects, addressing challenges, and contributing to the existing body of knowledge in their chosen fields.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Develop, implement, and test solutions to real world problems.	C3 (Apply)

Course Outline:

1. Database Design
2. Interface Design
3. Initial Prototype
4. Implementation
5. Testing

CMPC-5208 Computer Networks	
Credit Hours:	3 (2-1)
Contact Hours:	2-3
Pre-requisites:	None

Course Introduction:

This course introduces the basic concept of computer network to the students. Network layers, Network models (OSI, TCP/IP) and protocol standards are part of the course.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Describe the key terminologies and technologies of computer networks	C2 (Describe)
CLO-2	Explain the services and functions provided by each layer in the Internet protocol stack.	C2 (Explain)
CLO-3	Identify various internetworking devices and protocols and their functions in a networking	C4 (Identify)
CLO-4	Analyze working and performance of key technologies, algorithms and protocols	C4 (Analyze)
CLO-5	Build Computer Network on various Topologies	P3 (Build)

Course Outline:

Introduction and protocols architecture, basic concepts of networking, network topologies, layered architecture, physical layer functionality, data link layer functionality, multiple access techniques, circuit switching and packet switching, LAN technologies, wireless networks, MAC addressing, networking devices, network layer protocols, IPv4 and IPv6, IP addressing, sub netting, CIDR, routing protocols, transport layer protocols, ports and sockets, connection establishment, flow and congestion control, application layer protocols, latest trends in computer networks.

Reference Materials (or use any other standard and latest books):

1. Computer Networking: A Top-Down Approach Featuring the Internet, 6th edition by James F. Kurose and Keith W. Ross
2. Computer Networks, 5th Edition by Andrew S. Tanenbaum
3. Data and Computer Communications, 10th Edition by William Stallings
4. Data Communication and Computer Networks, 5th Edition by Behrouz A. Forouzan

Domain Core Courses

DSDC-5201 Introduction to Data Science	
Credit Hours: **Contact Hours:** **Pre-requisites:**	3 (3-0) 3-0 None

Course Introduction:

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.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Describe what Data Science is and the skill sets needed to be a data scientist.	C2 (Understand)
CLO-2	Apply EDA and the Data Science process in a case study.	C3 (Apply)
CLO-3	Comprehend the fundamental constructs of Python programming language.	C2 (Understand)
CLO-4	Apply basic machine learning algorithms to solve real world problems of moderate complexity.	C3 (Apply)

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 Materials (or use any other standard and latest books):

1. Foundations of data science, Blum, A., Hopcroft, J., & Kannan, R., VorabversioneinesLehrbuchs, 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.

DSDE-5102 Advanced Database Management System

Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	

Course Introduction:

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.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understanding advance data models, technologies and approaches for building distributed database systems.	C2 (Understand)
CLO-2	Applying the models and approaches in order to become enabled to select and apply appropriate methods for a particular case	C3 (Apply)
CLO-3	To develop a database solution for a given scenario/ challenging problem in the domain of distributed database systems.	C3 (Apply)

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)

Reference Materials (or use any other standard and latest 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 AviSilberschatz, Henry F. Korth and S. Sudarshan.
4. Database Systems: The Complete Book, 2nd Edition by Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom

CSDC-6201 HCI & Computer Graphics	
Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	N/A

Course Introduction:

The course concerns interaction between humans (the users) and computers. The course is used in UI design, rendering, geometric objects, animation, and many more.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Explain context of HCI and different measures for evaluation.	C2 (Understand)
CLO-2	Apply the principles of good design	C3 (Apply)
CLO-3	Perspective of age and disabilities.	C4 (Analyze)

Course Outline:

The human: Input–output channels, Human memory, Thinking, Emotion, Individual differences, Psychology and the design of interactive systems. The computer: Text entry devices, Positioning, pointing and drawing, display devices, Devices for virtual reality and 3D interaction, Physical controls, sensors and special devices, Paper: printing and scanning, Memory, Processing and networks. The interaction: Models of interaction, Frameworks and HCI, Ergonomics, Interaction styles, Elements of the WIMP interface, Interactivity, The context of the interaction, Experience, engagement and fun. Interaction design basics: What is design? The process of design, User focus, Scenarios, Navigation design, Screen design and layout, Iteration and prototyping. HCI in the software process: The software life cycle, Usability engineering, Iterative design and prototyping, Design rationale. Design rules: Principles to support usability, Standards, Guidelines, Golden rules and heuristics, HCI patterns. Implementation support: Elements of windowing systems, Programming the application. Using toolkits, User interface management systems. Evaluation techniques: What is evaluation? Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, choosing an evaluation method. Universal design: Universal design principles, Multi-modal interaction, Designing for diversity. User support: Requirements of user support, Approaches to user support, Adaptive help systems, designing user support systems. Task analysis: Differences between task analysis and other techniques, Task decomposition, Knowledge-based analysis, Entity–relationship-based techniques, Sources of information and data collection, Uses of task analysis. Dialog notations and design: What is dialog? Dialog design notations, Diagrammatic notations, Textual dialog notations, Dialog semantics, Dialog analysis and design. Models of the system: Standard formalisms, Interaction models, Continuous behavior. Modeling rich interaction: Introduction, Status–event analysis, Rich contexts, Low intention and sensor-based interaction. Groupware: Groupware systems, Computer-mediated communication, Meeting and decision support systems, Shared applications and artifacts, Frameworks for groupware, implementing synchronous groupware. Ubiquitous computing and augmented realities: Ubiquitous computing applications research, Virtual and augmented reality, Information and data visualization. Hypertext, multimedia and the World Wide Web: Understanding hypertext, Finding things, Web technology and issues, Static web content, Dynamic web content.

Reference Materials (or use any other standard and latest books):

1. Kunigk, J., Buss, I., Wilkinson, P., & George, L. (2018). *Architecting modern data platforms: a guide to enterprise hadoop at scale*. O'Reilly Media.
2. Marcus, A. (2015). HCI and user-experience design. *Human–Computer Interaction Series*, 265-269.
3. Grudin, J. (2006). The GUI shock: computer graphics and human-computer interaction. *Interactions*, *13*(2), 46-ff.
4. Jacko, J. A. (Ed.). (2012). Human computer interaction handbook: Fundamentals, evolving technologies, and emerging applications.

CSDC-6202 Computer Architecture	
Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	

Course Introduction:

This course in computer architecture will take you from an understanding of digital design using combinational logic and synchronous sequential building blocks to building your own single-cycle multicycle, and pipelined microprocessors.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand structure and behavior of the various functional modules of the computer	C2 (Understand)
CLO-2	How these structure and behavior interact to provide the processing needs of the user.	C3 (Apply)

Course Outline:

Introduction to a Simple Computer: CPU Basics and Organization, The Bus, Clock, The Input/Output Subsystem, Memory Organization and Addressing, Interrupts, MARIE, Instruction Processing, Hardware vs Micro-programmed Control, Real-World Examples of Computer. Architectures: Intel & MIPs Architecture. Instruction Set Architecture: Instruction Format, Instruction Types, Addressing, Instruction Pipelining, ISAs – Intel, MIPS, Java Virtual Machine. Micro-architecture: Single-Cycle Processor, Multicycle Processor, Pipeline Processors, DDL Representation, Exceptions. Advanced Micro-architecture: Deep Pipelines, Branch Prediction, Superscalar Processor, Out-of-Order Processor, Register Renaming, Single Instruction Multiple Data, Multithreading, Homogeneous Multiprocessing, Heterogeneous Multiprocessor. Memory: Types of Memory, The Memory Hierarchy, Cache Memory, Virtual Memory, Memory Management. Input/Output and Storage System: I/O and Performance, Amdahl's Law, I/O architectures, Data Transmission Modes, Magnetic Disk Technology, Optical Disk Technology, Magnatic Tape, RAID, Future of Data Storage. Alternative Architectures: RISC Machines, Flynn's Taxonomy, Parallel and Multiprocessor Architecture, Alternative Parallel Processing Approaches, Quantum Computing. Embedded Systems: Embedded Hardware & Embedded Software.

Reference Materials (or use any other standard and latest books):

1. Harris, S., & Harris, D. (2015). Digital design and computer architecture. Morgan Kaufmann.
2. Null, L. (2023). Essentials of Computer Organization and Architecture. Jones & Bartlett Learning.
3. Hennessy, J. L., & Patterson, D. A. (2011). *Computer architecture: a quantitative approach*. Elsevier.
4. Harris, D., & Harris, S. (2010). *Digital design and computer architecture*. Morgan Kaufmann.

ITDC-6204 Parallel and Distributed Computing	
Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	None

Course Introduction:

The Parallel and Distributed Computing course explores advanced computing paradigms, covering parallel processing and distributed systems. Participants gain expertise in designing and optimizing algorithms for parallel execution, addressing challenges in distributed computing environments.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Learn about parallel and distributed computers.	C2 (Understand)

CLO-2	Write portable programs for parallel or distributed architectures using Message-Passing Interface (MPI) library	C3 (Apply)
CLO-3	Analyze complex problems with shared memory programming with openMP.	C4 (Analyze)

Course Outline:

Asynchronous/synchronous computation/communication, concurrency control, fault tolerance, GPU architecture and programming, heterogeneity, interconnection topologies, load balancing, memory consistency model, memory hierarchies, Message passing interface (MPI), MIMD/SIMD, multithreaded programming, parallel algorithms & architectures, parallel I/O, performance analysis and tuning, power, programming models (data parallel, task parallel, process-centric, shared/distributed memory), scalability and performance studies, scheduling, storage systems, synchronization, and tools (Cuda, Swift, Globus, Condor, Amazon AWS, OpenStack, Cilk, gdb, threads, MPICH, OpenMP, Hadoop, FUSE).

Reference Materials (or use any other standard and latest books):

1. An Introduction to Parallel Programming, P. S. Pacheco and M. Malensek, Morgan Kaufmann, 2nd Edition.2021
2. Parallel And Distributed Computing,Ajit Singh, Kindle Edition,2021
3. Distributed Systems: Principles and Paradigms, A. S. Tanenbaum and M. V. Steen, Prentice Hall, 4th Edition, 2008

CSDC-6203 Compiler Construction

Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	

Course Introduction:

This course introduces students to the essential elements of building a compiler: parsing, context-sensitive property checking, code linearization, register allocation, etc.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand the basic techniques used in compiler construction such as lexical analysis, top-down, bottom-up parsing, context-sensitive analysis, and intermediate code generation	C2 (Understand)
CLO-2	Understand the basic data structures used in compiler construction such as abstract syntax trees, symbol tables, three-address code, and stack machines	C2 (Understand)
CLO-3	Design and implement a compiler using a software engineering approach	C2 (Understand)

Course Outline:

Overview of Compilation: Principles of Compilation, Compiler Structure, High-Level View of Translation, Desirable Properties of a Compiler. Scanners: Recognizing Words, Regular Expressions, Implementing Scanners. Parsers: Expressing Syntax, Top-Down Parsing, Bottom-Up Parsing. Context-Sensitive Analysis: Type Systems, Attribute-Grammar Framework, Ad Hoc Syntax-Directed Translation. Intermediate Representations: Graphical IRs, Linear IRs, Mapping Values to Names, Symbol Tables. The Procedure Abstraction: Procedure Calls, Name Spaces, Communicating Values Between Procedures, Standardized Linkages. Code Shape: Assigning

Storage Locations, Arithmetic Operators, Boolean and Relational Operators, Storing and Accessing Arrays, Character Strings, Structure References, Control-Flow Constructs, Procedure Calls. Code Optimization: Scope of Optimization, Local Optimization, Regional Optimization, Global Optimization, Interprocedural Optimization. Data-Flow Analysis: Iterative Data-Flow Analysis, Static Single-Assignment Form, Inter-procedural Analysis. Scalar Optimizations: Taxonomy for Transformations, Example Optimizations. Instruction Selection: Code Generation, Extending the Simple Tree-Walk Scheme, Instruction Selection via Tree-Pattern Matching, Instruction Selection via Peephole Optimization. Instruction Scheduling: The Instruction-Scheduling Problem, Local List Scheduling, Regional Scheduling. Register Allocation: Background Issues, Local Register Allocation and Assignment, Moving Beyond Single Blocks, Global Register Allocation and Assignment. Implementation of a prototype compiler (Class Assignment for the Semester)
Reference Materials (or use any other standard and latest books):
1. Engineering a Compiler, Second Edition by Keith Cooper and Linda Torczon, Morgan Kaufmann; 2ndEdition (February 21, 2017). ISBN-10: 012088478X 2. Compilers: Principles, Techniques, and Tools, A. V. Aho, R. Sethi and J. D. Ullman, Addison-Wesley, 2nd ed., 2007 3. Modern Compiler Design, D. Grune, H. E. Bal, C. J. H. Jacobs, K. G. Langendoen, John Wiley, 2012. 4. Modern Compiler Implementation in C, A. W. Appel, M. Ginsburg, Cambridge University Press, 2004.

Domain Elective Courses

ITDC-5202 Cyber Security	
Credit Hours: **Contact Hours:** **Pre-requisites:**	3 (3-0) 3-0

Course Introduction:

The Cyber Security course focuses on safeguarding digital systems and data, covering threat detection, encryption, and risk management strategies, preparing participants to defend against cyber threats and secure information assets.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	To be able to identify computer system threats	C2 (Understand)
CLO-2	To be able to identify Malware attacks, and understand the stages of attack and payloads.	C2 (Understand)
CLO-3	Implement various cryptographic techniques and simulate attack scenarios	C3 (Apply)

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; Wireless Security; Software security; Mobile device security; Mobile app security; Cyber Terrorism and Information Warfare; Introduction to Digital Forensics; Digital Forensics Categories.

Reference Materials (or use any other standard and latest books):

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

CSDE-6505 Introduction to Large Language Models	
Credit Hours: **Contact Hours:** **Pre-requisites:**	3 (3-0) 3-0 None

Course Introduction:

The student will journey through the world of Large Language Models (LLMs) and discover how they are reshaping the AI landscape. You'll explore the factors fueling the LLM boom, such as the deep learning revolution, data availability, and computing power. This conceptual course will dig into LLMs and how they revolutionize businesses and everyday life with real-world examples, from finance to content creation.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Deepens your understanding of the end-to-end AI system architecture needed to design and deploy large language models	C2 (Understand)
CLO-2	Acquire the tools, skills, and strategies to successfully deploy LLMs	C3 (Apply)
CLO-3	Implement an LLM application of your own during a hands-on group project	C3 (Apply)

Course Outline:

Overview of LLMs, Lifecycle of LLMs (pre-training, fine-tuning, and inference), LLM Hallucination & causes, LLM downstream tasks (Text classification, text similarity, search, question-answering, summarization, translation, and named entity recognition), Prompt engineering & optimization overview, Zero-shot and few-shot in-context learning, Fine-tune and evaluate models, Tradeoffs between various in-context learning approaches, Various types of embedding and their applications, Synthetic data generation, knowledge graph creation using LLM, Comparison of LLM models (GPT Turbo 3.5, GPT 4, Llama 2, Claude, BERT, Cohere, Lamda, Orca, Palm), HuggingFace Models, Integration Framework (LangChain), Data Framework (LlamaIndex).

Reference Materials (or use any other standard and latest books):

1. Quick Start Guide to Large Language Models: Strategies and Best Practices for Using ChatGPT and Other LLMs by Ozdemir, Sinan. Addison-Wesley Professional.
2. Natural language understanding with Python: combine natural language technology, deep learning, and large language models to create human-like language comprehension in computer systems by Dahl, Deborah Anna.
3. Modern Generative AI with ChatGPT and OpenAI models: leverage the capabilities of OpenAI's LLM for productivity and innovation with GPT3 and GPT4 by Alto, Valentina.

CSDE-6209 Semantic Web	
Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	None

Course Introduction:

This course provides an overview of Semantic Web technologies, including RDF, OWL, and SPARQL. Students will learn to model, represent, and query semantic data, enabling them to build intelligent and interoperable web applications.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand the foundational principles and components of the Semantic Web, including RDF, OWL, and SPARQL.	C2 (Understand)
CLO-2	Apply Semantic Web technologies to model information using RDF, create ontologies with OWL, and execute complex queries using SPARQL with hands-on projects and real-world applications.	C3 (Apply)
CLO-3	Analyze and evaluate semantic data models, ontologies, and SPARQL queries.	C4 (Analyze)

Course Outline:

Semantic Web – Introduction and Vision , Structured Web Documents, XML, RDF, RDF-S, Web Ontology Language, WL, Ontology Engineering (Protégé) ,Discovering Information, Querying (SPARQL) Semantic Web Applications (E-learning, Web services), Description Logic Reasoning (Fact++); Rules (SWRL) Building Semantic Web Applications (Apache Jena Framework), Building Semantic Web Applications, State-of-the-art in Semantic Web community (Linked data and applications)

Reference Materials (or use any other standard and latest books):

1. A Semantic Web Primer third edition Grigoris Antoniou,Paul Groth,Frank van Harmelen,Rinke Hoekstra ISBN:0262018284 9780262018289
2. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta Leo J. Obrst and Kevin T. Smith
3. Explorer's Guide to the Semantic Web by Thomas B. Passin

SEDC-6202 Software Project Management	
Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	None

Course Introduction:

In Software Project Management course students will navigate the intricate landscape of planning, execution, and control in software development projects. This course will equip them with essential skills to lead teams, manage resources, and ensure the successful delivery of software projects on time and within budget. The students will comprehensively explore project management principles tailored for the dynamic realm of software development.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Explain principles of the project lifecycle and how to identify opportunities to work with learners on relevant and appropriate project scenarios to share this understanding.	C2 (Understand)
CLO-2	Critically evaluate and discuss the issues around project management and its application in the real world with course participants and learners	C3 (Apply)
CLO-3	Choose project management techniques for IT projects to initiate, plan, execute and evaluate a project and work in teams to create a project plan for a project scenario that includes key tasks, critical path, dependencies and a realistic timeline.	C3 (Apply)
CLO-4	Present strategies for gaining confidence in managing projects through simple project planning examples.	C3 (Apply)

Course Outline:

Introduction: Software Project Versus Other Type of Projects Dimensions of a Software Project, Activities in SPM, Setting Goals & Objectives, Business Case, Significance of Processes, Project Vs. Program Management. Introduction of PM Tools, PMI's Knowledge Areas, Technical Fundamentals in SPM, Lifecycle Relationships, Classic Mistakes Product-Process-Peoples-Technology Mistakes PMI Framework, PMI Process Groups: Process Initiating Process Group, Planning Process Group, Executing Process, Process Monitoring and controlling, Closing Process Group, Project Charter, Statement of Work. Understanding Organizations, Organizational Structures, Functional -Project –Matrix, Organizational Impact on Projects, Identifying stakeholders: Define Responsibilities, Authority Relationships, Position Qualifications. Project Planning: Project Selection, Project Scope, Project Infrastructure, Analyze Project Characteristics, Identify Project & Product Activities, Work Break Down Structure. Project Evaluation: Strategic Assessment, Technical Assessment, Economic Assessment, Project Portfolio Management, Cost-Benefit Analysis, Cash Flow Forecasting, Cost-Benefit Evaluation Techniques, Procurement Management, Procurement Tools &Techniques, Types of Contracts. Selection of an Appropriate Approach in Project: Choosing Technologies, Technical Plan, Waterfall Model, V-Model, Spiral Model, Software Prototyping, Incremental Delivery, Agile Process Model: Dynamic Systems Development Method, Extreme Programming, Selection of Most Appropriate Process Model. Software Effort Estimation: Work Breakdown Structure (WBS) and Its Types, Estimation Problems, Software Estimation Techniques: Expert Judgment, Estimating By Analogy, LOC, Function Point Estimation, and COCOMO. Activity Planning: Project and Activities, Sequencings and

Scheduling Activities, Network Planning Models, Formulation of Network Model, Adding the Time Dimensions, The Forward Pass, The Backward Pass, Identifying the Critical Path, Identifying the Critical Activities Project, AOA, GanttChart, (Installation & Configuration of Software Tools like MS-Project). Risk Management: Categories of Risks, A Framework for Dealing with Risks, Evaluating the Risks to the Schedule: PERT, Importance of Risk, Types Of Risk, Risk Identification Techniques, Project Risk and Change Management. Risk Control, RMMM, Configuration Management & Maintenance, Environment for Configuration Control, Configuration Control vs. Version Control. Resource Allocation: Nature of Resources, Identifying Resource Requirements, Scheduling Resources, Resource Scheduling Techniques. Monitoring & Control: Creating Framework, Collecting Data, Visualizing Progress, Cost Monitoring, Earned Value, Change Control. Review and Evaluation: Determining Satisfaction of Requirements, Reviewing And Evaluating Performance, Project Closure: Project Documentation, Cutover/Migration, Quality Standards, Project Closing. Challenges of Outsourcing in Project Management, Presentations

Reference Materials (or use any other standard and latest books):

1. Software Project Management by Bob Hughes and Mike Cotterell, McGraw-Hill Education; 5th Edition. ISBN-10: 0077122798
2. Information Technology Project Management with MindTap by Kathy Schwalbe, 9E ISBN: 9789355736130, Edition: 9th, Year : 2019
3. A Guide to the Project Management Body of Knowledge, Seventh Edition (PMBOK Guide) (2021)
4. Applied Software Project Management by Andrew Stellman and Jennifer Greene, O'Reilly Media; 1st Edition (2005). ISBN-10: 0596009488
5. Mastering Software Project Management: Best Practices, Tools and Techniques by Murali K. Chemuturi and Thomas M. Cagley Jr., J. Ross Publishing (2010). ISBN-10: 1604270349
6. Effective Project Management: Traditional, Agile, Extreme by Robert K. Wysocki, Wiley; (2019). ISBN:9781119562801
7. The Software Project Manager's Handbook - Principles that work at work by Dwayne Phillips, 2ndEdition, IEEE Computer Society Press and Wiley Inter-science, . ISBN 0-471-67420-6

DSDE-6201 Big Data Analytics

Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	None

Course Introduction:

The course objective is to develop understanding about the core concept of Big Data, why Big Data requires a different programming paradigm and mindset, and what are the various programming approaches used, what type of data can be processed.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand the fundamental concepts of Big Data and its programming paradigm.	C2 (Understand)
CLO-2	Hadoop/MapReduce Programming, Framework, and Ecosystem	C3 (Apply)
CLO-3	Apache Spark Programming	C3 (Apply)

Course Outline:

Introduction and Overview of Big Data Systems; Platforms for Big Data, Hadoop as a Platform, Hadoop Distributed File Systems (HDFS), MapReduce Framework, Resource Management in the cluster (YARN), Apache Scala Basic, Apache Scala Advances, Resilient Distributed Datasets (RDD), Apache Spark, Apache Spark SQL, Data analytics on Hadoop Spark, Machine learning on Hadoop / Spark, Spark Streaming, Other Components of Hadoop Ecosystem

Reference Materials (or use any other standard and latest books):

1. White, Tom. "Hadoop: The definitive guide." O'Reilly Media, Inc., 2012.
2. Karau, Holden, Andy Konwinski, Patrick Wendell, and Matei Zaharia. "Learning spark: lightning-fast big data analysis." O'Reilly Media, Inc., 2015.
3. Miner, Donald, and Adam Shook. "MapReduce design patterns: building effective algorithms and analytics for Hadoop and other systems." O'Reilly Media, Inc., 2012.

AIDC-6101 Computer Vision

Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	None

Course Introduction:

With a single glance a human interprets the entire scene. How many objects are present in the scene and where they are located. Which person is present in the scene. What will happen next. However, computers lack this capability. We have seen only face detectors so far working in our mobile phones? What is the challenge in understanding the 3D scene, i.e., the identity, the location and the size of the objects present in the scene. In this course we will introduce the basic concepts related to 3D scene modelling from single view and multiple views.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understanding the single view geometry concepts	C2 (Understand)
CLO-2	Understanding the multiple view geometry concepts	C2 (Understand)
CLO-3	Apply concepts of CV for solving real world problems	C3 (Apply)

Course Outline:

Introduction to Computer Vision (Problems faced, History and Modern Advancements). Image Processing, Image filtering, Image pyramids and Fourier transform, Hough transform. Camera models, Setting up a camera model from parameters, Camera looking at a plane, Relationship of plane and horizon line, Rotation about camera center. Concatenation, Decomposition and Estimation of transformation from point correspondences, Points and planes in 2D/3D, Transformations in 2D/3D, Rotations in 2D/3D. Edge detection, corner detection. Feature descriptors and matching (HoG features, SIFT, SURF). Applications of Computer Vision Traditional Methods: Image Stitching: Making a bigger picture from smaller pictures Single View Geometry: Converting a single image into a 3D model. Applications of CV using Deep Learning: Image Detection (Localization, Historical Techniques, RCNN, FRCNN, YOLO, Retina), Image Segmentation (UNet, SegNet,MaskRCNN), Image Generation (GANN)

Reference Materials (or use any other standard and latest books):

1. Szeliski, R. (2022). *Computer vision: algorithms and applications*. Springer Nature.
2. .Hartley, R., & Zisserman, A. (2003). *Multiple view geometry in computer vision*. Cambridge university press.
3. Forsyth, D. A., & Ponce, J. (2002). *Computer vision: a modern approach*. prentice hall professional technical reference.
4. Gonzalez, R. C. (2009). *Digital image processing*. Pearson education India.

CSDE-6501 MERN Stack Development

Credit Hours:	3 (3-0)
Contact Hours:	3-0
Pre-requisites:	

Course Introduction:

MERN stack stands out for its versatility, efficiency, and end-to-end JavaScript implementation when building web applications. It allows developers to leverage a single language, JavaScript, across the entire stack, enabling code reuse and streamlining the development process.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Build full stack development	C3 (Apply)
CLO-2	Master authentication and authorization	C2 (Understand)
CLO-3	Master Data Modelling in mongoose	C2 (Understand)

Course Outline:

React Project scaffolding, React functional and class components, React parent to child and child to parent communications, React Redux, React Hooks, React Context Api, React Routers, React Material UI, React project with fake JSON server, Nodejs, Npm package registry understanding with package.json, Nodejs HTTP server, Express Introduction, Express server, Creation of rest apis, Validation with YUP or JOI validator, Usage of Lodash, Mail configuration with SMTP nodemail, Job with queues, Schedule Commands with cron jobs, File uploads with Multer, File upload with GridFS, Rest APIs (Modern Technique for Web applications), Graphql Apis (Modern Technique for Web applications), Mongodb, Mongodb CRUD queries, Lookup queries, aggregation pipeline, Mogodb with reference and embedded relations, Mongodb indexing, Mongodb with Mongoose ORM, Mongodb schema creation with mongoose, Apis Integration with Frontend React project, Api calls with Axios and fetch on frontend, Dotenv on frontend react and backend nodejs express, React store creation with redux persistent, React service Layer for Apis

Reference Materials (or use any other standard and latest books):

Text Book:

1. Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js App by Greg Lim
2. MERN Projects for Beginners: Create Five Social Web Apps Using MongoDB, Express.js, React, and Node by Nabendu Biswas

CSDE-6502 Django Web Framework		
Credit Hours: **Contact Hours:** **Pre-requisites:**	3 (3-0) 3-0	
Course Introduction:		
Build & deploy rich web applications using Django. Learn the fundamentals of building a full-featured web site using Django.		
CLO No.	**Course Learning Outcomes**	**Bloom Taxonomy**
CLO-1	Install and deploy a Django application	C3 (Apply)
CLO-2	Describe and build a data model in Django	C2 (Understand)
CLO-3	Apply built-in login functionality in Django	C3 (Apply)
Course Outline:		
Installing Django, HTML, CSS, SML, SQL, Data Models, Django views, Django generic views, Forms in http and html, Django forms, User authentication, One to many data models, Many to many data models, Javascript, JSON, Ajax, File Uploading, Pagination, Writing URLs, Sending emails, Limiting query results in django, TinyMCE integration, creating blogs, Filters in Django, Pass data from Django views to template.		
Reference Materials (or use any other standard and latest books):		
Text Book: 1. Django for beginners, Build websites with Python and Django by William S. Vincent 2. Django 4 By Example: Build powerful and reliable Python web applications from scratch 4th Edition by Antonio Melé		

CSDE-6503 Introduction to DevOps		
Credit Hours: **Contact Hours:** **Pre-requisites:**	3 (3-0) 3-0 N/A	
Course Introduction:		
This course covers best practices, tools, and techniques for automating tasks and collaborating with other engineers on projects.		
CLO No.	**Course Learning Outcomes**	**Bloom Taxonomy**
CLO-1	Essential DevOps concepts: software engineering practices, cloud native microservices, automated continuous deployments	C2 (Understand)
CLO-2	impact of DevOps, including breaking down silos, working in cross functional teams, and sharing responsibilities.	C2 (Understand)
Course Outline:		
DevOps Principles, DevOps Delivery Pipeline, DevOps on Cloud, Cloud & virtualization		

architecture, Cloud deployment architecture, Why we need DevOps on cloud?, Introduction to AWS, Introduction to version control, Git installation & setup, Git commands, Recording repository changes, Viewing commit history, Undoing things, Working with remotes, Branching & merging in git, Git workflows, Git cheatsheets, Jenkins tool management, Jenkins authentication, Jenkins authorization, Maven overview, Maven plugins, Maven build lifecycle, Maven test project, Introduction to docker, Working with container, Docker networking, Docker swarm, Kubernetes overview, Kubernetes cluster architecture, Design of pods
Reference Materials (or use any other standard and latest books):
Text Book: 1. Learning DevOps: A Comprehensive Guide to Accelerating DevOps Culture Adoption with Terraform, Azure DevOps, Kubernetes, and Jenkins by Mikael Krief, 2nd ed. Edition (2022). 2. Cloud Native DevOps with Kubernetes: Building, Deploying, and Scaling Modern Applications in the Cloud by John Arundel and Justin Domingus, ISBN: 9781098116828, 2nd ed. Edition (2022).

CSDE-6504 Software Testing & Quality Assurance		
Credit Hours: **Contact Hours:** **Pre-requisites:**	3 (3-0) 3-0	
Course Introduction:		
Software testing is indispensable for developers who want to ship high-quality software. After completing this course, you will have an understanding of the fundamental principles and processes of software testing.		
CLO No.	**Course Learning Outcomes**	**Bloom Taxonomy**
CLO-1	Distinguish between verification and validation describing the key differences between them.	C2 (Understand)
CLO-2	Write automated functional tests for both front-end and back-end code.	C2 (Understand)
Course Outline:		
Testing foundations, Testing in software development life cycle, Writing good unit tests, Black box testing, White box testing, Requirements based testing, Black box and white box testing using Cucumber, Introduction to Automated Analysis, Automated test generation, Static analysis, Effective automated verification, Web and mobile testing, Functional web testing, Nonfunctional web testing, Mobile testing, Penetration testing, Test design techniques and validation.		
Reference Materials (or use any other standard and latest books):		
Text Book: 1. Effective Software Testing: A Developer's Guide by Maurizio Aniche, 2022, ISBN: 9781633439931 2. Automated Software Testing with Cypress by Narayanan Palani, 1st Edition (2021) 3. Leading Quality: How Great Leaders Deliver High Quality Software and Accelerate Growth by Ronald Cummings-John & Owais Peer (2019)		

Mathematics & Supporting Courses

MATH-5103 Probability and Statistics	
Credit Hours:	3 (3-0)
Contact Hours:	3
Pre-requisites:	None

Course Introduction:

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

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Develops students fundamental skills of solving ordinary differential equations, and developing differential equations for real-world problems	C2(Understand)

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 Materials (or use any other standard and latest books):

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

General Education Courses

ENGL-6101 Technical & Business Writing	
Credit Hours:	3 (3-0)
Contact Hours:	3
Pre-requisites:	Functional English

Course Introduction:

Students in the senior level needs good technical writing skills not only for writing project report but also useful for them to communicate their resume and get place in the market. This is a high level course which provide useful knowledge to the students for writing proposals etc. Further, the course aims at augmenting students' proficiency in technical writing in order to sensitize them to the dynamics, challenges, and needs of the modern world characterized by technologically advanced social, cultural, and corporate settings. It will focus on students' ability to effectively convey and exchange information in cross-cultural, international, and multinational milieu necessitated by the emergence of global society.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	-	-

Course Outline:

Overview of technical reporting, use of library and information gathering, administering questionnaires, reviewing the gathered information; Technical exposition; topical arrangement, exemplification, definition, classification and division, casual analysis, effective exposition, technical narration, description and argumentation, persuasive strategy, Organizing information and generation solution: brainstorming, organizing material, construction of the formal outline, outlining conventions, electronic communication, generation solutions. Polishing style: paragraphs, listening sentence structure, clarity, length and order, pomposity, empty words, pompous vocabulary, document design: document structure, preamble, summaries, abstracts, table of contents, footnotes, glossaries, crossreferencing, plagiarism, citation and bibliography, glossaries, index, appendices, typesetting systems, creating the professional report; elements, mechanical elements and graphical elements. Reports: Proposals, progress reports, Leaflets, brochures, handbooks, magazines articles, research papers, feasibility reports, project reports, technical research reports, manuals and documentation, thesis. Electronic documents, Linear verses hierarchical structure documents.

Reference Materials (or use any other standard and latest books):

1. Technical Report Writing, by Pauley and Riordan, Houghton Mifflin Company, 8th Edition.
2. Effective Technical Communication by Ashraf Rizvi, Tata McGraw-Hill.

URCG-5122	Ideology and Constitution of Pakistan
Credit Hours: **Contact Hours:** **Pre-requisites:**	2 (2-0) 2 -

Course Introduction:

This course focuses on ideological background of Pakistan. The course is designed to give a comprehensive insight about the constitutional developments of Pakistan. Starting from the Government of India Act, 1935 till to date, all important events leading to constitutional developments in Pakistan will be the focus of course. Failure of the constitutional machinery and leading constitutional cases on the subject. Moreover, students will study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan. It will also cover the entire Constitution of Pakistan 1973. However, emphasis would be on the fundamental rights, the nature of federalism under the constitution, distribution of powers, the rights and various remedies, the supremacy of parliament and the independence of judiciary

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	To educate students about the history of Pakistan.	
CLO-2	To understand the basic concept of Islam and Quran Pak.	
CLO-3	To educate student Government and politics	

Course Outline:

- **Ideology of Pakistan**
  - Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah.
  - Two Nation Theory and Factors leading to Muslim separatism.
- **Constitutional Developments**
  - Salient Feature of the Government of India Act 1935
  - Salient Feature of Indian Independence Act 1947
  - Objectives Resolution
  - Salient Feature of the 1956 Constitution
  - Developments leading to the abrogation of Constitution of 1956
  - Salient features of the 1962 Constitution
  - Causes of failure of the Constitution of 1962
  - Comparative study of significant features of the Constitution of 1956, 1962 and 1973
- **Fundamental rights**
- **Principles of policy**
- **Federation of Pakistan**
  - President
  - Parliament
  - The Federal Government
- **Provinces**
  - Governors
  - Provincial Assemblies
  - The Provincial Government

- **The Judicature**
  - Supreme Court
  - High Courts
  - Federal Shariat Courts
  - Supreme Judicial Council
  - Administrative Courts and tribunals
- **Islamic Provisions in Constitution**
- **Significant Amendments of Constitution of Pakistan 1973**

Reference Materials (or use any other standard and latest books):

1. Constitutional and Political History of Pakistan by Hamid Khan
2. Mahmood, Shaukat and Shaukat, Nadeem. Constitution of the Islamic Republic of Pakistan, 3rd re edn. Lahore: Legal Research Centre, 1996.
3. Munir, Muhammad. Constitution of the Islamic Republic of Pakistan: Being a Commentary on the Constitution of Pakistan, 1973. Lahore, Law Pub., 1975.
4. Rizvi, Syed Shabbar Raza. Constitutional Law of Pakistan: Text, Case Law and Analytical Commentary. 2nd re edn. Lahore: Vanguard, 2005.
5. The Text of the Constitution of the Islamic Republic of Pakistan, 1973 (as amended).
6. Fundamental Laws of Pakistan by A.K. Brohi

URCA-5101 Introduction to Management

Credit Hours:	2 (2-0)
Contact Hours:	2
Pre-requisites:	None

Course Introduction:

Introduction to Marketing helps the students in exploring fundamental principles that drive successful business promotion and customer engagement. This course will delve into the core concepts of market research, product positioning, and strategic communication to provide a comprehensive foundation for understanding the ever-evolving world of marketing.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
-	-	

Course Outline:

Introduction to Managers and Management: What as Management and What Do Managers Do? Defining Management, Management Functions, Management Roles, Management Skills, History of Management. Organizational Culture and Environment: The Manager: Omnipotent or Symbolic? The Organization's Culture, The Environment - Defining Environment, The Specific Environment, The General Environment, Influence on Management Practice. Decision Making The Essence of Manager's Job: The Decision Making Process, The Rational Decision Maker, Decision Making Styles, Analyzing Decision Alternatives – Certainty, Risk, Uncertainty. Planning: The Foundations of Planning, The Definition of Planning, Purposes of Planning, Types of Plans, Contingency Factors on Planning, Objectives: The Foundation for Planning, Multiplicity of Objectives, Real Versus Stated Objectives, Traditional Objective Setting, Management by Objectives. Organization Structure and Design: Defining

Organization Structure and Design, Building, The Vertical Dimension of Organizations, Building the Horizontal Dimension of Organizations, The Contingency Approach to Organization Design, Application of Organization Design. Motivation: Motivating Employees, What is Motivation? Contemporary Approaches to Motivation, Contemporary Issues in Motivation, From Theory to Practice: Suggestions for Motivating Employees. Leadership: Managers Verses Leaders, Trait Theories, Behavioural Theories, Contingency Theories, Emerging Approaches to Leadership, Contemporary Issues in Leadership. Communication: Communication and Interpersonal Skills, Understanding Communication, Communication Styles of Men And Women, Feedback Skills, Delegation Skills', Conflict Management Skills, Negotiation Skills. Controlling - Foundations of Control: What is Control? The Importance of Control, The Control Process, Types of Control, Qualities of Effective Control, The Dysfunctional Side of Control, Ethical Issues in Control; Controlling Tools and Techniques: Information Controls, Financial Controls, Operations Controls, Behavioral Controls. The Personnel Function: Terminology, Who Does Personnel Work? Staff Role of The Personnel Department Personnel (Human Resource) Functions. Job Design and Analysis: Job Design, Job Information and Personnel Management, Analyzing Jobs-Obtaining Job Information, Functional Job Analysis, Administration of The Job Analysis Program. Human Resource Planning: Reasons for Human Resource Planning, The Planning Process. Recruitment and Selections/Testing and Interview: Labour Market Considerations, Recruitment and Selection Policy Issues, The Employment Process, Sources of People, The Selection Process, The Selection Procedure, Testing: Interview. Miscellaneous: Union and Management, Compensation Administration, Health And Safety.

Reference Materials (or use any other standard and latest books):

1. Management by Robbins, S.P. & Coulter, Mary, Prentice Hall; 10th Edition (November 3, 2008). ISBN-10: 0132090716
2. Fundamentals of Management by Robbins, S.P. &DeCenzo, David A, Prentice Hall; 7th Edition (January 13, 2010). ISBN-13: 978-0132090711
3. Human Resource Management by David A. DeCenzo and Stephen P. Robbins. Wiley; 7th Edition (October 10, 2001). ISBN-10: 0471397857

URCS-6101 Professional Practices

Credit Hours:	2 (2-0)
Contact Hours:	2
Pre-requisites:	None

Course Introduction:

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.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
-	-	-

Course Outline:

Historical, social, and economic context of Computing (software engineering, Computer Science, Information Technology); Definitions of Computing (software engineering, Computer Science, Information Technology) subject areas and professional activities; professional societies; professional

ethics; professional competency and life-long learning; uses, misuses, and risks of software; information security and privacy; business practices and the economics of software; intellectual property and software law (cyber law); social responsibilities, software related contracts, Software house organization. Intellectual Property Rights, The Framework of Employee Relations Law and Changing Management Practices, Human Resource Management and IT, Health and Safety at Work, Software Liability, Liability and Practice, Computer Misuse and the Criminal Law, Regulation and Control of Personal Information. Overview of the British Computer Society Code of Conduct, IEEE Code of Ethics, ACM Code of Ethics and Professional Conduct, ACM/IEEE Software Engineering Code of Ethics and Professional Practice. Accountability and Auditing, Social Application of Ethics.

Reference Materials (or use any other standard and latest books):

1. Boddington, P. (2023). AI ethics: a textbook. Springer Nature.
2. Professional Issues in Software Engineering by Frank Bott, Allison Coleman, Jack Eaton and Diane Rowland, CRC Press; 3rd Edition (2000). ISBN-10: 0748409513
3. Computer Ethics by Deborah G. Johnson, Pearson; 4th Edition (January 3, 2009). ISBN-10: 0131112414
4. A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet (3rd Edition) by Sara Baase, Prentice Hall; 3rd Edition (2008). ISBN-10: 0136008488
5. Applied Professional Ethics by Gregory R. Beabout, University Press of America (1993).
6. Noorman, M., & Johnson, D. G. (2014). Negotiating autonomy and responsibility in military robots. *Ethics and Information Technology*, *16*(1), 51-62.

URCG-5125	Civics and Community Engagement
Credit Hours:	2 (2-0)
Contact Hours:	2
Pre-requisites:	None

Course Introduction:

The Civics and Community Engagement course is designed to provide students with an understanding of the importance of civic participation, culture and cultural diversity, basic foundations of citizenship, group identities and the role of individuals in creating positive change within their communities. The course aims at developing students' knowledge, skills and attitudes necessary for active and responsible citizenship.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand the importance of civic participation, culture and cultural diversity, basic foundations of citizenship, group identities and the role of individuals in creating positive change within their communities.	C2 (Understand)
CLO-2	Develop students' knowledge, skills and attitudes necessary for active and responsible citizenship	C2 (Understand)

Learning outcomes

After completing this course, students will be able to

- Understand the concepts of civic engagement, community development, and social

responsibility.

- Understand rights and responsibilities of citizenship
- Understand cultural diversity in local and global context
- Analyze the significance of civic participation in promoting social justice, equity, and
- democracy.
- Examine the historical and contemporary examples of successful civic and community engagement initiatives.
- Identify and assess community needs, assets, and challenges to develop effective strategies for community improvement.
- Explore the ethical implications and dilemmas associated with civic and community engagement.
- Develop practical skills for effective community organizing, advocacy, and leadership.
- Foster intercultural competence and respect for diversity in community engagement efforts.
- Collaborate with community organizations, stakeholders, and fellow students to design and implement community-based projects.
- Reflect on personal growth and learning through self-assessment and critical analysis of community engagement experiences.

Course Outline:

Introduction to Civics & Community Engagement

- Overview of the course: Civics & Community Engagement
- Definition and importance of civics
- Key concepts in civics: citizenship, democracy, governance, and the rule of law
- Rights and responsibilities of citizens

Citizenship and Community Engagement

- Introduction to Active Citizenship: Overview of the Ideas, Concepts, Philosophy and Skills
- Approaches and Methodology for Active Citizenship

Identity, Culture, and Social Harmony

- Concept and Development of Identity, Group identities
- Components of Culture, Cultural pluralism, Multiculturalism, Cultural Ethnocentrism, Cultural relativism, Understanding cultural diversity, Globalization and Culture, Social Harmony,
- Religious Diversity (Understanding and affirmation of similarities & differences)
- Understanding Socio-Political Polarization
- Minorities, Social Inclusion, Affirmative actions

Multi-cultural society and inter-cultural dialogue

- Inter-cultural dialogue (bridging the differences, promoting harmony)
- Promoting intergroup contact/ Dialogue
- Significance of diversity and its impact
- Importance and domains of Inter-cultural dialogue

Active Citizen: Locally Active, Globally Connected

- Importance of active citizenship at national and global level
- Understanding community
- Identification of resources (human, natural and others)
- Utilization of resources for development (community participation)
- Strategic planning, for development (community linkages and mobilization)

Human rights, constitutionalism and citizens' responsibilities

- Introduction to Human Rights
- Human rights in constitution of Pakistan
- Public duties and responsibilities

- Constitutionalism and democratic process

Social Institutions, Social Groups, Formal Organizations and Bureaucracy

- Types of Groups, Group identities, Organizations
- Bureaucracy, Weber's model of Bureaucracy
- Role of political parties, interest groups, and non-governmental organizations

Civic Engagement Strategies

- Grassroots organizing and community mobilization
- Advocacy and lobbying for policy change
- Volunteerism and service-learning opportunities

Social issues/Problems of Pakistan

- Overview of major social issues of Pakistani society

Social Action Project

Reference Materials (or use any other standard and latest books):

1. Kennedy. J. K., &Brunold, A. (2016). Regional context and Citizenship education in Asia and Europe. New Yourk: Routledge, Falmer.
2. Henslin, James M. (2018). Essentials of Sociology: A Down to Earth Approach (13th ed.). New York: Pearson Education
3. Macionis, J. J., & Gerber, M.L. (2020). Sociology. New York: Pearson Education

Reference Books:

1. Glencoe McGraw-Hill. (n.d.). Civics Today: Citizenship, Economics, and Youth.
2. Magleby, D. B., Light, P. C., &Nemacheck, C. L. (2020). Government by the People (16th ed.). Pearson.
3. Sirianni, C., &Friedland, L. (2005). The Civic Renewal Movement: Community-Building and Democracy in the United States. Kettering Foundation Press.
4. Bloemraad, I. (2006). Becoming a Citizen: Incorporating Immigrants and Refugees in the United States and Canada. University of California Press.
5. Kuyek, J. (2007). Community Organizing: Theory and Practice. Fernwood Publishing.
6. DeKieffer, D. E. (2010). The Citizen's Guide to Lobbying Congress. TheCapitol.Net.
7. Rybacki, K. C., &Rybacki, D. J. (2021). Advocacy and Opposition: An Introduction to Argumentation (8th ed.). Routledge.
8. Kretzmann, J. P., & McKnight, J. L. (1993). Building Communities from the Inside Out: A Path Towards Finding and Mobilizing a Community's Assets. ACTA Publications.
9. Patterson, T. E. (2005). Engaging the Public: How Government and the Media Can Reinvigorate American Democracy. Oxford University Press.
10. Love, N. S., &Mattern, M. (2005). Doing Democracy: Activist Art and Cultural Politics. SUNY Press.

URCG-5124	Entrepreneurship
Credit Hours: **Contact Hours:** **Pre-requisites:**	2 (2-0) 2 None

Course Introduction:

This course addresses the unique entrepreneurial experience of conceiving, evaluating, creating, managing, and potentially selling a business idea. The goal is to provide a solid background with practical application of important concepts applicable to the entrepreneurial environment. Entrepreneurial discussions regarding the key business areas of finance, accounting, marketing and management include the creative aspects of entrepreneurship. The course relies on classroom discussion, participation, the creation of a feasibility plan, and building a business plan to develop a comprehensive strategy for launching and managing a new venture.

CLO No.	Course Learning Outcomes	Bloom Taxonomy
CLO-1	The course gives students the tools necessary to think creatively, to plan out whether their idea is marketable to investors, guide them through the launch their own business, or to support an employer in launching and growing an entrepreneurial venture.	C2 (Understand)

Course Learning Objectives

1. To enhance the 'entrepreneurial intentions' of the students by improving their natural willingness to start a business.
2. To understand the process of entrepreneurship and learn the ways to manage it by working individually in the class and in the form of groups outside the class to conduct field assignments.
3. To educate the students about the practical underpinnings of the entrepreneurship with the aid of practical assignments and idea pitching.

Course Outline:

1. **Background:** What is an Organization, Organizational Resources, Management Functions, Kinds of Managers, Mintzberg's Managerial Roles.
2. **Forms of Business Ownership:** The Sole proprietorship, Partnership, Joint Stock Company
3. **Entrepreneurship:** The World of the Entrepreneur, what is an entrepreneur? The Benefits of Entrepreneurship, The Potential Drawbacks of Entrepreneurship, Behind the Boom: Feeding the Entrepreneurial Fire.
4. **The Challenges of Entrepreneurship:** The Cultural Diversity in Entrepreneurship, The Power of "Small" Business, Putting Failure into Perspective, The Ten Deadly Mistakes of Entrepreneurship, How to Avoid the Pitfalls, Idea Discussions & Selection of student Projects, Islamic Ethics of Entrepreneurship.
5. **Inside the Entrepreneurial Mind:** From Ideas to Reality: Creativity, Innovation, and Entrepreneurship, Creativity – Essential to Survival, Creative Thinking, Barriers to Creativity, How to Enhance Creativity, The Creative Process, Techniques for Improving the Creative Process, Protecting Your Ideas, Idea Discussions & Selection of student Projects.
6. **Products and technology, identification opportunities**
7. **Designing a Competitive Business Model and Building a Solid Strategic Plan:** Building a strategic plan, Building a Competitive Advantage, The Strategic Management Process,

Formulate strategic options and select the appropriate strategies, Discussion about execution of Students' Project.

8. **Conducting a Feasibility Analysis and Crafting a Winning Business Plan:** Conducting a Feasibility Analysis, Industry and market feasibility, Porter's five forces model, Financial feasibility analysis. Why Develop a Business Plan, The Elements of a Business Plan, What Lenders and Investors Look for in a Business Plan, Making the Business Plan Presentation.
9. **Building a Powerful Marketing Plan:** Building a Guerrilla Marketing Plan, Pinpointing the Target Market, Determining Customer Needs and Wants Through Market Research. Plotting a Guerrilla Marketing Strategy: How to Build a Competitive Edge, Feed Back & Suggestions on Student Project, Islamic Ethics for Entrepreneurial Marketing
10. **E-Commerce and the Entrepreneur:** Factors to Consider before Launching into E-Commerce, Ten Myths of E-Commerce, Strategies for E-Success, Designing a Killer Web Site, Tracking Web Results, Ensuring Web Privacy and Security, Feed Back & Suggestions on Student Project.
11. **Pricing Strategies:** Three Potent Forces: Image, Competition, and Value, Pricing Strategies and Tactics, Pricing Strategies and Methods for Retailers, The Impact of Credit on Pricing
12. **Attracting Venture Capitalist:** Projected Financial Statements, Basic Financial Statements, Ratio Analysis, Interpreting Business Ratios, Breakeven Analysis, Feed Back &Suggestions on Student Project,
13. **Idea Pitching:** Formal presentation, 5-minutes pitch, funding negotiation and launching.

Reference Materials (or use any other standard and latest books):

Recommended Texts:

1. Scarborough, N. M. (2011). Essentials of entrepreneurship and small business management. Publishing as Prentice Hall, One Lake Street, Upper Saddle River, New Jersey 07458..

Suggested Readings:

1. Burstiner, I. (1989). Small business handbook. Prentice Hall Press.

URCG-5129 Understanding of Holy Quran/Fehm-e-Quran-I

1

Model Course Outline
for the Course Understanding of Quran – I

Course Title: Understanding of Quran – I
Course Book: Muallim ul Quran (Volume 1, 2 & 3) by Dr Ubaid ur Rahman
Credit Hours: 1 (0-1)
Contact Hours: 3 per week
Weeks: 15-16 (45-48 hours)

Course Learning Outcomes:

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

1. Develop the ability to understand basic words of the Quran, phrases and sentences that do not contain verbs (unit 1 to 5 of Muallim ul Quran Book) and then sentences having present tense (first half of unit 6 of Muallim ul Quran Book).
2. Acquire a strong foundation for understanding long verses of the Quran with clarity.
3. Comprehend Quranic vocabulary, particles (operative & non operative particles) , compounds (Adjective & Possessive compound), pronouns (singular & plural) and types of plural through hundreds of Quranic sentences.
4. Recognize and understand different styles of Quranic sentences, including nominal sentence, emphatic sentence, double emphatic sentence, negative sentence, interrogative sentence, oath –based sentences.
5. Strengthen understanding of fundamental Quranic linguistic styles, expressions and idioms.
6. Understand at least 30 to 40 % of each page of the holy Quran.

Provision of material, content and books:

- **Paper book:** All volumes are available in printed book form.
- **Tutorial videos:** Teaching video of each lesson available on YouTube.
- **Confirmation Videos:** A complete series of confirmation videos of all lessons is available in which the student can confirm his answers.
- **A flipbook:** A flipbook edition is also accessible.
- **Helping material:** Helping material for the teachers like quizzes, question papers and images is available on website.

2

Course Outline:

Weeks	Lectures (1.5 hrs)	Units	Lessons	Assignments/Home Task	Linguistic Rules
1.	1.	1	1-6	Writing the meaning of Quranic words Lesson 1-8	Proper Noun Masculine & Feminine
	2.	1	9-14	Writing the meaning of Quranic words 9-14	Two kinds of plural Concept of (و) "And" Common Noun
2.	1.	1	15-17	Writing the meaning of Quranic words, phrases & translation of Sentences 15-17	Demonstrative Noun (This & That for Masculine (هذا- هذه) Demonstrative Noun (This & That for Feminine) (ذلك- تلك)
	2.	1	18-19 & Revision (Unit 1)	Writing the meaning of Quranic words , phrases & translation of Sentences 17-19 Quiz	Laam for emphasis (لام التأكيد) Superlative Degree like اكبر Revision of all Quranic Sentences
3.	1.	Unit 2	1-3	Writing the meaning of Quranic words, phrases & translation of Sentences 1-3	Emphatic Particle إن Preposition "For" (اللام) Preposition (في)
	2.	2	4-6	Writing the meaning of Quranic words, phrases & translation of Sentences 4-6	Preposition (على- من- إلى)
4.	1.	2	7- 9	Writing the meaning of Quranic words & translation of Sentences 7-9	Preposition (الباء) Absolute Negation Particle Exceptive Particle (لا النافية للجنس)(ما النافية) (إلا)
	2.	2	10-13 & Revision (Unit 2)	Writing the meaning of Quranic words, phrases & translation of Sentences 10-13 Quiz	Subordinating Conjunction(أن), Was (كان), Vocative Particle(حرف النداء)

3

5.	1.	Unit 3	1-2	Writing the meaning of Quranic phrases 1-2	Quranic Adjective Compounds (صفة وموصوف)
	2.	3	3-5	Writing the meaning of Quranic phrases & translation of sentences 3-5	Quranic Possessive Construction (مضاف ومضاف إليه)
6.	1.	3	6 -7	Writing the meaning of Quranic phrase translation of sentences 6-7	Quranic Possessive Construction (مضاف ومضاف إليه)
	2.	3	8-10 & Revision (Unit 3)	Writing the meaning of Quranic phrase & translation of sentences 8-10 Quiz	Active Participle (اسم الفاعل), Passive Participle (اسم المفعول), Dual (مثنى)
7.	1.	Unit 4	1-2	Writing the meaning of Quranic phrase & translation of sentences 1-2	Personal Pronoun He(هو المنفصل) Possessive Pronoun His ـه المتصل)
	2.	4	3-4	Writing the meaning of Quranic phrase & translation of sentences 3 -4	Possessive Pronoun with prepositions like في بيته Pronoun "His" with prepositions like له، منه، فيه
8.	1.	4	5-8	Writing the meaning of Quranic sentences 5-8	Personal Pronoun You(أنت المنفصل) Possessive Pronoun Your ك المتصل) Possessive Pronoun with prepositions like في بيتك Pronoun "your" with prepositions like لك، منك، فيك
	2.	Mid-Term			

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9.	1.	4	9-12	Writing the meaning of Quranic phrases & sentences 9-12	Personal Pronoun She(هي المنفصل) Possessive Pronoun Her ها المتصل) Possessive Pronoun with prepositions like في بيتها Pronoun "Her" with prepositions like لها،
	2.	4	13-16	Writing the meaning of Quranic phrases & sentences 13-16	Personal Pronoun I (أنا المنفصل) Possessive Pronoun Her ي المتصل) Possessive Pronoun with prepositions like في بيتيPronoun "My" with prepositions like لي
10.	1	4	17 & Revision Unit 4	Revision of all Quranic sentences of Unit 4 Quiz	Adverb (حال)
	2.	Unit 5	1-2	Writing the meaning of Quranic phrases & sentences 1-2	Masculine Plural جمع المذكر السالم و جمع المذكر السالم المسبوق بحرف الجر
11.	1.	5	3-4	Writing the meaning of Quranic phrases & sentences 3-4	Possessive Construction with Plurals جمع المذكر السالم المسبوق بالإضافة
	2.	5	5-6	Writing the meaning of Quranic phrases, sentences & verses 5-6	Personal Pronoun They (هم المنفصل) Possessive Pronoun Their هم المتصل)
12.	1.	5	7-8	Writing the meaning of Quranic phrases, sentences & verses 7-8	Possessive Pronoun with prepositions like في بيتهمPronoun "Their" with prepositions like لهم
	2.	5	9-11	Writing the meaning of Quranic phrases, sentences & verses 9-11	Personal Pronoun You (انتم المنفصل) Possessive Pronoun Your كم المتصل) Possessive Pronoun with prepositions

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					like في بيتكم
13.	1.	5	12-14	Writing the meaning of Quranic phrases & sentences & verses 12-14	Pronoun "Your" with prepositions like لكم Personal Pronoun We (نحن المنفصل) Possessive Pronoun Our نا المتصل)
	2.	5	15-16	Writing the meaning of Quranic sentences & verses 15-16	Possessive Pronoun with prepositions like في بيتنا Pronoun "Our" with prepositions like لنا
14.	1.	5	17-18	Writing the meaning of Quranic sentences & Verses 17-18	Demonstrative Pronoun These, Those (هؤلاء- أولئك)
	2.	5	19-23	Writing the meaning of Quranic sentences & Verses 19-23	(ما / إلا، إن / إلا، إنما، ليس، ما ، أم/أم، أن، بل، كان) (ألا، أليس، اليوم، يومئذ، سبحان، مابينهما، قل، إذن، بئس، نعم، كلا، ما أدراك، حسب، أعلم ب، مصير، مرجع، دينا(تمييز)
15.	1.	5	Revision Unit 5	Quiz	
	2.	5	1-3 (till Page 16)	Writing the meaning of Quranic Verbs &Translation of Quranic Sentences & Verses (1-3)	Introduction of Present Tense(فعل مضارع) & Verbal Sentence (جملة فعلية) Present Tense الفعل المضارع صيغة المفرد يعلم
16.	1.	6	3 (From Page 17) & 4 -5	Translation of Quranic Sentences & Verses 3-5	Present Tense الفعل المضارع صيغة المفرد يعلم
	2.	6	6	Translation of Quranic Sentences & Verses	Present Tense الفعل المضارع صيغة الجمع يعلمون

URCG-5130 Understanding of Holy Quran/Fehm-e-Quran-II

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Model Course Outline
for the Course Understanding of Quran – II

Course Title: Understanding of Quran – II
Course Book: Muallim ul Quran (Volume 3, 4 & 5) by Dr Ubaid ur Rahman
Credit Hours: 1 (0-1)
Contact Hours: 3 per week
Weeks: 15-16 (45-48 hours)

Course Learning Outcomes:

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

1. Directly comprehend hundreds of Quranic sentences & verses.
2. Understand at least 80 to 85 % of each page of the holy Quran.
3. Understand common verses across different Quranic topics.
4. Achieve proficiency in the basic and advance linguistic aspects of the Arabic language.
5. Understand the difference between Quranic verbs in various forms, such as present, past and imperative.
6. Develop the ability to understand long verses of the holy Quran independently and then comprehend their interpretation.

Provision of material, content and books:

- **Paper book:** All volumes are available in printed book form.
- **Tutorial videos:** Teaching video of each lesson available on YouTube.
- **Confirmation Videos:** A complete series of confirmation videos of all lessons is available in which the student can confirm his answers.
- **A flipbook:** A flipbook edition is also accessible.
- **Helping material:** Helping material for the teachers like quizzes, question papers and images is available on website.

Course Outline:

Weeks	Lectures	Units	Lessons	Assignments/Home Task	
1.	1.	6	6	Understanding & Translation of Verses	Present Tense صیغۃ جمع مذکر غائب مثل یعبدون
	2.	6	7-8	Understanding & Translation of Verses	Present Tense صیغۃ جمع مذکر غائب مثل یعبدون
2.	1.	6	9-10	Understanding & Translation of Verses	Present Tense صیغۃ مفرد مذکر مخاطب (تعبد) وجمع مذکر مخاطب (تعبدون)
	2.	6	11-12	Understanding & Translation of Verses	Present Tense صیغۃ جمع مذکر مخاطب (تعبدون)

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					صيغة المتكلم (أعبد)
3.	1.	6	13	Understanding & Translation of Verses	Present Tense صيغة جمع المتكلم (نعبد)
	2.	6	14-15	Understanding & Translation of Verses	Negative Imperative صيغة المفرد وصيغة الجمع , لا تعبدْ، لا تعبدوا
4.	1.	6	16-17	Understanding & Translation of Verses	Conditional Sentences & masdar moawal (مصدر موزل)
	2.	6	18-19	Understanding & Translation of Verses	Laam uttaleel (لام التعليل) & Laam ul jhood(لام الجحود)
5.	1.	6	20-21	Understanding & Translation of Verses	Present with object pronouns & Passive Voice
	2.	6	Revision (Unit 6)	Quiz	
6.	1.	Unit 7	1 (sec 1-3)	Understanding & Translation of Verses	Past Tense صيغة المفرد الغائب
	2.	6	1 (Sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
7.	1.	6	1 (Sec 5-6)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
	2.	6	1 (Sec 7-9)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
8.	1.	7	Revision	Understanding & Translation of Verses QUIZ	Past Tense صيغة المفرد للغائب
	2.				
9.	1.	7	2 (sec 1-2)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
	2.	7	2 (sec 3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
10.	1.	7	2 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
	2.	7	2 (sec 6-7)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
11.	1.	7	3 (sec 1-2)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا

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	2.	7	3 (sec 2-3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
12.	1.	7	3 (sec 3-4)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
	2.	7	3 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
13.	1.	7	4 (sec 1-2-3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمخاطب عبدتم
	2.	7	4 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمخاطب عبدتم
14.	1.	7	5-6	Understanding & Translation of Verses Quiz	Past Tense صيغة المتكلم والمخاطب عبدتُ ، عبدتَ
	2.	7	7	Understanding & Translation of Verses	Past Tense صيغة المؤنث للغائب عبدتْ
15.	1.	7	8	Understanding & Translation of Verses	Passive Voice (Past Tense) فعل مجهول للمفرد
	2.	7	9	Understanding & Translation of Verses	Passive Voice (Past Tense) فعل مجهول الجمع
16.	1.	8	1-4	Understanding & Translation of Verses	Imperative Verb for singular فعل الأمر للمفرد
	2.	7	5-8	Understanding & Translation of Verses	Imperative Verb for plural فعل الأمر للجمع

URCG-5132 Ethics-II

Ethics-II

URCG-5132

1-Course Description

I (0-1)

The course *Ethics-II* is designed to provide students with a deeper understanding of ethical principles and practices from both Semitic and non-Semitic religions, as well as their application in professional and social contexts. Students will engage with Jewish, Christian, Islamic, Hindu, Buddhist, Sikh, Confucian, and Jain ethical traditions. The course emphasizes moral reasoning, decision-making, tolerance, and peacebuilding. It aims to cultivate an inclusive, humanistic, and holistic approach towards ethical living and interfaith engagement.

2- Learning Objectives

The course objectives are to:

1. Understand the fundamental principles and theories of ethics.
2. Introduce the ethical and moral teachings of Judaism, Christianity, Islam, and Hinduism.
3. Explore the ethical teachings of non-Semitic religions such as Buddhism, Sikhism, Confucianism, and Jainism.
4. Develop critical thinking skills to evaluate ethical arguments and theories.
5. Promote ethical leadership and interfaith harmony.

3- Learning Outcomes

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

1. Identify and analyze major ethical theories and teachings from world religions.
2. Understand the role of religions in improving moral values and social behavior.
3. Demonstrate ethical decision-making in various personal and professional contexts.
4. Recognize the impact of ethical decisions on individuals, communities, and society.
5. Apply skills of ethical leadership, including communication, conflict resolution, and inclusive engagement.

4-Course Structure

1. Interactive lectures, Group discussions and debates
2. Reflection papers and presentations
3. Assignments and Quiz

~~Course Title: Ethics-II (For Non-Muslim Students) Course Code: URCG-5130~~ X

Course Contents

Unit 1: Ethical Teachings of Semitic Religions

- Judaism and its ethical teachings
- Christianity and its ethical teachings
- Islam and its ethical teachings

Unit 2: Ethical Teachings of Non-Semitic Religions

- Hinduism and its ethical teachings
- Sikhism and Buddhism: ethical values and practices
- Confucian and Jain ethical traditions

Unit 3: Professional Ethics

- Ethics for students and teachers
- Ethics in doctor–patient relationships
- Ethics in trader–customer interactions

Unit 4: Concept and Significance of Tolerance

- Definition, need, and importance of tolerance
- Teachings of Semitic religions on tolerance and their contemporary relevance
- Teachings of non-Semitic religions on tolerance and their contemporary relevance

Unit 5: Foundational Values and Ethics for Peacebuilding in Society

- Respect for sacred scriptures, personalities, places of worship, and religious symbols
- Promotion of tolerance and broadmindedness
- Encouragement of dialogue and harmony
- Benevolence towards humanity
- Establishment of justice and fairness
- Patience, forbearance, and forgiveness

Textbook

- Kidder, R. M. (2009). *How Good People Make Tough Choices: Resolving the Dilemmas of Ethical Living*. Harper.

Suggested Readings

1. Barash, D. P., & Webel, C. P. (2014). *Peace and Conflict Studies*. Sage.
2. Smart, N. (1998). *The World's Religions*. Cambridge University Press.
3. Nasr, S. H. (2003). *The Heart of Islam: Enduring Values for Humanity*. HarperOne.
4. Sharma, A. (2006). *Hindu Ethics: Purity, Abortion, and Euthanasia*. SUNY Press.
5. Harvey, P. (2000). *An Introduction to Buddhist Ethics: Foundations, Values and Issues*. Cambridge University Press.
6. Coward, H., & Perkinson, J. (2013). *A Cross-Cultural Dialogue on Ethical Leadership*. Wilfrid Laurier University Press.
7. Confucius. (1998). *The Analects*. Oxford University Press.