

FOUNDATION UNIVERSITY ISLAMABAD

فناؤنڈیشن یونیورسٹی اسلام آباد



Bachelor of Engineering Technology (Information)
B.E. Tech (Information)
Department of Engineering Technology

Road Map B.E. Tech (Information)

Program	No. of semesters	Course category	No. of courses in the program	Credit hours
B.E. Tech (Information)	08	Core / Compulsory	17	63
		General	12	31
		IDE	1	3
		Capstone	2	6
		Internship	2	32
		Total	34	135

Semester Wise Course Plan

SEMESTER 1

S#	Course Title	Credit Hours	Status
1	Application of Information & Communication Technologies	3	General Education
2	Programming Fundamental	4	Core
3	Calculus and Analytic Geometry	3	General Education
4	Islamic Studies	2	General Education
5	Functional English	3	General Education
6	Digital Logic Design	3	Core
	Total	18	

SEMESTER 2

S#	Course Title	Credit Hours	Status
1	Computer Architecture and Assembly Language	4	Core
2	Object Oriented Programming	4	Core
3	Ideology and Constitution of Pakistan	2	General Education
4	Probability and Statistics	3	General Education
5	Applied Physics	3	General Education
	Total	16	

SEMESTER 3

S#	Course Title	Credit Hours	Status
1	Data Structures and Algorithms	4	Core
2	Professional Practices	2	General Education
3	Computer Networking Technologies	4	Core
4	Entrepreneurship	2	General Education
5	Civics and Community Engagement	2	General Education
6	Database Systems	4	Core
	Total	18	

SEMESTER 4

S#	Course Title	Credit Hours	Status
1	Mobile App Development	4	Core
2	Introduction to Web Technologies	4	Core

3	Environmental Sciences	3	General Education
4	Technical Report Writing	3	General Education
5	Operating System Principles	4	Core
	Total	18	

SEMESTER 5

S#	Course Title	Credit Hours	Status
1	Software Engineering	3	Core
2	Theory of Automata & Compilers	3	Core
3	Technology Project Part 1	3	Capstone
4	Introduction to Data Science	4	Core
5	Introduction to Cyber Security	4	Core
	Total	17	

SEMESTER 6

S#	Course Title	Credit Hours	Status
1	Technology Project Part 2	3	Capstone
2	Machine Learning	3	Core
3	Organizational Behavior	3	IDE
4	Visual Programming	4	Core
5	Introduction to Artificial Intelligence	3	Core
	Total	16	

SEMESTER 7

S#	Course Title	Credit Hours	Status
1	Supervised Industrial Training-I	16	Internship
	Total	16	

SEMESTER 8

S#	Course Title	Credit Hours	Status
1	Supervised Industrial Training-II	16	Internship
	Total	16	

COURSE TITLE: APPLICATION OF INFORMATION & COMMUNICATION TECHNOLOGIES

COURSE INTRODUCTION & OBJECTIVES:

This course is designed to provide students with an exploration of the practical applications of Information and Communication Technologies (ICT) and software tools in various domains. Students will gain hands-on experience with a range of software applications, learning how to leverage ICT to solve daily life problems, enhance productivity and innovate in different fields. Through individual and interactive exercises and discussions, students will develop proficiency in utilizing software for communication, creativity, and more.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Explain the fundamental concepts, components, and scope of Information and Communication Technologies (ICT).
- Identify uses of various ICT platforms and tools for different purposes.
- Apply ICT platforms and tools for different purposes to address basic needs in different domains of daily, academic, and professional life.
- Understand the ethical and legal considerations in the use of ICT platforms and tools.

COURSE CONTENTS:

Introduction to Information and Communication Technologies:

- Components of Information and Communication Technologies (basics of hardware, software, ICT platforms, networks, local and cloud data storage etc.).
- Scope of Information and Communication Technologies (use of ICT in education, business, governance, healthcare, digital media and entertainment, etc.).
- Emerging technologies and future trends.

Basic ICT Productivity Tools:

- Effective use of popular search engines (e.g., Google, Bing, etc.) to explore World Wide Web.
- Formal communication tools and etiquettes (Gmail, Microsoft Outlook, etc.).
- Microsoft Office Suites (Word, Excel, PowerPoint).
- Google Workspace (Google Docs, Sheets, Slides).
- Dropbox (Cloud storage and file sharing), Google Drive (Cloud storage with Google Docs integration) and Microsoft OneDrive (Cloud storage with Microsoft Office integration).
- Evernote (Note-taking and organization applications) and OneNote (Microsoft's digital notebook for capturing and organizing ideas).
- Video conferencing (Google Meet, Microsoft Teams, Zoom, etc.).
- Social media applications (LinkedIn, Facebook, Instagram, etc.).

ICT in Education:

- Working with learning management systems (Moodle, Canvas, Google Classrooms, etc.).
- Sources of online education courses (Coursera, cdX, Udemy, Khan Academy, etc.).
- Interactive multimedia and virtual classrooms.

ICT in Health and Well-being:

- Health and fitness tracking devices and applications (Google Fit, Samsung Health, Apple Health, Xiaomi Mi Band, Runkeeper, etc.).
- Telemedicine and online health consultations (OLADOC, Sehat Kahani, Marham, etc.).

ICT in Personal Finance and Shopping:

- Online banking and financial management tools (JazzCash, Easypaisa, Zong PayMax, I LINK and MNET, Kccnu Wallet, etc.).
- E-commerce platforms (Daraz. pk, Telemart, Shophivc, etc.)

Digital Citizenship and Online Etiquette:

- Digital identity and online reputation.
- Netiquette and respectful online communication.
- Cyberbullying and online harassment.

Ethical Considerations in the Use of ICT Platforms and Pools:

- Intellectual property and copyright issues.
- Ensuring originality in content creation by avoiding plagiarism and unauthorized use of information sources.
- Content accuracy and integrity (ensuring that the content shared through ICT platforms is free from misinformation, fake news, and manipulation).

RECOMMENDED BOOKS/READINGS:

1. "Discovering Computers" by Vermaat, Shaffer, and Freund.
2. "GO! with Microsoft Office" Series by Gaskin, Vargas, and McLellan.
3. "Exploring Microsoft Office" Series by Grauer and Poatsy.
4. "Computing Essentials" by Morley and Parker.
5. "Technology in Action" by Evans, Martin, and Poatsy.

COURSE TITLE: PROGRAMMING FUNDAMENTALS**COURSE INTRODUCTION & OBJECTIVES:**

The "Programming Fundamentals" course is designed to equip students with the essential knowledge and skills required to embark on a coding journey. In this course, students delve into the core principles of programming, starting from the very basics of computer hardware and software. We explore the inner workings of computer programs, the significance of high-level programming languages, and the pivotal roles of compilers and interpreters. Students learn to design, write, and compile their programs, master the art of working with variables, and harness the power of mathematical operations. Decision-making structures, loops, functions, and file handling are all unveiled, providing a robust foundation for students to craft functional and creative programs.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Understand the concepts of programming, the characteristics of programming tools, and their applications.
- Analyze basic programming constructs, data types of programming language (python or C/C++), and common errors in the programs.
- Design and implement algorithms to solve real-world problems.

COURSE CONTENTS:**Background:**

- Basics of computer hardware and software
- How computers store data and manipulate
- Introduction to programming languages
- Concept of compiler and interpreter

- Building and running computer programs

Fundamentals:

- Program development cycle
- Pseudocode and flowchart
- Design, write, and compile simple programs
- Working with variables, comments, and input
- Data types and assignment statements
- Mathematical operations and calculations

Decision Structures:

- Introduction to decision structures
- if and if-else structures
- Comparing strings
- Nested decision structures
- Logical operators and boolean variables

Repetition Structures:

- While and For loops
- Counters and accumulators
- Running totals
- Sentinels in loops
- Input validation loops
- Nested loops

Functions:

- Function definition and benefits
- Identifying situations for using functions
- Defining and calling functions
- Local and global variables
- Value-returning functions
- Standard library functions and modules

Files and Exceptions:

- Basic file input and output
- File types and access methods
- File processing
- Handling exceptions

Lists and Tuples:

- C++
- Linked Lists and types
- Tuples in Python
- Working with dictionaries and sets

RECOMMENDED BOOKS/READINGS:

1. C++ Programming: From Problem Analysis to Program Design”, Sixth Edition by D.S. Malik
2. Python for Everybody: Exploring Data in Python 3" by Charles Severance
3. The C++ Programming Language” 4th Edition by Bjarne Stroustrup

COURSE TITLE: CALCULUS AND ANALYTICAL GEOMETRY

COURSE INTRODUCTION & OBJECTIVES:

This course is designed to equip students with the fundamental mathematical tools and concepts that are essential for understanding and solving a wide range of problems in science and engineering. Throughout this course, students will explore the intricacies of differentiation and integration, uncover the power of vector calculus, and delve into the fascinating realm of analytical geometry in multiple dimensions. By the end of this course, students will have mastered calculus techniques and gained the analytical skills needed to investigate engineering technology problems.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Discuss basic equations, and graphical sketches of different functions, limits, and continuity.
- Solve problems by applying techniques of differentiation and integration.
- Analyze vector calculus and analytical geometry in multiple dimensions for the investigation of different engineering technology problems.

COURSE CONTENTS:

Basics

- Definition of derivative
- Differentiation Rules
- Chain Rule
- Implicit Differentiation

Applications

- Slope
- Equation of tangent and normal
- Maxima
- Minima
- Point of inflection

Integration

- Indefinite integral
- Integration techniques (parts, substitution, partial fractions)
- Integration of trigonometric identities

Definite Integrals

- Area under the curve
- Area between curves
- Mean value theorem
- Volume by slicing
- Solid revolution

Vector Spaces

- Vector operations
- Divergence
- Curl
- Directional derivatives
- Partial derivatives

Vectors in Planes

- Dot product
- Cross product
- Lines and planes in space

- Angle between vectors

RECOMMENDED BOOKS/READINGS:

1. Thomas' Calculus Early Transcendentals, Thirteenth edition
2. Stewart, J. (8th Edition). Calculus. Early Transcendentals.

COURSE TITLE: ISLAMIC STUDIES

COURSE INTRODUCTION & OBJECTIVES:

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

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

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

COURSE CONTENTS:

Introduction to Islam:

- Definition of Islam and its core beliefs.
- The Holy Quran (introduction, revelation and compilation).
- Hadith and Sunnah (compilation, classification, and significance).
- Key theological concepts and themes (Tawhid, Prophethood, Akhirah etc.).

Sirah of the Holy Prophet (Peace Be Upon Him) as Uswa-i-Hasana:

- Life and legacy of the Holy Prophet PBUH.
- Diverse roles of the Holy Prophet PBUH (as an individual, educator, peace maker, leader etc.).

Islamic History and Civilization:

- World before Islam.
- The Rashidun Caliphate and expansion of Islamic rule.
- Contribution of Muslim scientists and philosophers in shaping world civilization.

Islamic Jurisprudence (Fiqh):

- Fundamental sources of Islamic jurisprudence.
- Pillars of Islam and their significance.
- Major schools of Islamic jurisprudence.
- Significance and principles of Ijtihad.

Family and Society in Islam:

- Status and rights of women in Islamic teachings.
- Marriage, family, and gender roles in Muslim society.
- Family structure and values in Muslim society.

Islam and the Modern World:

- Relevance of Islam in the modern world (globalization, challenges and prospects).

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

RECOMMENDED BOOKS/READINGS:

1. "The five Pillars of Islam: A Journey Through the Divine Acts of Worship" by Muhammad Mustafa Al-Azami.
2. "The Five Pillars of Islam: A Framework for Islamic Values and Character Building" by Musharraf Hussain
3. "Towards Understanding Islam" by Abul A' la Mawdudi.
4. "Island Nazria e Hayat" by Khurshid Ahmad

COURSE TITLE: FUNCTIONAL ENGLISH

COURSE INTRODUCTION & OBJECTIVES:

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

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

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

COURSE CONTENTS:

Foundations of Functional English:

- Vocabulary building (contextual usage, synonyms, antonyms and idiomatic expressions)
- Communicative grammar (subject-verb-agreement, verb tenses, fragments, modifiers, articles, word classes, etc.)
- Word formation (affixation, compounding, clipping, back formation, etc.)
- Sentence structure (simple, compound, complex and compound-complex)
- Sound production and pronunciation

Comprehension and Analysis:

- Understanding purpose, audience and context
- Contextual interpretation (tones, biases, stereotypes, assumptions, inferences, etc.)
- Reading strategies (skimming, scanning, SQ4R, critical reading, etc.)
- Active listening (overcoming listening barriers, focused listening, etc.)

Effective Communication:

- Principles of communication (clarity, coherence, conciseness, courteousness, correctness, etc.)
- Structuring documents (introduction, body, conclusion and formatting)
- Inclusivity in communication (gender-neutral language, stereotypes, cross-cultural communication, etc.)
- Public speaking (overcoming stage fright, voice modulation and body language)
- Presentation skills (organization content, visual aids and engaging the audience)
- Informal communication (small talk, networking and conversational skills)
- Professional writing (business e-mails, memos, reports, formal letters, etc.)

RECOMMENDED BOOKS/READINGS:

1. "Understanding and Using English Grammar" by Betty Schramper Azar.
2. "English Grammar in Use" by Raymond Murphy.
3. "The Blue Book of Grammar and Punctuation" by Jane Straus.
4. "English for Specific Purposes: A Learning-Centered Approach " by Tom Hutchinson and Alan Waters.

COURSE TITLE: DIGITAL LOGIC DESIGN**COURSE INTRODUCTION & OBJECTIVES:**

The course on "Digital Logic Design" provides students with a solid foundation in the realm of logic and circuit design. In this course, students delve into the intricate world of number systems, truth functions, and Boolean algebra, unlocking the tools and techniques needed to create and optimize digital circuits. Through hands-on activities and guided learning, students will master the art of designing combinational and sequential networks, utilizing elements like latches, flip-flops, and programmable gate arrays. This course serves as a gateway to understanding the logic that underlies modern computing systems, enabling students to bring their innovative ideas to life in the form of digital circuits and systems.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Comprehend the working with different number systems, Boolean algebra and mapping methods using standard mathematical rules
- Design and working of combinational logic circuits using digital logic principles and Boolean algebra.
- Design the sequential logic circuits using digital logic principles, Boolean algebra and mapping methods.

COURSE CONTENTS:**Number Systems**

- Introduction to number systems
- Binary, octal, and hexadecimal systems
- Conversions between number systems

Truth Functions

- Introduction to truth functions
- Binary connectives
- Evaluation of truth functions
- Many statement compounds

- Physical realizations

Boolean Algebra

- Boolean algebra basics
- Switching devices
- Minimization of Boolean functions
- Tabular minimizations
- Cubical representation of Boolean functions

Combinational Networks

- Properties of combinational networks
- Design of NAND and NOR networks
- Switching expressions for NAND and NOR networks
- Comparator, decoders, encoders, multiplexers, and demultiplexers

Sequential Networks

- Introduction to sequential networks
- Latches
- Sequential networks in fundamental mode
- Synthesis of sequential networks
- Minimization of the number of states

Clocked networks

- Flip-flops (RS, JK, D, T, master/slave)
- Field programmable gate arrays

RECOMMENDED BOOKS/READINGS:

1. "Digital Design" by M. Morris Mano
2. "Fundamentals of Digital Logic with VHDL Design" by Stephen Brown and Zvonko Vranesic
3. "Digital Logic Design" by B. Holdsworth and R.C. Woods

COURSE TITLE: COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE

COURSE INTRODUCTION & OBJECTIVES:

This course introduces the principles of computer organization and architecture using solid mathematical and engineering fundamentals, performance and cost trade-offs, and with special emphasis on Assembly Language. Topics include computer performance, instruction set design, machine language and assembler language programming, computer arithmetic, data path and controller design, pipelining and memory structures; real-time computer applications.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Acquire the basic knowledge of computer organization, computer architecture and assembly language.
- Understand the concepts of basic computer organization, architecture, and assembly language techniques.
- Solve the problems related to computer organization and assembly language.

COURSE CONTENTS:

Introduction to computer systems

- Information is bits + context, programs are translated by other programs into different forms, it pays to understand how compilation systems work,

- processors read and interpret instructions stored in memory, caches matter, storage devices
- form a hierarchy, the operating system manages the hardware, and systems communicate with other systems using networks

Representing and manipulating information

- Information storage, integer representations, integer arithmetic, floating point
- Machine-level representation of programs: a historical perspective, program encodings
- Data formats, accessing information.
- Arithmetic and logical operations
- Control, procedures, array allocation and access
- Heterogeneous data structures

putting it together:

- Understanding pointers, life in the real world
- Using the gdb debugger
- Out of-bounds memory references and buffer overflow

x86-64

- Extending ia32 to 64 bits, machine-level representations of
- Floating-point programs;

Processor architecture

- Y86 instruction set architecture, logic design
- Hardware Control Language (HCL), sequential Y86 implementations
- General principles of pipelining, pipelined Y86 implementations

RECOMMENDED BOOKS/READINGS:

1. Computer Organization & Design (The Hardware / Software Interface) by Patterson and Hennessy, Fifth, Morgan Kaufmann, ISBN 1-55860-604-1
2. The C Programming Language by Kernighan and Ritchie, Second Edition
3. Computer Architecture (A Quantitative Approach) by Patterson and Hennessy, Fourth Edition, 2007, Morgan Kaufmann

COURSE TITLE: OBJECT-ORIENTED PROGRAMMING

COURSE INTRODUCTION & OBJECTIVES:

This course introduces the concepts of object-oriented programming to students with a background in the procedural paradigm. The course begins with a brief review of control structures and data types with emphasis on structured data types and array processing. It then moves on to introduce the object-oriented programming paradigm, focusing on the definition and use of classes along with the fundamentals of object-oriented design. Other topics include an overview of programming language principles, simple analysis of algorithms, basic searching and sorting techniques, event-driven programming, memory management and an introduction to software engineering issues.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Understand principles of object-oriented paradigm
- Identify the objects & their relationships to build object-oriented solution.
- Be able to implement a solution using libraries.

COURSE CONTENTS:

OOP Introduction

- Beginning of programming
- Structured programming
- Why Do We Need Object-Oriented Programming?
- Object oriented programming
- Characteristics of Object-Oriented Languages
- Objects, Classes, Inheritance, Reusability, Data Abstraction, Data Encapsulation
- Creating new data types
- Polymorphism and overloading
- Software Engineering Case Study: introduction to Object Technology and the UML

Structure

- Structure basics
- Structure within structure
- Structures and classes
- Enumerations,
- Software Engineering Case Study: examining the ATM Requirements Document

Objects and classes

- Basics of class and objects with real world example
- Data member and member function
- Access specifier
- C++ objects as data types
- Constructors, Destructors
- Object as function argument
- Overloaded constructor,
- The default copy constructor
- Returning objects from function
- Class, object and memory, Static class data
- Const and classes, Const member functions, Const objects

Functions and functions overloading

- Functions Basics
- Overloaded functions
- Inline functions
- Default arguments
- Variables and storage classes, Automatic variable, External variables
- Static variables, Storage
- Const function arguments

Operator overloading

- Overloading unary operator
- Overloading binary operator
- Data conversion
- Pitfall of operator overloading and conversion

Inheritance

- Inheritance basics in real world and programming
- Derived class and base class, public, private & protected
- Overriding member functions
- Class hierarchies, Abstract base class
- Constructor and member functions

- Scope resolution with overridden functions
- Public and private inheritance
- Access specifiers: when to use what
- Level of inheritance
- Multiple inheritance

Pointers

- Pointer basics concepts
- Addresses and pointers
- The address of operator
- Pointer and arrays
- Pointers and functions
- Pointers and ctype string
- Memory management
- Pointer to objects
- Pointers to pointers

Virtual functions

- Virtual functions
- Abstract classes and pure virtual functions
- Friend functions
- Friend classes
- Static functions
- The this pointer

Polymorphism

- Type of Polymorphism
- Function Overloading
- Operator Overloading

Streams and files

- Stream classes
- The stream class hierarchy
- Disk file I/O with streams
- File pointers
- Error handling in file I/O
- File I/O with member functions

RECOMMENDED BOOKS/READINGS:

1. C++ by Robert Lafore
2. C++ How to Program By Deitel Deitel

COURSE TITLE: IDEOLOGY AND CONSTITUTION OF PAKISTAN

COURSE INTRODUCTION & OBJECTIVES:

This course is designed to provide students with a fundamental exploration of the ideology and the constitution of Pakistan. The course focuses on the underlying principles, beliefs, and aspirations that have been instrumental in shaping and developing Pakistan as a sovereign state. Moreover, the course will allow the students to understand the core provisions of the constitution of the Islamic Republic of

Pakistan concerning the fundamental rights and responsibilities of Pakistani citizens to enable them to function in a socially responsible manner.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Demonstrate enhanced knowledge of the basis of the ideology of Pakistan with special reference to the contributions of the founding fathers of Pakistan.
- Demonstrate fundamental knowledge about the constitution of Pakistan 1973 and its evolution with special reference to state structure.
- Explain the guiding principles on rights and responsibilities of Pakistani citizens as enshrined in the constitution of Pakistan 1973.

COURSE CONTENTS:

Introduction to the Ideology of Pakistan

- Definition and significance of ideology
- Historical context of the creation of Pakistan (with emphasis on socio-political, religious, and cultural dynamics of British India between 1857 till 1947).
- Contributions of the founding fathers of Pakistan in the freedom movement including but not limited to Allama Muhammad Iqbal, Muhammad Ali Jinnah., etc.
- Contributions of women and students in the freedom movement for separate homeland for Muslims of British India.

Two-Nation Theory

- Evolution of the 'wo-Nation Theory (Urdu-Hindi controversy, Partition of Bengal, Simla, Deputation 1906, Allama Iqbal's Presidential Address 1930, Congress Ministries 1937 Lahore Resolution 1940),
- Role of communalism and religious differences.

Introduction to the Constitution of Pakistan

- Definition and importance of a constitution.
- Ideological factors that shaped the Constitution(s) of Pakistan (Objectives Resolution 1949).
- Overview of constitutional developments in Pakistan,

Constitution and State Structure

- Structure of Government (executive, legislature, and judiciary).
- Distribution of powers between federal and provincial governments.
- 18th Amendment and its impact on federalism,

Fundamentals Rights, Principles of Policy and Responsibilities

- Overview of fundamental rights guaranteed to citizens by constitution of Pakistan 1973 (articles 8-28)
- Overview of principles of policy (articles 29-40)
- Responsibilities of Pakistani citizens (article 5)

Constitutional Amendments

- Procedures for amending the constitution
- Notable constitution amendments and their implications

RECOMMENDED BOOKS/READINGS:

1. "The Idea of Pakistan" by Stephen P. Cohen.
2. "Ideology of Pakistan" by Javed Iqbal.
3. "The Struggle for Pakistan" by I. H. Qureshi.

4. "Pakistan the Formative Phase" by Khalid Bin Sayeed.
5. "Pakistan: Political Roots and Development" by Safdar Mahmood.
6. "Ideology of Pakistan" by Sharif-ul-Mujahid.
7. "The Struggle for Pakistan: A Muslim Homeland and Global Politics" by Ayesha Jalal.
8. "Jinnah, Pakistan and Islamic Identity: The Search for Saladin" by Akbar S. Ahmed.
9. "The Making of Pakistan: A Study in Nationalism" by K.K. Aziz.
10. "Pakistan: A New History" by Ian Talbot.
11. "Pakistan in the Twentieth Century: A Political History" by Lawrence Ziring.
12. "The Constitution of Pakistan 1973". Original.
13. "Constitutional and Political Development of Pakistan" by Hamid Khan.
14. "The Parliament of Pakistan" by Mahboob Hussain.
15. "Constitutional Development in Pakistan" by G.W. Choudhury.
16. "Constitution-Making in Pakistan: The Dynamics of Political Order" by G.W. Choudhury

COURSE TITLE: PROBABILITY AND STATISTICS

COURSE INTRODUCTION & OBJECTIVES:

It is a sequential undergraduate course that focuses on logical reasoning supported with mathematical and statistical concepts and modeling / analysis techniques to equip students with analytical skills and critical thinking abilities necessary to navigate the complexities of the modern world . The course is designed to familiarize students with the quantitative concepts and techniques required to interpret and analyze numerical data and to inculcate an ability in students the logical reasoning to construct and evaluate arguments, identify fallacies, and think systematically. Keeping the pre-requisite course of Quantitative Reasoning (I) as its base, this course will enable students further their quantitative, logical and critical reasoning abilities to complement their specific major / field of study.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Understanding of logic and logical reasoning
- Understanding of basic quantitative modeling and analyses
- Logical reasoning skills and abilities to apply them to solve quantitative problems and evaluate arguments.

COURSE CONTENTS:

Probability

- Fundamentals of probability theory
- Probability distribution and statistical characteristics of a random signal
- Measures of central tendency and variation
- Chebychev's theorem: z-scores: Frequency distributions: Graphical representation of data and Box plots: Symmetry: skewness and Quintiles (percentiles: deciles & Quartiles): Conditional probability and Bayes's theorem: counting techniques

Mathematical Expectation

- Concept of random variable: Discrete and continuous variable

Variance

- Standard Deviation
- Different Types of Distributions

Linear Regression and Correlation

- Regression models and correlation coefficients: ANOVA: Estimation of statistical characteristics of data: Classical and Bayesian method of estimation: Estimation of Z-test: t-test and Goodness of fit test: Estimation theory and optimum estimators: Concept of uncorrelated: independent and orthogonal data.

RECOMMENDED BOOKS/READINGS:

1. "Introductory Statistics" by Prem S. Mann
2. "Applied Statistical Modeling" by Salvatore Babones

COURSE TITLE: APPLIED PHYSICS

COURSE INTRODUCTION & OBJECTIVES:

The course on "Applied Physics" provides students with a comprehensive understanding of the fundamental principles and concepts that govern the behavior of electrical and magnetic phenomena in our physical world. Covering topics ranging from electric charge and electromagnetic fields to circuits and magnetic materials, this course equips students with the knowledge and practical skills necessary to analyze and manipulate electrical and magnetic systems. Through hands-on experiments and theoretical learning, students will delve into the laws of electrostatics, electromagnetism, and mechanics, enabling them to apply these principles to real-world scenarios. Additionally, the course emphasizes the importance of laboratory work and the application of physics in various technological applications, paving the way for students to become adept problem solvers and critical thinkers in the field of applied physics.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Comprehend the laws of physics related to electrostatics and the construction of capacitors.
- Apply knowledge of electromagnetism and construct inductors
- Describe basic laws of mechanics pertaining to force and motion.
- Trace basic principles used in mechanics, electrostatics and electromagnetism using the available laboratory.

COURSE CONTENTS:

Electric Charge

- Conductors and insulators
- Coulomb's law: Electric field
- Field due to a point-charge Electric dipole and line of charge
- Flux of an electric field
- Permittivity of a medium
- Gauss's law and Application of Gauss's Law:

Electric Potential

- Calculating the potential from electric field
- Potential due to a point-charge and a group of point-charges
- Potential due to a dipole
- Potential due to a continuous charge distribution

Capacitors

- Calculating capacitance
- Capacitors in series and parallel

- Factors affecting capacitance.
- Application of Capacitors

Current and Conductors

- Electric current and current density
- Resistance and resistivity
- Ohm's law
- The Steady Magnetic Field
- Resistors in series and parallel
- Temperature dependence of resistance and other factors affecting resistance
- Application of resistors
- The magnetic field
- Magnetic force on a current carrying conductor.
- Torque on a current loop

Magnetic field due to current

- Force between two parallel current-carrying conductors
- Biot Savart law and its applications
- Ampere's law
- Inductance and inductors
- Factors affecting inductance Permeability Faraday's law of induction
- Lenz's law
- Energy stored in a magnetic field
- Self-induction and Mutual Induction
- Magnets and magnetic materials
- Di-magnetic material
- Para-magnetic material
- Ferromagnetism
- Concepts of Rest and motion
- Force and friction
- Work Energy and power
- Momentum and law of conservation of momentum

RECOMMENDED BOOKS/READINGS:

1. Halliday, Resnick and Walker, "Fundamentals of Physics"
2. "University Physics" by Young and Freedman
3. "Introduction to Electrodynamics" by David J. Griffiths

COURSE TITLE: DATA STRUCTURES AND ALGORITHMS

COURSE INTRODUCTION & OBJECTIVES:

The course on Data Structures and Algorithms serves as a foundational pillar in the realm of computer science and programming. It offers students a comprehensive understanding of the fundamental data structures, algorithmic techniques, and their applications in solving real-world computational problems efficiently. Covering a wide array of topics, from abstract data types to graph algorithms, the course equips learners with the knowledge and skills essential for designing, analyzing, and implementing efficient algorithms. With a balance of theoretical concepts and hands-on activities,

students embark on a journey to master the art of algorithmic problem-solving, making them adept programmers capable of tackling complex challenges in various domains.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Understand the fundamentals of data structures such as lists, queues, trees, etc.
- Compare tradeoffs in the design and implementations of the data structures.
- Apply the concept of algorithm in solving real-world problems.

COURSE CONTENTS:

Fundamental

- Abstract data types and their importance
- Complexity analysis and Big O notation
- Overview of algorithmic analysis techniques

Stacks:

- Linked list implementation of stacks
- Array implementation of stacks
- Applications of stacks
- Time and space complexity analysis

Recursion and Recursive Algorithms

- Understanding recursion and its properties
- Analyzing recursive algorithms
- Divide and conquer algorithms.

Sorting Algorithms

- Various sorting algorithms and their implementations
- Time and space complexity of sorting algorithms

Queues and Deques -

- Queue data structure
- Deque data structure
- Priority queues
- Linked list and array implementations
- Time and space complexity analysis

Linked Lists

- Singly-linked lists
- Doubly linked lists
- Circular linked lists
- Sorted linked lists
- Time and space complexity of linked list operations

Searching and Hashing

- Searching algorithms for unsorted and sorted arrays.
- Hashing and indexing techniques
- Open addressing and chaining methods
- Time and space complexity analysis

Trees and Tree Traversals

- Overview of tree data structure
- Binary search trees
- Heaps and heap operations

- Balanced trees (e.g., AVL trees, Red-Black trees)
- Tree traversal techniques - Time and space complexity analysis

Graphs

- Introduction to graphs and their representations
- Breadth-first traversal
- Depth-first traversal
- Topological ordering of graphs
- Shortest path algorithms (e.g., Dijkstra's algorithm)
- Adjacency matrix and adjacency list implementations
- Time and space complexity analysis

RECOMMENDED BOOKS/READINGS:

1. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.
2. Data Structures and Algorithms in Python by Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser.
3. Data Structures and Algorithms in C++" by Adam Drozdek.
4. Introduction to the Design and Analysis of Algorithms by Anany Levitin.
5. Algorithms by Robert Sedgewick and Kevin Wayne.

COURSE TITLE: DATABASE SYSTEMS

COURSE INTRODUCTION & OBJECTIVES:

Throughout this course, students will learn the fundamental concepts of databases, from the basic principles of data organization to the intricacies of query optimization and recovery mechanisms. They will acquire the skills to design, model, and manipulate relational databases using Structured Query Language (SQL). Additionally, students will explore the evolving landscape of NoSQL databases and gain a holistic understanding of database systems, equipping them with the knowledge and practical experience needed for effective data management in real-world scenarios. Join us as we delve into the core of data storage and retrieval, enabling students to become proficient database administrators and developers.

COURSE OUTCOMES:

- Explain fundamental database concepts.
- Apply conceptual, logical and physical database schemas using different data models.
- Investigate functional dependencies and resolve database anomalies by normalizing database tables.
- Apply Structured Query Language (SQL) for database definition and manipulation in any DBMS.

COURSE CONTENTS:

Fundamental

- Basic database concepts Database vs. file-based systems
- Database architecture and components
- Three-level schema architecture
- Data independence

Relational Data Model

- Overview of the relational data model
- Attributes, domains, and tuples
- Schemas and relation instances
- Keys and integrity constraints

Relational Algebra

- Fundamental operations of relational algebra
- Selection and projection operations
- Cartesian product and join operations
- Different types of joins
- Normalization and Data Modeling
- Introduction to normalization
- Functional dependencies and normal forms
- Entity-relationship (ER) model
- Entity sets, attributes, and relationships.
- Entity-relationship diagrams (ERDs)

Structured Query Language (SQL)

- Overview of SQL - Data definition language (DDL) statements
- Data manipulation language (DML) statements Joins and sub-queries in SQL
- Grouping and aggregation in SQL
- Concurrency Control and Recovery
- Concurrency control in database systems
- Managing concurrent transactions
- Database backup and recovery mechanisms
- Indexing and Performance Optimization
- Indexes and their role in database performance
- Types of indexes (e.g., B-trees, hash indexes)
- Query optimization and performance-tuning techniques

NoSQL Databases

- Introduction to NoSQL systems
- Comparison of relational and NoSQL databases
- Overview of different NoSQL database models

RECOMMENDED BOOKS/READINGS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke.
2. Database Systems: The Complete Book" by Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom.
3. SQL for Mere Mortals by John L. Viescas and Michael J. Hernandez.
4. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence by Martin Fowler and Pramod J. Sadalage.

COURSE TITLE: ENTREPRENEURSHIP

COURSE INTRODUCTION & OBJECTIVES:

Entrepreneurship is an interdisciplinary course designed to teach students how to think and act entrepreneurial. Students learn how to start up and operate a business. The course will build on cross-curricular academic skills, by integrating inquiry-based learning and business tools that will enable

students to analyze, create, develop and pilot small businesses. Concepts and skills are reinforced by a strong emphasis on hands-on experiences. Applications to society, individuals, and the utilization of technology are included. This course includes a broad series of lessons and activities that offer a variety of modalities for ultimate student engagement and content retention.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Understand the entrepreneurship concept as a whole and the role of entrepreneurship in economic development.
- Compare the role and importance of small and medium-sized enterprises in the economy.
- Find an attractive market and apply the understanding of business planning.

COURSE CONTENTS:

The concept of entrepreneurship:

- The economist view of entrepreneurship; the sociologist view;
- Behavioral approach to Entrepreneurship and Management.
- The process of entrepreneurship.

Entrepreneurial Management

- The entrepreneurial business
- Entrepreneurship in service institutions the new venture.

Innovation concepts

- Importance of innovation for entrepreneurs
- Sources of innovative opportunities
- The innovation process:
- Risks involved in innovation.

Entrepreneurial profile

- Trait approach to understanding entrepreneurship.
- Factors influencing entrepreneurship.
- The environment; Socio cultural factors;
- Support systems. Teamwork; Networking organization.

Motivation and compensation

- Value system. Defining SMEs
- Scope of SMEs; Entrepreneurial managers of SME
- Financial and marketing problems of SMEs
- Framework for developing entrepreneurial marketing.
- Devising entrepreneurial marketing plan; Entrepreneurial marketing. strategies;
- Product quality and design

Role of entrepreneur in the economic development

- Generation of services;
- Employment creation and training;
- Ideas; knowledge and skill development.

Case Studies of Successful Entrepreneurs:

The Japanese experience.

RECOMMENDED BOOKS/READINGS:

1. Technology Ventures: From Idea to Enterprise by Thomas Byers, Richard Dorf, Andrew Nelson, 4th Edition, McGraw Hill (Latest Edition).

2. Paul Burns and Jim Dew Hurst: “Small Business and Entrepreneurship”, Palgrave Macmillan Publishing Company, Second Edition (Latest Edition)
3. Peter F. Drucker: “Innovation and Entrepreneurship”, Harper Business, Reprint Edition (Latest Edition)
4. The Startup Owner’s Manual: The Step-By-Step Guide for Building a Great Company by Steve Blank, Bob Dorf, K & S Ranch, (Latest Edition)
5. The Lean Startup: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses by Eric Ries, Penguin Books (Latest Edition)
6. John B. Miner, “Entrepreneurial Success”, Berrett-Koehler Publishers, (Latest Edition)

COURSE TITLE: PROFESSIONAL PRACTICES

COURSE INTRODUCTION & OBJECTIVES:

This course is designed to enhance key factors of interpersonal relations. To build social ethics. To know organizational behavior so that individual and team works can be done in a more professional way without compromising organization principles and without hurting others interests.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Comprehend the basis of a profession, professional ethics, various moral and social issues,
- Importance of values and professional ethics in personal life and professional career, and consequences of acting unethically in organization and society
- Acquire knowledge of various roles of engineering technologist in applying ethical principles at various professional levels
- Resolve the ethical dilemmas using common ethical values and identify possible actions to be taken in response.

COURSE CONTENTS:

Introduction

- Introduction to ethics; personal and professional ethics; the nature of engineering ethics; legal, professional and historical definitions
- Origin of professional ethics
- Profession and professionalism; professional accountability; professional success; professional risks; professional associations
- Benefits of acting ethically and consequences of acting unethically.

Value of Ethics

- Values in professional ethics; central responsibility of engineering professionals; ethics in different fields of work
- IEEE code of ethics; ethical code for engineering professionals
- global issues in professional ethics; ethics in manufacturing and marketing
- intellectual property rights; business ethics and corporate governance.

Ethical Dilemmas

- Common ethical dilemmas; resolution of ethical dilemmas
- possible actions in response to dilemmas
- probable consequences of these actions.

RECOMMENDED BOOKS/READINGS

1. Engineering Ethics Concepts & Cases by Charles E Harris, (Latest Edition) Kenneth Blanchard, Professional Ethics, (Latest Edition)
2. Ethics in Engineering, by Mike W. Martin, Roland Schinzinger, McGraw-Hill, (Latest Edition)
3. The Seven Habits of Highly effective people by Stephan r. Covey (Latest Edition)
4. Engineering Ethics: Concepts and Cases, by Charles E. Harris, Michael S. Pritchard, Michael J. Rabins, Wadsworth, (Latest Edition)
5. Professional Ethics: R. Subramanian, Oxford University Press, (Latest Edition)
6. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press (Latest Edition)

COURSE TITLE: CIVICS AND COMMUNITY ENGAGEMENT

COURSE INTRODUCTION & OBJECTIVES:

This course is designed to provide students with fundamental knowledge about civics, citizenship, and community engagement. Students will learn about the essentials of civil society, government, civic responsibilities, inclusivity, and effective ways to participate in shaping the society which will help them apply theoretical knowledge to the real-world situations to make a positive impact on their communities.

COURSE OUTCOMES:

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

- Demonstrate fundamental understanding of civics, government, citizenship, and civil society.
- Understand the concept of community and recognize the significance of community engagement for individuals and groups.
- Recognize the importance of diversity and inclusivity for societal harmony and peaceful co-existence.

COURSE CONTENTS:

Introduction to Civics and Citizenship:

- Definition of civics, citizenship, and civic engagement.
- Historical evolution of civic participation.
- Types of citizenship: active, participatory, digital, etc.
- The relationship between democracy and citizenship.

Civics and Citizenship

- Concepts of civics, citizenship, and civic engagement.
- Foundations of modern society and citizenship.
- Types of citizenship: active, participatory, digital, etc.

State, Government and Civil Society

- Structure and functions of government in Pakistan.
- The relationship between democracy and civil society.
- Right to vote and importance of political participation and representation.

Rights and Responsibilities

- Overview of fundamental rights and liberties of citizens under Constitution of Pakistan 1973.
- Civic responsibilities and duties.
- Ethical considerations in civic engagement (accountability, non-violence, peaceful dialogue, civility, etc.)

Community Engagement

- Concept, nature and characteristics of community.
- Community development and social cohesion.
- Approaches to effective community engagement.
- Case studies of successful community driven initiatives.

Advocacy and Activism

- Public discourse and public opinion.
- Role of advocacy in addressing social issues.
- Social action movements.

Digital Citizenship and Technology

- The use of digital platforms for civic engagement.
- Cyber ethics and responsible use of social media.
- Digital divides and disparities (access, usage, socioeconomic, geographic, etc.) and their impacts on citizenship.

Diversity, Inclusion and Social Justice:

- Understanding diversity in society (ethnic, cultural, economic, political etc.).
- Youth, women, and minorities' engagement in social development.
- Addressing social inequalities and injustices in Pakistan.
- Promoting inclusive citizenship and equal rights for societal harmony and peaceful co-existence.

RECOMMENDED BOOKS/READINGS:

1. "Civics Today: Citizenship, Economics, & You" by McGraw-Hill Education
2. "Citizenship in Diverse Societies" by Will Kymlicka and Wayne Norman.
3. "Engaging Youth in Civic Life" by James Youniss and Peter Levine.
4. "Digital Citizenship in Action: Empowering Students to Engage in OnlineCommunities" by Kristen Mattson.
5. "Globalization and Citizenship: In the Pursuit of a Cosmopolitan Education" by Graham Pike and David Selby.
6. "Community Engagement: Principles, Strategies, and Practices" by Becky J. Feldpausch and Susan M. Omilian.
7. "Creating Social Change: A Blueprint for a Better World" by Matthew Clarke and Marie-Monique Steckel.

COURSE TITLE: COMPUTER NETWORKING TECHNOLOGIES

COURSE INTRODUCTION & OBJECTIVES:

Behavior of data signals propagated through a transmission medium, twisted pair, coaxial cable, optical fiber, and wireless (microwave radio and infrared). Distinction between digital and analog data; and digital and analog transmission; Differentiation between asynchronous and synchronous communication. Data link control protocols, the cooperative point-to-point exchange of data between two devices. Error detection, error and flow control. Frequency-division multiplexing (FDM) and time-division multiplexing (TDM). Packet-switched networks, network routing and congestion control. Basic concepts of frame relay and cell relay networks (ATM); Traditional LANs, Ethernet and token ring. Bridges, routers and basic principles of internetworking (IP). Host to host transport protocol mechanisms (TCP) and Network management tools, techniques, and services.

COURSE OUTCOMES:

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

- Describe the key terminologies and technologies of computer networks and the services and functions provided by each layer in the Internet protocol stack.
- Describe different mathematical equation for protocols, algorithm and their functions in a network
- Build Computer Network on various Topologies

COURSE CONTENTS:

Introduction to Computer Networks

- OSI Reference Model: A Layered Approach
- Intro to TCP/IP Protocol Suite Digital Switching Concepts
- Packet Switching Principles
- Virtual Circuits and Datagrams
- X.25
- Frame and Cell Relay

Transmission Media and Digital Signaling

- Analog vs. Digital Transmission
- Nyquist and Shannon Limits
- Digital or Analog Data to Digital Signals

Physical Interfaces, Noise and Error Control

- Asynchronous and Synchronous Transmission
- X.21
- T-1 and ISDN Synchronous
- Frequency and Time Division Multiplexing
- Error Detection and CRC Polynomial Codes.

Data Link Control

- Stop & Wait
- Sliding Window ARQ
- Go-back-N
- Selective Reject

Data Link Layer Protocols and Multiplexing

- HDLC
- Random access Protocols
- Controlled Access
- FDMA
- TDMA
- CDMA
- Flow Control and Congestion Control

Local Area Networks (LAN)

- Topologies
- Media
- Medium Access Control
- MAC Layer
- IEEE 802.x Standards
- Ethernet

- Fast Ethernet and Gigabit Ethernet
- Wireless Ethernet
- LAN devices
- Spanning Tree Algorithm
- Virtual LANs.

Internetworking LAN/WAN Design

- Bridges
- Routers and Gateways

Internet

- IPv4 and IPv6
- Transport Protocols
- OSI TCP
- Credit Allocation
- TCP/IP
- Host to Host Flow Control
- Network Applications
- Layers 5, 6, and 7 Applications/Protocols

RECOMMENDED BOOKS/READINGS:

1. Data And Computer Communications, 8th Edition William Stalling
2. Computer Networks, By Andrew Tanenbaum 4th Edition

COURSE TITLE: MOBILE APP DEVELOPMENT

COURSE INTRODUCTION & OBJECTIVES:

This course is designed to introduce the concept of developing a new mobile app for Android or iOS. Anticipate the challenges of mobile application development and tap into the cloud to enhance the user experience.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Describe key characteristics of fundamental mobile application concepts.
- Interpret, write and distribute mobile applications.
- Apply effective collaboration and presentation skills in proposing an innovative app concept.
- Analyze and discuss apps and trends in the mobile market.

COURSE CONTENTS:

Introduction

- Introduction to Mobile Application Development
- Difference between cross and native platforms

Preparing the Environment

- Introduction to IDE
- Installing Android Studio
- Creating Android Project
- Executing Project On Device
- Launching Emulator

Android Platform Architecture

- Application Framework

- Libraries
- Android RT
- Core Libraries
- Linux Kernel

User Interface Widgets

- Basic Layout
- Basic Widgets

UI Architecture

- Activity Life Cycle
- Intent – Moving Data from One activity to other
- Serialization
- Techniques and tools to Support design on multi-screens

Notification and Toast, Menus

- Menus & Dialogs
- Notifications and Toast

Adapter-Spinner

- Lists
- List View
- Customize List View

Fragments

- Fragments and Activities
- List Fragment

View Pager

- Dialog Fragments
- View Pager
- Tabbed Application.

Services

- Services
- Consuming system services

Internet Connectivity

- Internet connectivity
- Receiving HTTP Response (JSON)
- Consuming web services
- Json Paring and Data Modeling

Application Design with web services

- ServerSide Concepts
- AppData Introduction

Data Storage

- Shared Preferences
- Android File System
- Internal storage
- External storage
- Content Provider

Database connectivity

- SQLite
- Introducing SQLite

- SQLiteOpenHelper and creating a database
- Working with cursors Inserts, updates, and deletes
- Content provider

Publishing your Application

- Packaging and Versioning
- Exporting a Signed Build
- Google Play Store
- Project/Presentation Submission

RECOMMENDED BOOKS/READINGS:

1. iOS Programming: The Big Nerd Ranch Guide by Christian Keur and Aaron Hillegass (6th edition)
2. Intro to iOS app development with swift (<https://www.udacity.com/course/intro-to-ios-app-development-with-swift--ud585>)

COURSE TITLE: INTRODUCTION TO WEB TECHNOLOGIES

COURSE INTRODUCTION & OBJECTIVES:

This course is designed for students with basic knowledge of programming, databases and networks, this course covers the concepts of web design and development. This course introduces students to protocols, web designing, scripting and server-side web development using different web languages. Topics include an overview of web; HTML; CSS; Javascript; JQuery; MySQL; PHP/ASP .NET; Freelancing profiles and orders.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Explain the concepts of web designing and development
- Design web pages using HTML, CSS and Javascript
- Design server-side code in PHP to manage user data using MySQL database

COURSE CONTENTS:

Introduction & Overview:

- Introduction to Web
- Web vs Internet
- Client-Server Communication & Protocols
- Web Versions

HTML

- Intro to HTML
- HTML Basic elements & Typography
- Document Object Model (DOM)
- HTML Tables, Lists, Forms
- Special Characters

HTML5

- Elements, Canvas, SVG, Drag/Drop, Geo-location, Audio, Video
- Form Validations using HTML5, Required, Pattern

CSS

- CSS usage and Selectors

- Inline, Internal and External CSS
- Using Classes and IDs with CSS
- Styling Tables, Images, Colors
- Box Model, Margin and Padding

Advanced CSS

- Selectors, Combinators, Pseudo Classes
- Pseudo Attributes, Attribute Selectors
- Media Queries

Color Theory

- Emotional Impact of Colors
- Color Wheel & Color Schemes
- Color Warmth
- Color Systems (RGB, CMYK, HEX)
- Tints & Shades, Hues, Saturation and Lightness, Contrast
- Color Blindness

JavaScript

- JavaScript Basics: Syntax, Variables
- Events & Event Handlers, Functions
- Programming Concepts in JS
- Conditional Structures, Loops, Arrays, this keyword, Dates and Maps

jQuery

- Intro to jQuery, jQuery selectors, jQuery libraries

PHP

- PHP syntax, include and require, include website headers/footers using PHP
- PHP local and global variables, loops, conditions, functions, classes, objects
- Server-side Validations, Sessions

MySQL/XAMPP

- xampp, wampp servers, MySQL Databases
- MySQL and MySQLi, database connection
- CRUD operations in PHP using MySQL databases

Freelancing

- Freelancing, Profile Creation, Orders, Gigs, Bidding

RECOMMENDED BOOKS/READINGS:

1. Web Technologies A computer Science Perspective by C Jackson
2. Color Theory in Web UI Design: A Practical Approach to the Principles

COURSE TITLE: TECHNICAL REPORT WRITING

COURSE INTRODUCTION & OBJECTIVES:

Intensive study of and practice in writing for professional settings. Focus on the types of documents necessary to make decisions and take action on the job, such as proposals, reports, instructions, policies and procedures, e-mail messages, letters, and descriptions of products and services. Practice in individual and collaborative processes involved in the creation of ethical and efficient documents.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Able to gain the knowledge and skill of utilizing modern presentation skills.
- Able to understand the basics of technical report writing
- Able to adopt a skill of writing technical English in proposal preparation, research papers, and reports presentation according to the correct standards.

COURSE CONTENTS:

Introduction to Technical Writing

- Definition and Importance of Technical Writing
- Evolution and Historical Background
- Key Elements of Effective Technical Communication

Technical Communication Process

- Overview of the Communication Process
- Target Audience and Purpose in Technical Writing
- Types of Technical Documents

Proposal Write-up and Improvement Strategies

- Crafting Effective Proposals
- Strategies for Improving Proposal Writing
- Peer Review and Feedback Mechanisms

Introduction to Research and Research Types

- Understanding Research in Technical Writing
- Basic Research Types: Applied and Fundamental
- Interdisciplinary and Collaborative Research

Choosing Research Problems and Research Advisors

- Identifying Relevant Research Problems
- Importance of Research Advisors
- Building a Research Proposal

How to Carry Out Research

- Research Planning and Execution
- Data Collection and Analysis Methods
- Ethical Considerations in Research

Different Parts of Technical Writing

- Components of a Technical Document
- Structure and Organization of Technical Writing
- Visual Elements in Technical Documents

Formulation – Problem Statement

- Crafting a Clear Problem Statement
- Defining Objectives and Scope
- Importance of a Well-Defined Problem

Literature Review

- Role and Significance of Literature Review
- Conducting a Comprehensive Literature Review
- Synthesizing Information from Existing Studies

Design – Methodology

- Developing a Research Design
- Methodology Selection and Justification

- Experimental Design and Data Collection

Analysis - Data Analysis and Interpretation

- Statistical Analysis Techniques
- Interpreting Research Findings
- Presenting Results Effectively

Good Writing Style Techniques

- Clarity and Conciseness in Writing
- Tone and Style Considerations
- Grammar and Punctuation Rules

Uses of Correct Words

- Precision in Language Usage
- Avoiding Ambiguity and Jargon
- Commonly Misused Words in Technical Writing

Presenting and Publishing Research

- Strategies for Effective Presentations
- Publishing in Peer-Reviewed Journals
- Conference Presentations and Proceedings

Write Business/Professional Correspondence

- Importance of Professional Correspondence
- Crafting Effective Cover Letters and CVs
- Email Etiquette in a Professional Setting

Writing Meeting Minutes

- Role and Purpose of Meeting Minutes
- Structure and Content of Meeting Minutes
- Timely Distribution and Follow-up

Introduction to Informal Writing

- Characteristics of Informal Writing
- Use Cases for Informal Reports
- Informal Communication in the Workplace

Uses of Informal Reports

- Types and Formats of Informal Reports
- Informal Reporting for Decision-Making
- Effective Communication in Informal Settings.

RECOMMENDED BOOKS/READINGS:

1. Successful Writing at Work, by Phillip C. Kolin, 4th Concise Edition. Cengage.
2. Burnett, Rebecca E. Technical Communication.

COURSE TITLE: OPERATING SYSTEM PRINCIPLES

COURSE INTRODUCTION & OBJECTIVES:

To introduce the core concepts of operating systems, such as processes and threads, scheduling, synchronization, deadlocks, memory management, storage management and file systems. The course will consist of assigned reading, weekly lectures, one midterm and final exam, semester project, and a sequence of assignments and quizzes. The goal of the readings and lectures is to introduce the core concepts and of the project and assignments is to give students some exposure to operating system

code and concepts. Students are expected to read the assigned materials before each class, and to participate in in-class discussions.

COURSE OUTCOMES:

On the successful completion of the course, candidates will be able to:

- Describe the characteristics of different structures of the Operating Systems
- Identify the core functions of the Operating Systems and Explain the major performance issues with regard to the core functions of the operating system.
- Compute the algorithms of the core functions of the Operating Systems

COURSE CONTENTS:

Introduction

- What Operating Systems Do, Computer-System Organization
- Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security,
- Distributed Systems ,Special-Purpose Systems ,Computing Environments

Operating System & Structure

- Operating System Services, User Operating System Interface
- System Calls, Types of System Calls
- System Programs, Operating System Design and Implementation
- Operating System Structure, Virtual Machines, Operating System Generation, System Boot.

Processes

- Process Concept, Process Scheduling, Operations on Processes
- Cooperating Processes, Inter-process Communication
- Communication in Client-Server Systems

Threads

- Threads concepts, User level threads, kernel level threads, mapping of threads

CPU Scheduling

- Basic Concepts
- Scheduling Criteria, Scheduling Algorithms
- Multiple-Processor Scheduling, Real-Time Scheduling, Thread Scheduling
- Operating Systems Examples

Deadlock

- The Deadlock Problem, System Model, Deadlock Characterization
- Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance
- Deadlock Detection,Recovery from Deadlock

Memory Management

- Background, Swapping, Contiguous Memory Allocation
- Paging ,Structure of the Page Table
- Segmentation Example: The Intel Pentium

File Systems

- File Concept
- Access Methods
- Directory Structure
- File-System Mounting
- File Sharing
- Protection

Security

- The Security Problem ,Program Threats ,System and Network Threats
- Cryptography as a Security Tool
- User Authentication, Implementing Security Defenses
- Firewalling to Protect Systems and Networks
- Computer-Security Classifications, An Example: Windows XP

RECOMMENDED BOOKS/READINGS:

1. Operating Systems Concepts, 9th edition by Abraham Silberschatz
2. Modern Operating Systems, 4th edition by Andrew S. Tanenbaum
3. Operating Systems, Internals and Design Principles, 9th edition by William Stallings

COURSE TITLE: SOFTWARE ENGINEERING

COURSE INTRODUCTION & OBJECTIVES:

Throughout this course, students will learn the essential principles and practices of professional software engineering, from understanding the nature of software to mastering the art of requirements engineering, design, and testing. They will delve into agile methodologies and software process models, gaining practical insights into how to effectively manage and plan software projects. By exploring topics such as model-driven engineering, architectural design, and quality assurance, students will acquire the skills and knowledge needed to design, develop, and maintain robust and reliable software systems. Additionally, this course will equip students with the tools for effective project management, configuration management, and continuous process improvement.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Describe various software architectural styles.
- Use software modeling techniques for requirements analysis and requirements presentation.
- Develop user stories and use cases to represent software requirements.

COURSE CONTENTS:

Nature of Software

- Understanding the nature of software
- Overview of software engineering
- Professional software development
- Software engineering practice

Software Process Structure

- Software process structure
- Software process models
- Agile software development
- Agile process models
- Agile development techniques

Requirements Engineering Process

- Requirements engineering process
- Functional and non-functional requirements
- Context models
- Interaction models

- Structural models
- Behavioral models

Model-Driven Engineering

- Fundamentals of software design
- Architectural design
- Object-oriented representation
- Structural decomposition
- Design and implementation
- UML diagrams and design patterns

Software Project Management, Testing and Quality Assurance

- Software testing and quality assurance
- Software Evolution
- Project management and project planning
- Configuration management
- Software process improvement

RECOMMENDED BOOKS/READINGS:

1. "Software Engineering: A Practitioner's Approach" by Roger S. Pressman.
2. "Software Requirements" by Karl Wieggers and Joy Beatty.
3. "Software Testing: Principles and Practices" by Srinivasan Desikan and Gopaldaswamy Ramesh.

COURSE TITLE: TECHNOLOGY PROJECT PART 1

COURSE INTRODUCTION & OBJECTIVES:

This course is the first part of Technology Project. It is an integral component of our program, designed to bridge the gap between theoretical knowledge and practical application. This course spans the 5th and 6th semesters, providing students with a unique opportunity to delve deep into a technology project of their choice. Throughout this course, student will be engaging in a hands-on project. The outcome of this are as follows:

- Analyze problem statements through research and literature review.
- Display the Design/Development of Solutions
- Display communication skills through presentations, technical reports, and posters
- Practice and adopt ethical values in various methods
- Demonstrate effectiveness as an individual as well as a team member
- Demonstrate Project Management skills

COURSE TITLE: INTRODUCTION TO DATA SCIENCE

COURSE INTRODUCTION & OBJECTIVES:

The ability to transform raw data into actionable insights is not just valuable—it's essential. Throughout this course, students will embark on an exciting journey where they'll master the art of data handling, processing, and interpretation. From understanding the diverse types of data to addressing data quality challenges, students will build a solid foundation. Students will delve into Python's data science stack, unlocking its power to manipulate and visualize data. Students will learn to extract valuable information from text data, apply predictive and inference algorithms, and evaluate

model performance. By the course's end, students will have the skills and confidence to embark on data-driven adventures of their own, making informed decisions and uncovering hidden patterns in the vast sea of data.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Develop expertise in data analysis, encompassing theoretical understanding and practical application of essential data science concepts and tools.
- Develop the skills to extract valuable insights from structured and unstructured data, apply machine learning algorithms, and assess model performance for predictive and inference tasks.
- Acquire a comprehensive understanding of data processing techniques, including data cleaning, and preparing for real-world data science challenges.

COURSE CONTENTS:

Introduction to Data Science

- Overview of data science and its significance
- The data science lifecycle and processes

Types of Data and Datasets

- Understanding various types of data
- Introduction to different datasets and their characteristics

Data Quality and Pre-processing

- Measuring data quality
- Common data collection issues
- Data pre-processing stages and techniques

Python Data Science Stack

- Introduction to Python for data science
- Overview of key libraries (Numpy, Pandas, Matplotlib)

Relational Algebra & SQL

- Relational databases and SQL queries
- Data retrieval and manipulation with SQL

Exploratory Data Analysis

- Basic and exploratory data analysis techniques
- Generating visualizations

Prediction and Inference Algorithms

- Supervised and unsupervised learning
- Introduction to predictive and inference algorithms

Bias-Variance Tradeoff

- Understanding the bias-variance tradeoff
- Impact on model performance

Model Evaluation & Performance Metrics

- Metrics for model evaluation (Accuracy, Precision-Recall, F-1 Score, etc.)
- Model performance assessment

RECOMMENDED BOOKS/READINGS:

1. Data Science, 2nd Edition by Vijay Kotu, Bala Deshpande
2. "Python for Data Analysis" by Wes McKinney.
3. "Python for Data Science Handbook" by Jake VanderPlas.
4. "SQL For Data Science" by David Njoku.

5. "Introduction to Machine Learning with Python" by Andreas C. Müller & Sarah Guido.

COURSE TITLE: INTRODUCTION TO CYBER SECURITY

COURSE INTRODUCTION & OBJECTIVES:

This course provides students an introduction to common cyber security threats, vulnerabilities, and risks related to web applications, networks, software and mobile applications. Moreover, it will also enable students to differentiate between the various forms of malware and how they affect assets in cyberspace, equipping students with basic skills in identifying and mitigating security threats.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- To be able to identify computer system threats.
- To be able to identify Malware attacks, and understand the stages of attack and payloads.
- Implement various cryptographic techniques and simulate attack scenarios.

COURSE CONTENTS:

Introduction to Cyber security

- Defining Cyber Security and its importance
- Value of Assets
- Challenges of securing information
- Ethical and Legal Issues
- PECA

Networks and the Internet

- Networks Basics
- How Internet Works
- Basic Network Utilities
- TCP/IP Model
- OSI Model
- Cloud Computing

Cyber threat landscape

- Assessing the Likelihood of an Attack on Your Network
- The Vulnerability–Threat–Control Paradigm

Understanding security

- Relationship of security to convenience

Information security Principles

- C-I-A triad, McCumber Cube

Information Security Terminology

- Vulnerability
- Threat
- Risk
- Attacks
- Controls
- Hacking & Ethical Hacking

Who are the attackers

- Cybercriminals
- Script kiddies

- Brokers
- Insiders
- Cyberterrorists
- Hactivists
- State-sponsored attackers

Advanced Persistent Threat (APT)

- Definition
- Examples

Malware, types of malware

- Defining Malware
- Viruses
- Worms
- Trojan Horses
- Buffer-Overflow
- Rootkits
- Logic Bombs
- Spam

Attacks using malware

- Traits of Malware
- Circulation
- Infection
- Concealment
- Payload capabilities

Malware Attack Lifecycle: Stages of Attack and Cyber kill chain

- Seven stages of attack lifecycle
- Reconnaissance
- Weaponization
- Delivery
- Exploitation
- Installation
- Command and Control
- Actions on Objectives

Social engineering attacks

- Psychological approaches
- Phishing
- cyber stalking
- Physical procedures
- Protecting against social engineering attacks

Types of payload

- Payload Capabilities
- collect data
- delete data
- modify system security settings and launch attacks

Industrial Espionage in Cyberspace

- Introduction
- Real world examples

- Information as an asset
- trade secrets
- How espionage occurs
- Protecting against espionage

Basic cryptography

- History of Encryption
- Symmetric
- Asymmetric Encryption
- Caesar Cipher
- Playfair & Polybius Cipher
- Hashing
- Digital Certificates
- Cryptanalysis

Web application attacks

- Client-side web application attacks
- Server-side web application attacks

Database security

- Introduction to Databases
- Security Requirements of Databases
- Securing Data
- DLP and sensors
- SQL Injection Attack and prevention steps

Privacy and anonymity

- Concepts
- Principles
- Authentication and Privacy
- Privacy Impacts of Emerging Technologies

Network security

- Networks Concepts
- Threats to Network Communication
- Network Scanning
- Firewalls and IDPS

Software security

- Application Development Security
- Application Configuration Baselines
- Secure Coding Practices

Mobile device security

- Mobile Device Risks
- Securing Mobile Devices
- MDMs

Mobile app security

- Mobile Application Management (MAM)

Cyber Terrorism and Information Warfare

- Information Control
- Disinformation
- Defences against Cyber Terrorism

- TOR and Dark Web
- PECA Act 2016

Introduction to Digital Forensics

- Goal of Digital Forensics
- General Guidelines
- Tools

Digital Forensics Categories

- Evidence on PC
- System logs
- Mobile
- Network Forensics
- Virtual Forensics

RECOMMENDED BOOKS/READINGS:

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
4. Malware Analyst's Cookbook: Tools and Techniques for Fighting Malicious Code" by Michael Hale Ligh et al.

COURSE TITLE: MACHINE LEARNING

COURSE INTRODUCTION & OBJECTIVES:

This course introduces principles, algorithms, and applications of machine learning from the point of view of modeling and prediction. It includes formulation of learning problems and concepts of representation, over-fitting, and generalization. These concepts are exercised in supervised learning and reinforcement learning, with applications to images and to temporal sequences.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Develop a solid understanding and mathematical intuition of machine learning algorithms.
- Design and implement machine learning algorithms to solve real-life problems.
- Analyze the performance of a machine learning system and enhance its efficiency through feature selection, regularization, and hyperparameter optimization techniques.

COURSE CONTENTS:

Introduction to Machine Learning and Basic Concepts

- Overview of Machine Learning (ML)
- Historical Background and Evolution
- Core Concepts and Terminology in ML

Formulation of Learning Problems and Representation

- Problem Definition in Machine Learning
- Types of Learning Problems
- Data Representation for ML

Over-fitting and Generalization

- Understanding Over-fitting and Under-fitting
- Generalization in Machine Learning

- Techniques to Mitigate Over-fitting

Supervised Learning

- Introduction to Supervised Learning
- Types of Supervised Learning Algorithms
- Regression and Classification

Evaluation Metrics and Model Validation

- Metrics for Model Evaluation
- Cross-Validation Techniques
- Model Validation and Testing

Feature Selection Techniques

- Importance of Feature Selection
- Methods for Feature Selection
- Feature Importance in ML Models

Regularization Techniques

- Overview of Regularization
- L1 and L2 Regularization
- Elastic Net Regularization

Reinforcement Learning

- Fundamentals of Reinforcement Learning
- Markov Decision Processes
- Q-Learning and Policy Gradient Methods

Applications in Images

- Image Classification in ML
- Object Detection and Recognition
- Image Segmentation Techniques

Applications in Temporal Sequences

- Time Series Analysis in Machine Learning
- Sequence Prediction and Forecasting
- Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) Networks

Model Tuning and Hyperparameter Optimization

- Importance of Model Tuning
- Hyperparameter Optimization Techniques
- Grid Search and Random Search Methods.

RECOMMENDED BOOKS/READINGS:

1. T. Hastie, R. Tibshirani, and J. Friedman. The Elements of Statistical Learning. Springer 2011. (Available for download on the authors' web-page: <http://statweb.stanford.edu/~tibs/ElemStatLearn/>)
2. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective, MIT Press 2012. (Electronic copy available through the Bodleian library.)
3. Christopher M. Bishop. Pattern Recognition and Machine Learning, Springer 2007.

COURSE TITLE: ORGANIZATIONAL BEHAVIOR

COURSE TITLE: TECHNOLOGY PROJECT II

COURSE INTRODUCTION & OBJECTIVES:

This course develops the ability to solve challenging and advanced engineering technology problems in real life, in order to utilize and integrate knowledge and expertise that students developed through their course work.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Analyze problem statements through research and literature review.
- Display the Design/Development of Solutions
- Develop a wide range of technical skills by using modern Tools
- Practice and adopt ethical values in various methods
- Demonstrate effectiveness as an individual as well as a team member
- Display communication skills through presentations, technical reports, and posters
- Demonstrate Project Management skills

COURSE TITLE: VISUAL PROGRAMMING

COURSE INTRODUCTION & OBJECTIVES:

This course is designed for students with basic object-oriented programming background, this course covers concepts of visual programming. This course introduces students to C# programming language, Windows and Web Apps development using .NET framework. Topics include an overview of .NET framework, C# Basics and syntax, OOP Concepts in C#, Console Applications, Desktop & Windows Applications, Using SQL Server for storage and retrieval in Windows Apps, ASP .NET Web Apps.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Explain the concepts of visual programming.
- Explain console and windows applications and its features
- Apply visual programming in .NET framework to develop console, windows and web applications.

COURSE CONTENTS:

Introduction and Background of .NET Framework

- Overview of .NET Framework
- Evolution and Historical Context
- Components and Architecture of .NET

Introduction to Events

- Understanding Events in Software Development
- Importance of Events in .NET
- Event-Driven Programming Paradigm

Fundamentals of Event-Driven Programming

- Key Concepts in Event-Driven Programming
- Event Handlers and Delegates
- Event Subscription and Triggering

Message Handling

- Message Passing in .NET
- Messaging Patterns

- Asynchronous Message Handling

User Interfaces

- Overview of User Interfaces in .NET
- Graphical User Interfaces (GUI)
- Console-based User Interfaces

C# Language and its Syntax

- Introduction to C# Programming Language
- Basic Syntax Rules
- Data Types and Variables

Console Applications in C#

- Creating Console Applications
- Input and Output Operations
- Command-Line Arguments

Assemblies

- Understanding Assemblies in .NET
- Types of Assemblies
- Assembly Deployment and Versioning

Namespaces

- Role of Namespaces in C#
- Organizing Code with Namespaces
- Importing and Declaring Namespaces

Datatypes, Operators, Enumerations

- Data Types in C#
- Operators and Expressions
- Enumerations and their Usage

Delegates

- Introduction to Delegates
- Delegate Declaration and Instantiation
- Multicast Delegates

Input/Output

- File Handling in C#
- Reading and Writing to Files
- Stream-based Input/Output

Conditional Structures and Loops

- Conditional Statements (if, else, switch)
- Looping Constructs (for, while, do-while)
- Break and Continue Statements

Classes and Objects

- Object-Oriented Programming (OOP) Principles
- Class Declaration and Instantiation
- Methods and Properties

Inheritance and OOP Concepts in C#

- Inheritance and Polymorphism
- Abstraction and Encapsulation
- Interfaces and Abstract Classes

Visual Studio and its Components

- Introduction to Visual Studio IDE
- Overview of Solution Explorer, Toolbox, and Properties Window
- Debugging and Code Profiling

C# Attributes and Types

- Understanding Attributes in C#
- Commonly Used Attributes
- Custom Attributes

Developing Windows Form Applications

- Basics of Windows Forms
- Creating a Simple Windows Form Application
- Event-Driven Programming in Windows Forms

Windows Form Controls

- Overview of Windows Form Controls
- Common Controls and their Usage
- Custom Controls and User Controls

Common Windows Form Controls

- Textboxes, Labels, and Buttons
- RadioButtons, ComboBox, and CheckBoxes
- DateTimePicker and NumericUpDown
- FileOpen and FileSave Dialogs

Properties, Events, and Methods of Form Controls

- Manipulating Control Properties
- Handling Events in Windows Forms
- Implementing Methods for Controls

Data Validations

- Types of Data Validations
- RequiredField, Range, Compare, RegularExpression Validators
- Custom Validators in Windows Forms

Revisiting SQL Databases and MS SQL Server

- Overview of SQL Databases
- Introduction to Microsoft SQL Server
- Database Design and Normalization

SQL Server Connection

- Establishing Connection to SQL Server
- CRUD Operations in SQL Server
- Error Handling in SQL Server

Windows Application to SQL Server

- Integrating Windows Forms with SQL Server
- Data Binding and Displaying Data
- Handling Transactions

Data Management in ASP .NET

- Overview of ASP .NET
- Data Access in ASP .NET Applications
- Using Data Controls in Web Forms

Developing Web Applications with ASP .NET

- Basics of Web Application Development

- ASP .NET Page Life Cycle
- Web Forms and MVC in ASP .NET

HTML, CSS, and JavaScript Revisiting

- HTML Fundamentals
- Styling Web Pages with CSS
- Client-Side Scripting with JavaScript

Master and Content Pages

- Creating Master Pages in ASP .NET
- Content Pages and Page Layouts
- Managing Consistent Design

Menus and Other Elements in Web Pages

- Implementing Menus in Web Applications
- Navigation Controls
- Interactive Elements in Web Pages

SQL Server and Web Applications

- Database Connectivity in Web Applications
- CRUD Operations in ASP .NET
- Data Binding in Web Controls

Web Application to SQL Server

- Integrating Web Applications with SQL Server
- Secure Database Connections
- Handling Session and State Management

RECOMMENDED BOOKS/READINGS:

1. Visual C#: How to Program Deital and Deital, 6th Edition, Pearson Education, 2017
2. Programming in C# .NET by J. C. Bradley, McGraw Hill, 2014
3. Microsoft Visual C# 2013 Step by Step (Step by Step Developer) by Shar J., 1st Edition, 2013

COURSE TITLE: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

COURSE INTRODUCTION & OBJECTIVES:

The course on Artificial Intelligence provides a comprehensive introduction to the field of AI, covering its fundamental principles, techniques, and applications. Students will embark on a journey to understand the core components of AI, including reasoning, problem-solving, machine learning, and uncertainty handling. Students will explore how AI systems reason, learn, and make decisions. Moreover, they will delve into recent trends and real-world case studies. This course serves as a gateway to unlock the potential of artificial intelligence and its impact on various domains, preparing students to navigate the evolving world of intelligent systems and technologies.

COURSE OUTCOMES:

On the successful completion of the course candidates will be able to:

- Comprehend the basics of artificial intelligence with emphasize on search algorithms and the concept of AI agents.
- Apply various search algorithms such as uninformed, informed and heuristic.
- Describe fundamentals of knowledge representation, inference and theorem proving.

COURSE CONTENTS:

Introduction

- Overview of AI
- Identifying AI systems
- Branches of AI
- Historical context and milestones

Reasoning and Knowledge Representation

- Introduction to reasoning and knowledge representation
- Propositional logic
- First-order logic
- Representing knowledge in AI systems

Problem Solving by Searching

- Informed and uninformed searching algorithms
- Local search techniques
- Constraint satisfaction problems
- Adversarial search and game-playing
- Min-max algorithm and alpha-beta pruning

Learning

- Types of machine learning: Unsupervised, supervised, reinforcement
- Algorithms and techniques for each type
- Training and testing models

Uncertainty Handling

- Uncertainty in AI
- Fuzzy logic and its applications

Recent Trends in AI and Applications of AI Algorithms

- Emerging trends in AI
- Case studies of AI systems
- Analysis of AI applications

RECOMMENDED BOOKS/READINGS:

1. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig.
2. "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy.

COURSE TITLE: SUPERVISED INDUSTRIAL TRAINING 1

COURSE INTRODUCTION & OBJECTIVES:

This is part one for Supervised Industrial Training. It is again an integral part of our program, designed to bridge the gap between theoretical knowledge and practical application. This course spans the 7th and 8th semesters, providing students with a unique opportunity to delve deep into a technology project of their choice. Throughout this course, student will be engaging in a hands-on project. It will help in refining students' professional skills, including project documentation, presentation skills, and adhering to ethical standards in technology development. Upon completion, students should have a project or different projects that showcases their ability to handle real-world technology challenges, preparing them for industry demands and potential employment opportunities.

The outcome of this are as follows:

- Learn to apply engineering technology knowledge learned in classroom environment in real industrial situations.

- Demonstrate Project Planning and Management skills.
- Display the Technical Skills Application
- Demonstrate the Problem-Solving skills.
- Demonstrate effectiveness as an individual as well as a team member.
- Develop awareness about general workplace behavior and display professional development.

COURSE TITLE: SUPERVISED INDUSTRIAL TRAINING 2

COURSE INTRODUCTION & OBJECTIVES:

This is part two for Supervised Industrial Training. It is again an integral part of our program, designed to bridge the gap between theoretical knowledge and practical application. This course spans the 7th and 8th semesters, providing students with a unique opportunity to delve deep into a technology project of their choice. Throughout this course, student will be engaging in a hands-on project. It will help in refining students' professional skills, including project documentation, presentation skills, and adhering to ethical standards in technology development. Upon completion, students should have a project or different projects that showcases their ability to handle real-world technology challenges, preparing them for industry demands and potential employment opportunities.

The outcome of this are as follows:

- Learn to apply engineering technology knowledge learned in classroom environment in real industrial situations.
- Demonstrate Project Planning and Management skills.
- Display the Technical Skills Application
- Demonstrate the Problem-Solving skills.
- Demonstrate effectiveness as an individual as well as a team member.
- Develop awareness about general workplace behavior and display professional development.