



PEOPLE'S INFORMATION TECHNOLOGY DEPARTMENT (PITP) PHASE - II

AN INITIATIVE BY INFORMATION SCIENCE &
TECHNOLOGY DEPARTMENT, GOVERNMENT OF SINDH

COURSE OUTLINES

PREPARED BY:

SUKKUR IBA UNIVERSITY



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Course Name: Cloud Computing



Course Overview

This 8-week course, part of the Peoples Information Technology Program (PITP) phase-II, provides a comprehensive introduction to Cloud Computing, focusing heavily on hands-on application, particularly within Microsoft Azure. The curriculum begins with fundamentals like Cloud Deployment Models (Public, Private, Hybrid) and Service Models (IaaS, PaaS, SaaS). It rapidly progresses to core topics such as Infrastructure as a Service (IaaS), Virtualization, Cloud Storage, and Networking. Key advanced areas covered include Infrastructure as Code (IaC) using Azure Resource Manager (ARM) Templates, Containerization (Docker and Kubernetes), Cloud Security, Governance, Identity and Access Management (IAM), and Compliance Frameworks. The final weeks focus on Cloud Migration Strategies, Advanced DevOps (including serverless and DevSecOps), Advanced Operations (Monitoring, APM, Azure Log Analytics), culminating in a Capstone Project involving the real-world application deployment on Azure.

Learning Outcomes

Upon completion of this course, students will be able to:

- Define and differentiate between Cloud Deployment Models (Public, Private, Hybrid) and Service Models (IaaS, PaaS, SaaS).
- Implement core IaaS concepts including Virtualization, Cloud Storage, and Cloud Networking.
- Apply Azure DevOps and Azure Pipelines for Continuous Integration/Continuous Deployment (CI/CD) workflows.
- Utilize Infrastructure as Code (IaC) techniques, specifically using Azure Resource Manager (ARM) Templates.
- Implement Containerization using Docker and Kubernetes, including container security.



- Manage Cloud Security Policies, Identity and Access Management (IAM), Data Protection (Encryption), Governance, and Compliance Frameworks.
- Formulate and execute Cloud Migration Strategies and Cloud Disaster Recovery plans.
- Apply advanced monitoring, Application Performance Monitoring (APM), and logging using Azure Monitor and Log Analytics.
- Deploy a real-world application on Azure as part of a final Capstone Project.

Instructors Guidelines

The course must prioritize Hands-on Labs to reinforce theoretical knowledge, especially in Weeks 2-5 covering IaaS, PaaS, Azure Pipelines, and IaC implementation. Instructors should dedicate substantial time to the use of command line tools (CLI & PowerShell). The final week (Week 8) is crucial and must be reserved almost entirely for guiding students through the Capstone Project and subsequent Final Presentations. Emphasis should be placed on security, governance, and compliance throughout the curriculum.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (Capstone Project/Labs)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Fundamentals of Cloud Computing — Definition, Evolution, Key Characteristics (On-Demand, Scalability, Pay-as-you-go)
	Day 02	Cloud Deployment Models — Public, Private, Hybrid, Community — Use Cases, Pros & Cons
	Day 03	Cloud Service Models — IaaS, PaaS, SaaS — Deep Dive with Real-World Examples (AWS EC2, Azure App Service, Office 365)
	Day 04	Cloud Security & Compliance — Shared Responsibility Model, Data Sovereignty, GDPR, HIPAA Overview
	Day 05	Project: Cloud Readiness Assessment — Evaluate a Business Case for Cloud Migration Based on Cost, Security, and Scalability
	Outcome	By the end of Week 01, students will be able to:



		<ul style="list-style-type: none"> Define cloud computing and explain its core characteristics and benefits. Differentiate between public, private, hybrid, and community cloud deployment models. Compare and contrast IaaS, PaaS, and SaaS with practical examples. Understand foundational cloud security principles and compliance frameworks. Assess organizational readiness for cloud adoption.
Week 02	Day 01	IaaS Core Concepts — Compute, Storage, Networking — Virtualization Fundamentals (Hypervisors, VMs)
	Day 02	IaaS Building Blocks — Cloud Storage Types (Object, Block, File), Virtual Networks, Subnets, Security Groups
	Day 03	Infrastructure Automation — Intro to Terraform/ARM, Orchestration with Azure Automation, CLI/PowerShell Basics
	Day 04	Azure Fundamentals — Azure Portal Navigation, Resource Groups, Creating First VM, Storage Account
	Day 05	Hands-on Lab — Deploy a Virtual Machine with Networking and Storage using Azure Portal & CLI
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> Explain how IaaS abstracts physical infrastructure into virtualized resources. Configure cloud storage and networking components for secure deployments. Automate infrastructure provisioning using CLI and introductory IaC concepts. Navigate Azure portal and deploy core resources (VM, Storage, Network). Gain practical experience deploying and managing cloud infrastructure.
Week 03	Day 01	PaaS Deep Dive — Azure App Service, Serverless (Functions), Managed Databases — Scalability & Security Features
	Day 02	SaaS & Productivity — Microsoft 365, Salesforce, Zoom — Business Models, Customization, Integration via APIs
	Day 03	SaaS Performance & Reliability — SLAs, Uptime, Multi-Tenancy, Data Isolation, Disaster Recovery for SaaS
	Day 04	CI/CD with Azure Pipelines — Build/Release Pipelines, YAML Configuration, Triggers, Artifacts
	Day 05	Hands-on Lab — Deploy a Web App via Azure App Service with CI/CD Pipeline from GitHub
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> Deploy and scale applications using PaaS without managing underlying infrastructure. Evaluate SaaS solutions for business productivity and integration capabilities. Understand SaaS reliability, SLAs, and architectural considerations. Build and automate CI/CD pipelines using Azure DevOps. Deliver a fully automated deployment of a web application.
Week 04	Day 01	Review: Cloud Fundamentals, Deployment & Service Models, Security Basics



	Day 02	Review: IaaS Components, Azure VM/Storage/Networking, CLI, Automation Intro
	Day 03	Review: PaaS/SaaS Concepts, CI/CD Pipelines, Azure DevOps
	Day 04	Practice Lab: Troubleshoot Broken Deployment — Fix Networking, Permissions, Pipeline Errors
	Day 05	Mid Term Examination (Covers Weeks 01–03: Cloud Models, IaaS, PaaS, SaaS, Azure Core, CI/CD, Security Fundamentals)
	Outcome	By the end of Week 04, students will be able to: <ul style="list-style-type: none"> • Demonstrate comprehensive understanding of cloud service and deployment models. • Deploy and manage IaaS resources using Azure and automation tools. • Implement CI/CD pipelines for PaaS applications. • Troubleshoot common deployment and configuration issues. • Prepare for advanced topics: storage, containers, security, governance, and migration.
Week 05	Day 01	Cloud Storage Deep Dive — AWS S3, Azure Blob, GCP Cloud Storage — Object vs Block vs File Storage Use Cases
	Day 02	Cloud Networking & VPC — Subnets, Route Tables, NAT Gateways, Peering, Security Best Practices
	Day 03	Infrastructure as Code (IaC) — ARM Templates, JSON Structure, Parameterization, Deployment via CLI
	Day 04	Advanced IaC Lab — Deploy Multi-Tier App (Web + DB + Storage) using ARM Template
	Day 05	Virtualization & Containers — Hypervisors (Type 1/2), Docker Basics, Container vs VM, Kubernetes Intro
	Outcome	By the end of Week 05, students will be able to: <ul style="list-style-type: none"> • Select appropriate cloud storage types based on workload requirements. • Design secure and scalable cloud networks using VPC concepts. • Author and deploy infrastructure using ARM templates (IaC). • Understand the role of virtualization and begin working with containers. • Deploy complex, multi-resource environments programmatically.
Week 06	Day 01	Identity & Access Management (IAM) — Roles, Policies, RBAC, Azure AD, Conditional Access, MFA
	Day 02	Data Protection & Governance — Encryption (at rest/in transit), Key Management (Azure Key Vault), Data Classification
	Day 03	Cost Management & Compliance — Azure Cost Analysis, Budgets, Reserved Instances, Compliance Frameworks (ISO, SOC, NIST)
	Day 04	Azure Automation — Runbooks, Desired State Configuration (DSC), Auto-scaling, Alerting
	Day 05	Hands-on Lab — Implement Governance: Set Budget Alerts, Configure RBAC, Enable MFA, Deploy DSC Configuration
	Outcome	By the end of Week 06, students will be able to: <ul style="list-style-type: none"> • Implement least-privilege access using IAM and Azure AD.



		<ul style="list-style-type: none"> • Protect data using encryption and centralized key management. • Monitor, analyze, and optimize cloud spending. • Automate operational tasks and enforce configuration compliance. • Apply governance policies for security, cost, and regulatory compliance.
Week 07	Day 01	Cloud Migration Strategies — Rehost, Refactor, Rearchitect, Rebuild, Replace — Assessment & Planning
	Day 02	DevOps & Disaster Recovery — CI/CD Maturity, Backup Strategies, Azure Site Recovery, RTO/RPO
	Day 03	Cloud Analytics & Serverless — Azure Synapse, Power BI, Azure Functions, Event-Driven Architecture
	Day 04	Advanced DevOps — DevSecOps Integration, Infrastructure Testing, Secure Pipeline (Scan, Approve, Deploy)
	Day 05	Capstone Lab — Build a Secure CI/CD Pipeline with IaC, Automated Testing, and Deployment to Staging Environment
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> • Plan and execute cloud migration using appropriate strategies. • Design disaster recovery solutions with defined RTO/RPO. • Leverage serverless and analytics services for modern applications. • Integrate security into DevOps pipelines (DevSecOps). • Deliver a production-ready, automated, secure deployment pipeline.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why Cloud Skills = Business Opportunities”
	Day 02	Idea to Business — Brainstorm Marketable Cloud Skills (Azure Migration, IaC Automation, Security Audits), Map to Services, Write 3 Business Ideas + Peer Feedback
	Day 03	Building Teams & Communication — Role Distribution (Cloud Architect, DevOps, Security, Sales), Digital Tools (Azure DevOps, Slack, Trello), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for Cloud Pros — LinkedIn Optimization, Portfolio (GitHub IaC Templates, Azure Certifications, Project Docs), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: Cloud Models, IaaS/PaaS/SaaS, Azure, Storage, Networking, Virtualization, Containers, Security, Governance, Migration, DevOps + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> • Define digital entrepreneurship through the lens of cloud computing professionals. • Convert technical skills (ARM templates, CI/CD pipelines, Azure security, migration strategies) into sellable freelance services or scalable cloud products.



		<ul style="list-style-type: none"> • Develop 3 viable business ideas — e.g., “Azure Migration for Pakistani SMEs”, “IaC as a Service”, “Cloud Security Audits for Startups”. • Build collaborative cloud teams and pitch solutions using professional tools and agile methodologies. • Create a standout LinkedIn profile and online portfolio showcasing certifications (AZ-900, AZ-204), GitHub repos, or lab reports. • Set up and optimize Fiverr/Upwork profiles with compelling gigs like “I Will Automate Your Azure Infrastructure” or “I Will Secure Your Cloud Environment”. • Understand how to land first clients, manage feedback, and scale into a cloud consultancy or MSP (Managed Service Provider). • Demonstrate mastery of core cloud computing concepts — from virtualization to DevSecOps. • Leave the course with a personal roadmap to launch a freelance cloud career or tech-enabled business in Pakistan or globally.
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Cloud Computing Assignment

Title: Freelance Cloud Project — Deploy & Secure a Web App in the Cloud (10 Marks / \$10)

Freelance Scenario:

A small startup has built a simple web application (e.g. a Flask or Node.js “To-Do” app) and now wants you to deploy it in the cloud. They expect you to host it on Azure (or any cloud provider), apply security, automate deployment, and provide a maintenance and cost plan.

You will present this as a mini project to the client, showcasing a cloud deployment you built, the security configuration, cost estimations, and a deployment pipeline.

Assignment Tasks:

1. Setup & Deployment (2 marks)

- Create a basic web app (if not provided) — e.g. a CRUD To-Do app using Flask or Node.js.
- Deploy the application to Azure (or any cloud you choose) using PaaS (e.g. Azure App Service, or equivalent).
- Provide the **public URL** for access (can be a staging/preview).

Deliverable: URL + short steps you took.

2. Infrastructure & Automation (2 marks)



- Define infrastructure using **Infrastructure as Code (IaC)** — e.g. using Azure Resource Manager (ARM) templates, Terraform, or Bicep.
- Automate deployment with a CI/CD pipeline (Azure Pipelines, GitHub Actions, or equivalent).
- Ensure that the database (if used) and storage (if used) are also provisioned automatically.

Deliverable: IaC code + pipeline configuration (YAML or whatever format).

3. Security & Governance (2 marks)

- Configure Identity & Access Management (IAM) roles and policies: ensure least privilege.
- Enable HTTPS (TLS/SSL) for your web app.
- Implement network security (e.g. restrict access using firewall rules or subnet controls).
- Enable logging / monitoring in the cloud (e.g. Azure Monitor, log analytics, or equivalent).

Deliverable: Screenshots and description of security settings.

4. Cost Management & Compliance (2 marks)

- Estimate monthly cost of running your deployment (compute, storage, networking).
- Propose budget optimizations (e.g. scaling options, reserved instances, autoscaling).
- List relevant compliance or standards the client should watch (e.g. GDPR, ISO, PCI if applicable).
- Suggest governance policies (tagging, resource groups, budgets, alerts).

Deliverable: Cost estimation + recommendations + compliance list.

5. Documentation & Client Report (2 marks)

- Write a one-page client report summarizing:
 - Architecture with a diagram
 - Deployment pipeline
 - Security measures
 - Estimated costs and governance policies
 - Suggestions for future improvements (e.g. serverless, autoscaling, backup strategy)
- Include instructions for the client to update or redeploy the app (step-by-step).

Deliverable: PDF/Word report and architecture diagram.

Bonus: Save & Version Control (1 mark)

- (0.5) Provide full version control history (e.g. GitHub link) with clean commit messages.



- (0.5) Include comments, README file, and instructions so someone else can replicate the deployment.

Submission Requirements:

- Repository or zip file containing:
 - Web app source code
 - IaC templates / scripts
 - CI/CD pipeline config
 - Client report + architecture diagram
 - Screenshots for security, logs, monitoring
 - Instructions (README)
- Provide deployed public URL (even if staging)

Evaluation Rubric:

Task	Marks
Setup & Deployment	2
Infrastructure & Automation	2
Security & Governance	2
Cost Management & Compliance	2
Documentation & Client Report	2
Bonus: Version Control & Docs	1 (0.5 + 0.5)
Total	10

Estimated Time to Complete: 12–20 hours

This assignment simulates a **real freelance cloud engagement**: deploying a web app, securing it, automating infrastructure, estimating costs, and producing client deliverables.

Cloud Computing Quiz

Total Marks: 5

Instructions: Choose the correct option (a, b, c, or d).

Questions:

1. What is a main advantage of cloud computing?
 - a) Unlimited free hardware
 - b) On-demand resource scalability
 - c) No need for internet
 - d) Full control of physical servers



2. Which cloud deployment model combines public and private clouds?
 - a) Public
 - b) Private
 - c) Hybrid
 - d) Community
3. In cloud service models, what does IaaS stand for?
 - a) Infrastructure as a Service
 - b) Internet as a Service
 - c) Integration as a Service
 - d) Identity as a Service
4. Which model gives the user control over applications, but not the underlying infrastructure?
 - a) SaaS
 - b) PaaS
 - c) IaaS
 - d) FaaS
5. Which of the following is a security concern in the cloud?
 - a) Infinite bandwidth
 - b) Data privacy and multi-tenancy risks
 - c) No need for patching
 - d) Local hardware failures only

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	b	11	b	21	b
2	c	12	a	22	c
3	a	13	b	23	b
4	b	14	d	24	b
5	b	15	b	25	b



Course Name: Cyber Security & Ethical Hacking



Course Overview

This 8-week course provides an outline covering the fundamental concepts and practical skills required in Cybersecurity. The curriculum starts with foundational topics such as the CIA triad, understanding the difference between threat, vulnerability, and risk, and security awareness. It moves into specific threats like malware, phishing, and DoS attacks, alongside vulnerability assessment basics. Subsequent weeks focus on securing infrastructure (Networking, Firewalls, VPNs), Cryptography and Data Protection, System Security and Hardening (patch management, least privilege), and Offensive Techniques like Reconnaissance, Footprinting (OSINT), Scanning, and Exploitation (SQLi demo). The course concludes with crucial elements of incident response, ethical reporting, and a Capstone Security Assessment.

Learning Outcomes

Upon completion of this course, students will be able to:

- Identify and define core cybersecurity fundamentals, including the CIA triad and various security risks.
- Analyze and identify cyber threats such as malware types, phishing, and Denial of Service (DoS) attacks.
- Secure network infrastructure using firewalls, secure protocols, and VPNs.
- Apply cryptographic principles, including encryption, hashing, and message integrity.
- Implement system security and hardening techniques, such as managing OS permissions and practicing patch management.
- Perform reconnaissance and footprinting activities, utilizing techniques like OSINT and WHOIS lookups.



- Understand and demonstrate basic scanning and exploitation concepts, including port scanning and SQL injection demonstrations.
- Execute ethical reporting procedures and perform a comprehensive capstone security assessment.

Instructors Guidelines

The course structure mandates a strong emphasis on practical application, with the weekly schedule split into 6 hours of Theory and 9 hours of Practical sessions. Instructors should utilize specialized tools and resources, including lecture slides, sample phishing emails, mock policy documents, case study scenarios, simulated firewall rules, and encryption exercises. The final week must integrate the theoretical knowledge into a comprehensive hands-on Capstone Security Assessment.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (Capstone Security Assessment)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Introduction to Cybersecurity — CIA Triad (Confidentiality, Integrity, Availability), Security Goals, Real-World Breach Case Studies
	Day 02	Threats, Vulnerabilities, Risks — Definitions, Differences, Risk Assessment Frameworks, Threat Modeling Basics
	Day 03	Social Engineering — Phishing, Pretexting, Baiting, Vishing — Psychology of Attacks, Red Flags
	Day 04	Security Awareness Lab — Analyze Sample Phishing Emails, Create Security Policy Snippets, Simulate User Training
	Day 05	Project: Build a Personal Security Checklist — Apply CIA, Threat Types, and Social Engineering Defenses to Daily Digital Life
	Outcome	By the end of Week 01, students will be able to: <ul style="list-style-type: none"> • Define and apply the CIA triad to real-world scenarios. • Differentiate between threats, vulnerabilities, and risks. • Recognize and defend against common social engineering tactics. • Analyze phishing attempts and draft basic security policies. • Develop a personal cybersecurity action plan for daily digital hygiene.



Week 02	Day 01	Cyber Threats Deep Dive — Malware (Viruses, Worms, Trojans, Ransomware), Spyware, Adware, Rootkits
	Day 02	Attack Vectors — Phishing Campaigns, Drive-by Downloads, Malvertising, Watering Hole Attacks
	Day 03	Denial-of-Service (DoS/DDoS) — Types, Impact, Botnets, Mitigation Strategies
	Day 04	Vulnerability Assessment Basics — Scanning Concepts, CVE, CVSS, Prioritization, Mock Report Analysis
	Day 05	Practical Lab — Phishing Email Analysis + Vulnerability Triage Simulation Using Case Studies
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> Classify and describe major malware types and their behaviors. Understand how DoS/DDoS attacks work and how to mitigate them. Interpret vulnerability reports and prioritize remediation. Conduct basic phishing forensic analysis. Apply threat intelligence to assess organizational risk exposure
Week 03	Day 01	Networking Fundamentals — OSI Model, TCP/IP, Ports, Protocols (HTTP, HTTPS, FTP, SSH, DNS)
	Day 02	Network Security Devices — Firewalls (Stateful/Stateless), IDS/IPS, Proxies, WAFs — Rule Configuration Basics
	Day 03	Secure Protocols & Encryption in Transit — TLS/SSL, VPNs (IPSec, SSL), SSH Tunneling, Secure Configurations
	Day 04	Network Diagram Analysis — Identify Weak Points, Suggest Security Zones, DMZ, Segmentation Strategies
	Day 05	Practical Lab — Simulate Firewall Rule Creation + Analyze Network Traffic for Anomalies
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> Map network traffic to OSI/TCP layers and identify insecure protocols. Configure basic firewall rules and understand IDS/IPS functions. Explain how VPNs and TLS secure data in transit. Analyze network diagrams for security gaps and propose improvements. Simulate secure network architecture using best practices.
Week 04	Day 01	Review: CIA Triad, Threat Modeling, Malware, DoS, Social Engineering
	Day 02	Review: Networking Concepts, Firewalls, Secure Protocols, Diagram Analysis
	Day 03	Review: Vulnerability Assessment, Phishing Labs, Security Policies
	Day 04	Practice Capture-the-Flag (CTF) Mini-Challenge — Apply Concepts in Simulated Environment
	Day 05	Mid Term Examination (Covers Weeks 01–03: Fundamentals, Threats, Networking, Awareness, Basic Defense Strategies)
	Outcome	<p>By the end of Week 04, students will be able to:</p> <ul style="list-style-type: none"> Demonstrate mastery of core cybersecurity principles and terminology.



		<ul style="list-style-type: none"> Analyze threats and vulnerabilities across network and human layers. Design basic defensive architectures using firewalls and secure protocols. Identify and respond to social engineering and phishing attempts. Prepare for advanced topics: cryptography, system hardening, and offensive security.
Week 05	Day 01	Cryptography Fundamentals — Encryption vs Hashing, Symmetric (AES) vs Asymmetric (RSA), Keys, Certificates
	Day 02	Data Protection in Practice — File Encryption, Full Disk Encryption, Email Encryption (PGP), Password Hashing (bcrypt)
	Day 03	Message Integrity & Digital Signatures — Hash Functions (SHA-256), HMAC, Signing/Verification Process
	Day 04	Hands-on Crypto Lab — Encrypt/Decrypt Files, Generate Hashes, Verify Signatures, Brute-Force Demo (Ethical)
	Day 05	Applied Cryptography — Implementing HTTPS, Analyzing SSL/TLS Handshake, Certificate Chain Validation
	Outcome	<p>By the end of Week 05, students will be able to:</p> <ul style="list-style-type: none"> Differentiate between encryption, hashing, and digital signatures. Apply symmetric and asymmetric cryptography to secure data. Verify message integrity and authenticity using hashing and signing. Perform basic cryptographic operations using command-line tools. Understand how cryptography secures web traffic and stored data.
Week 06	Day 01	System Hardening — OS Security Configurations, Disabling Unnecessary Services, User Account Controls
	Day 02	Least Privilege & Access Control — RBAC, Admin vs Standard User, sudo Policies, File Permissions (Linux/Windows)
	Day 03	Patch Management — Vulnerability Patching Cycles, Zero-Day vs N-Day, Automated Tools, Change Management
	Day 04	Authentication Systems — MFA, Biometrics, Password Policies, Account Lockout, Session Management
	Day 05	Malware Response Lab — Analyze System Logs, Isolate Infected Host, Apply Patches, Restore from Backup
	Outcome	<p>By the end of Week 06, students will be able to:</p> <ul style="list-style-type: none"> Harden operating systems against common attacks. Implement least privilege and role-based access controls. Manage patch cycles and reduce attack surface through updates. Configure and enforce strong authentication mechanisms. Respond to malware incidents using logs, isolation, and recovery procedures.
Week 07	Day 01	Reconnaissance & OSINT — Passive vs Active Recon, WHOIS, DNS Enumeration, Google Dorking, Metadata Analysis
	Day 02	Footprinting Tools — nslookup, dig, theHarvester, Shodan, Maltego — Legal and Ethical Use



	Day 03	Scanning Techniques — Port Scanning (Nmap), Service Detection, Banner Grabbing, Vulnerability Scanning (Nessus/OpenVAS Intro)
	Day 04	Exploitation Concepts — Exploit vs Payload, Metasploit Framework Intro, SQL Injection Demo (on Test App)
	Day 05	Ethical Hacking Lab — Perform Full Recon → Scan → Identify Vulnerability → Document (No Actual Exploitation Without Permission)
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> • Conduct passive and active reconnaissance using OSINT tools. • Perform ethical network scanning to identify open ports and services. • Understand the anatomy of common exploits like SQL injection. • Use tools like Nmap and Shodan within legal and authorized boundaries. • Document findings in a professional vulnerability assessment report.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why Cybersecurity Skills = Business Opportunities”
	Day 02	Idea to Business — Brainstorm Marketable Skills (Vulnerability Scanning, Security Audits, Phishing Simulations), Map to Services, Write 3 Business Ideas + Peer Feedback
	Day 03	Building Teams & Communication — Role Distribution (Pentester, Analyst, Compliance Officer, Sales), Digital Tools (Slack, Trello, Metasploit Teams), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for Security Pros — LinkedIn Optimization, Portfolio (GitHub Reports, CTF Scores, Certifications), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: CIA Triad, Threats, Networking, Cryptography, System Hardening, Recon, Scanning, Exploitation + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> • Define digital entrepreneurship through the lens of cybersecurity professionals. • Convert technical skills (network scanning, crypto implementation, OS hardening, phishing analysis) into sellable freelance services or scalable security products. • Develop 3 viable business ideas — e.g., “SMB Security Audits for Pakistani Businesses”, “Phishing Simulation as a Service”, “Vulnerability Scanning for E-commerce Platforms”. • Build collaborative security teams and pitch services using professional communication and project management tools. • Create a standout LinkedIn profile and online portfolio showcasing lab reports, certifications (e.g., CEH, CompTIA), or CTF achievements.



		<ul style="list-style-type: none"> • Set up and optimize Fiverr/Upwork profiles with compelling gigs like “I Will Perform Ethical Hacking on Your Website” or “I Will Secure Your Network Against Cyber Threats”. • Understand how to land first clients, manage feedback, and scale into a cybersecurity consultancy or MSSP (Managed Security Service Provider). • Demonstrate mastery of core cybersecurity and ethical hacking concepts — from defense to offense. • Leave the course with a personal roadmap to launch a freelance cybersecurity career or digital security business in Pakistan or globally.
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Cybersecurity Assignment:

Small Business Security Audit & Threat Analysis (10 Marks / \$10)

Freelance Scenario:

You've been hired by a **small business** that recently experienced suspicious activity on their internal network. The owner wants a **basic security audit**, including an analysis of common threats, a vulnerability scan simulation, and a basic **security awareness guide** for employees.

This task involves analyzing mock data, simulating common scanning techniques, and delivering **actionable recommendations** — similar to an entry-level consultant project on platforms like Upwork or Freelancer.

Client Requirements:

“We want to know how exposed we are. Can you help us assess our current risks, scan for vulnerabilities, and prepare a one-page internal policy for employee security awareness?”

Assignment Tasks:

1. Threat & Risk Identification (2 Marks)

- Based on the company scenario (small business with internal network and ~15 employees):
 - Identify **3 most likely cybersecurity threats** (e.g., phishing, ransomware, weak passwords).
 - Describe **real-world examples** or recent incidents that match these threats.



- Explain the **risk impact** for this specific business.

Deliverable: Bullet-point or table format with threats, examples, and risk levels.

2. Vulnerability Scan Simulation (3 Marks)

- Perform a **simulated** scan on a vulnerable test system (like **DVWA** or **Metasploitable2**) using a tool like:
 - **Nmap** or **Zenmap**
 - (Alternative: use online sandbox tools or screenshots from public test scans)
- Identify **open ports**, **OS detection**, and basic service banners.
- Highlight **3 potential vulnerabilities** based on scan results.
- Suggest **remediation steps** for each.

Deliverable: Screenshots + brief explanation of each scan & vulnerability.

3. Basic Social Engineering Awareness (2 Marks)

- Review the provided **sample phishing email** (or find one online).
- Highlight the **social engineering techniques** used.
- Write a **short advisory email (5–7 lines)** to staff warning them about phishing emails and how to spot/report them.

Deliverable: Screenshot of phishing email (if used), bullet points of techniques used, and staff advisory.

4. Security Hardening Recommendations (2 Marks)

- Provide **5 recommendations** the business should follow to harden their security, across:
 - Network security
 - System security
 - User behavior
- Briefly justify each recommendation (1–2 sentences).

Deliverable: Numbered list with justifications.

5. Bonus: Create a 1-page Internal Security Awareness Policy (1 mark)

- Include the following sections:
 - **Password policy**
 - **Email & phishing precautions**
 - **Internet usage guidelines**
 - **Incident reporting procedure**
- Use clear, simple language suitable for non-technical staff.

Deliverable: Submit as a separate page (PDF or DOCX).



Submission Requirements:

- A compiled PDF or notebook with:
 - Screenshots from scans (if used)
 - Tables, descriptions, and recommendations
 - Advisory email and awareness policy
- You may use a Jupyter Notebook, Word document, or PDF format

Evaluation Rubric:

Task	Marks
Threat & Risk Identification	2
Vulnerability Scan & Analysis	3
Social Engineering Awareness	2
Security Hardening Recommendations	2
Bonus: Awareness Policy	1
Total	10

Estimated Time to Complete: 6–10 hours

Cybersecurity & Ethical Hacking – Multiple Choice Quiz

Total **Marks:** 5
Instructions: Choose the correct option (a, b, c, or d).

Questions:

1. What does the “CIA” triad in cybersecurity stand for?
 - a) Control, Integrity, Authentication
 - b) Confidentiality, Integrity, Availability
 - c) Cyber, Intelligence, Access
 - d) Code, Input, Access
2. Which of the following is an example of social engineering?
 - a) SQL Injection
 - b) Buffer overflow
 - c) Phishing email
 - d) Brute force attack
3. A **vulnerability** is:
 - a) An actual attack



- b) A potential weakness
- c) A patched system
- d) An antivirus software
- 4. What is the difference between a threat and a risk?
 - a) Threat is always internal; risk is external
 - b) Threat exploits a vulnerability; risk is the potential impact
 - c) Risk is more dangerous than a threat
 - d) They are the same thing
- 5. What type of malware disguises itself as legitimate software?
 - a) Worm
 - b) Virus
 - c) Trojan
 - d) Ransomware

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	b	11	b	21	b
2	c	12	b	22	c
3	b	13	b	23	c
4	b	14	c	24	b
5	c	15	a	25	c



Course Name: Database Management



Course Overview

This comprehensive 8-week course (40 days, 3 hours per session) covers foundational to advanced concepts in Database Administration. The course begins with Structured Query Language (SQL) mastery, covering basic queries, Data Manipulation Language (DML), advanced joins, and aggregation. It then delves into Database Design, including Normalization (1NF, 2NF, 3NF), Entity-Relationship (ER) Modeling, Indexing, and Sharding. Key Database Management Systems (DBMS) like MySQL and PostgreSQL are explored for installation, user management, and routine maintenance. The curriculum introduces NoSQL databases (MongoDB, Cassandra), advanced Performance Tuning, Backup and Recovery solutions (including Point-in-Time Recovery and High Availability Replication), ETL (Extract, Transform, Load) processes for data integration, and concludes with detailed Database Security topics such as encryption, auditing, and regulatory compliance (GDPR, HIPAA). A strong emphasis is placed on applying skills through Freelancing Focus sessions.

Learning Outcomes

Upon completion of this course, students will be able to:

- Write and optimize complex SQL queries involving joins, aggregation functions, and grouping.
- Design well-structured databases by applying normalization principles (1NF, 2NF, 3NF) and Entity-Relationship (ER) modeling.
- Install, configure, and manage user roles and permissions in popular DBMS platforms like MySQL and PostgreSQL.



- Differentiate between NoSQL databases (Document-based, Key-value, Column-based) and implement sharding and replication for large-scale applications.
- Identify database performance bottlenecks and implement tuning techniques, including indexing, query optimization, and caching.
- Set up robust database backup strategies (full, incremental, differential), perform Point-in-Time Recovery (PITR), and configure high availability replication.
- Build and manage ETL pipelines to extract, transform, and load data from multiple sources.
- Implement strong database security measures, including data encryption (SSL/TLS, TDE), securing server infrastructure, and setting up audit trails for compliance (GDPR, HIPAA).

Instructors Guidelines

The course is structured around daily 3-hour sessions incorporating both Theory & Practical components. Instructors must integrate Freelancing Focus days (Days 5, 10, 15, 20, 25, 30, 35, 40), where students are assessed on responding to real-time client requirements and creating professional service gigs (e.g., "I Will Write and Optimize SQL Queries" or "I Will Design and Normalize Your Database") on platforms like Fiverr and Upwork.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (Practical Assignments/Freelancing Focus)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Introduction to SQL & Relational Databases — Data Types, Table Creation in MySQL/PostgreSQL/SQL Server
	Day 02	Writing Basic SQL Queries — SELECT, WHERE, ORDER BY, LIMIT — Filtering and Sorting Data



	Day 03	Data Manipulation — INSERT, UPDATE, DELETE — Transactions and Rollback Concepts
	Day 04	Advanced SQL Querying — Joins (INNER, LEFT), Aggregations (SUM, AVG, COUNT), GROUP BY, HAVING
	Day 05	Freelancing Focus — SQL Gig Creation on Fiverr/Upwork — “I Will Write & Optimize SQL Queries”
	Outcome	<p>By the end of Week 01, students will be able to:</p> <ul style="list-style-type: none"> • Understand relational database fundamentals and SQL syntax. • Create, query, and manipulate data using core SQL commands. • Write complex queries using joins and aggregate functions. • Apply transactional safety with BEGIN/ROLLBACK. • Launch a freelance gig offering SQL query writing and optimization services.
Week 02	Day 01	Database Design & Normalization — 1NF — Schema Design, Eliminating Redundancy
	Day 02	Advanced Normalization — 2NF, 3NF — Functional Dependencies, Efficient Structure
	Day 03	Entity-Relationship (ER) Modeling — Entities, Attributes, Relationships (1:1, 1:M, M:M)
	Day 04	Advanced Architecture — Indexing, Partitioning, Sharding for Scalability
	Day 05	Freelancing Focus — Gig: “I Will Design & Normalize Your Database with ER Diagrams”
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> • Design normalized databases to 3NF for efficiency and integrity. • Model databases visually using ER diagrams. • Apply indexing, partitioning, and sharding for performance at scale. • Create professional database design gigs targeting startups and SMEs. • Translate client requirements into scalable, well-structured schemas.
Week 03	Day 01	DBMS Introduction — Install & Configure MySQL, PostgreSQL — Instances, Tablespaces
	Day 02	User Roles & Permissions — RBAC, Creating Admin/Developer/Viewer Roles
	Day 03	Routine Maintenance — Statistics, Index Rebuild, Vacuuming, Integrity Checks
	Day 04	Monitoring & Tuning — CPU/Memory/Disk I/O, System Tools, Config Adjustments
	Day 05	Freelancing Focus — Gig: “I Will Install & Manage Your MySQL/PostgreSQL Database”
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> • Install, configure, and secure popular DBMS platforms. • Manage user access with role-based permissions. • Perform routine maintenance to ensure database health. • Monitor and tune system resources for optimal performance.



		<ul style="list-style-type: none"> Offer freelance DBMS setup, security, and maintenance services to small businesses.
Week 04	Day 01	Review: SQL Queries, Joins, Aggregations, Normalization, ER Diagrams
	Day 02	Review: DBMS Installation, User Management, Indexing, Monitoring
	Day 03	Review: Freelancing Gigs — SQL Optimization, Database Design, DBMS Setup
	Day 04	Practice Quiz + Q&A — Troubleshoot Common Errors, Client Requirement Simulations
	Day 05	Mid Term Examination (Covers Weeks 01–03: SQL, Database Design, DBMS Management, Freelancing Concepts)
	Outcome	By the end of Week 04, students will be able to: <ul style="list-style-type: none"> Demonstrate mastery of SQL syntax, query optimization, and data manipulation. Design and normalize relational databases using ER modeling. Install, secure, and maintain production-ready DBMS environments. Prepare freelancing profiles targeting real-world database needs. Identify knowledge gaps and solidify core concepts through mid-term assessment.
Week 05	Day 01	NoSQL Introduction — MongoDB, Couchbase — Flexible Schemas, Document Structure
	Day 02	Key-Value & Column Stores — Redis, Cassandra — Use Cases, Performance, Scaling
	Day 03	Scaling NoSQL — Sharding, Replication in MongoDB/Cassandra — Handling High Traffic
	Day 04	Optimizing NoSQL — Indexing, Query Tuning, Write-Heavy Workload Strategies
	Day 05	Freelancing Focus — Gig: “I Will Set Up & Manage Your MongoDB/Cassandra Database”
	Outcome	By the end of Week 05, students will be able to: <ul style="list-style-type: none"> Differentiate between SQL and NoSQL databases and choose appropriately. Install, configure, and manage MongoDB, Redis, and Cassandra. Implement sharding and replication for horizontal scaling. Optimize NoSQL performance through indexing and query design. Offer NoSQL setup and management gigs for real-time, large-scale applications.
Week 06	Day 01	Performance Tuning Intro — Bottlenecks, Execution Plans, Query Analysis
	Day 02	Query Optimization — Restructuring SQL, Index Usage, Join/Subquery Efficiency
	Day 03	Indexing & Caching — Multi-column, Full-text Indexes — Redis for Query Caching



	Day 04	Resource Management — CPU/Memory/Disk Tuning, Partitioning, Load Balancing
	Day 05	Freelancing Focus — Gig: “I Will Optimize Your MySQL/PostgreSQL Database for Speed”
	Outcome	<p>By the end of Week 06, students will be able to:</p> <ul style="list-style-type: none"> Identify and resolve database performance bottlenecks. Optimize SQL queries and apply appropriate indexing strategies. Implement caching and resource tuning for high-load environments. Reduce infrastructure costs through performance improvements. Market themselves as database performance consultants on freelance platforms.
Week 07	Day 01	ETL Introduction — Extract, Transform, Load — Tools: Talend, Apache NiFi, Pentaho
	Day 02	Extracting Data — From Databases, CSV, APIs — Structured vs. Unstructured Sources
	Day 03	Data Transformation — Cleaning, Normalizing, Validating — Rule-Based Processing
	Day 04	Loading Data — Bulk Inserts, Data Warehouses, Ensuring Integrity & Consistency
	Day 05	Freelancing Focus — Gig: “I Will Build ETL Pipelines for Data Integration”
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> Design and implement end-to-end ETL pipelines. Extract data from heterogeneous sources (DBs, files, APIs). Clean, transform, and validate data for unified storage. Load large datasets efficiently while preserving integrity. Offer ETL and data integration services to analytics-driven businesses.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why Database Skills = Business Opportunities”
	Day 02	Idea to Business — Brainstorm Marketable Database Skills (SQL, ETL, Optimization, NoSQL), Map to Services, Write 3 Business Ideas + Peer Feedback
	Day 03	Building Teams & Communication — Role Distribution (DBA, Developer, Analyst), Digital Tools (Slack, Zoom, GitHub), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for Database Pros — LinkedIn Optimization, Portfolio (GitHub/Notion), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: SQL, DB Design, DBMS, NoSQL, Performance, Backup, ETL + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> Define digital entrepreneurship through the lens of database professionals.



		<ul style="list-style-type: none"> • Convert technical skills (SQL, optimization, ETL, NoSQL) into sellable freelance services or products. • Develop 3 viable business ideas — e.g., “Database Audit as a Service”, “ETL Pipeline Setup”, “Query Optimization Consultancy”. • Build collaborative teams and pitch database solutions using professional communication tools. • Create a standout LinkedIn profile and online portfolio showcasing SQL scripts, ER diagrams, or performance reports. • Set up and optimize Fiverr/Upwork profiles with compelling gigs like “I Will Tune Your Slow Database” or “I Will Build Your ETL Pipeline”. • Understand how to land first clients, manage feedback, and scale into a database consultancy or agency. • Demonstrate mastery of core database concepts — from SQL to ETL to disaster recovery. • Leave the course with a personal roadmap to launch a freelance database career or tech-enabled business.
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Database Assignment:

Inventory Management System for a Retail Store (10 Marks / \$10)

Freelance Scenario:

You have been hired by a small retail store, ShopSmart, to design and implement an inventory management database system. Currently, they use manual tracking, which leads to stock discrepancies and slow reporting. With around 100–300 daily sales (and future scalability up to 1,000 transactions daily), ShopSmart needs a robust solution. The system should handle products, suppliers, sales, and customer data, while also supporting logs, reporting, backups, and recovery.

Your task is to build a hybrid solution using **SQL (PostgreSQL/MySQL)** for structured data and **NoSQL (MongoDB)** for unstructured logs, ensuring efficiency, scalability, and data privacy compliance.

Dataset:

There is no predefined dataset. Students must design the schema and populate it with sample data (at least 20 products, 10 suppliers, 50 customers, and 100+ sales records).



Assignment Tasks:

1. Database Design & Schema Creation (2 marks)

- Create an ER diagram including entities such as:
 - **Products** (ProductID, Name, Price, Stock)
 - **Suppliers** (SupplierID, Name, Contact)
 - **Sales** (SaleID, ProductID, CustomerID, Date, Quantity)
 - **Customers** (CustomerID, Name, Contact, Address)
- Normalize tables up to 3NF.
- Implement constraints: Primary keys, Foreign keys, NOT NULL, UNIQUE.

2. SQL Implementation & Queries (3 marks)

- Create the database schema in **PostgreSQL/MySQL**.
- Insert sample data.
- Write queries to generate useful reports:
 - **INNER JOIN**: Show sales with supplier details.
 - **Aggregations**: Use SUM/COUNT/AVG to calculate total sales, average stock, and revenue.
 - **GROUP BY**: Generate product-wise and customer-wise sales summaries.
 - **Filtering**: Retrieve sales within a date range.

3. NoSQL Integration with MongoDB (2 marks)

- Create a MongoDB database for logging events (e.g., login attempts, sales logs, errors).
- Insert sample log data.
- Implement indexing for faster searches.
- Demonstrate sharding/partitioning for scalability.

4. Backup & Recovery Strategy (2 marks)

- Configure automated backups:



- Full backup weekly.
- Incremental backup daily.
- Set up Point-In-Time Recovery (PITR) for **PostgreSQL/MySQL**.
- Write a short note on how this ensures data availability and disaster recovery.

5. User Roles & Security (1 mark)

- Create roles in **PostgreSQL/MySQL**:
 - **Admin**: Full access.
 - **Staff**: Read/write access to products and sales, but restricted access to sensitive tables.
- Demonstrate role-based queries and permissions.

Submission Requirements:

- ER Diagram (image or PDF).
- SQL scripts (.sql file) for schema creation, data insertion, and queries (**PostgreSQL/MySQL**).
- MongoDB script/commands for log database and indexing.
- Backup and recovery configuration steps (documented).
- Short report (1–2 pages) explaining design choices and challenges.

Evaluation Rubric:

Task	Marks
Database Design & ER Diagram	2
SQL Schema & Queries	3
NoSQL Integration (MongoDB)	2
Backup & Recovery	2
User Roles & Security	1
Total	10



Estimated Time to Complete: 8-12 hours

DBMS Quiz

Total Marks: 5

Instructions: Choose the correct option (a, b, c, or d).

Questions:

1. What is the primary function of SQL in relational databases?
 - a) Managing hardware resources
 - b) Interacting with and querying databases
 - c) Designing user interfaces
 - d) Compiling programming code
2. Which SQL clause is used to filter results in a SELECT query?
 - a) ORDER BY
 - b) GROUP BY
 - c) WHERE
 - d) HAVING
3. What does the INSERT statement in SQL primarily do?
 - a) Update existing records
 - b) Delete records
 - c) Add new data to a table
 - d) Sort data
4. Which SQL feature ensures transactional integrity by allowing rollback of changes?
 - a) SELECT
 - b) JOIN
 - c) BEGIN TRANSACTION
 - d) GROUP BY
5. What type of JOIN returns all records from the left table and matching records from the right table?
 - a) INNER JOIN
 - b) LEFT JOIN
 - c) RIGHT JOIN
 - d) FULL JOIN

Answer Key:

Q#	Ans	Q#	Ans
1	b	11	b
2	c	12	a
3	c	13	b
4	c	14	b
5	b	15	c

Course Name: Data Science



Course Overview

This 8-week bootcamp introduces students to the core concepts and practical tools used in Data Science. The course begins with a programming foundation, covering Python Data Structures, Pandas for Data Wrangling, and Data Cleaning Techniques. Students will learn data representation through Visualization (Seaborn) and Exploratory Data Analysis (EDA). The statistical component includes Data Distributions, Correlation, and advanced Hypothesis Testing. The majority of the course focuses on Machine Learning, covering Supervised Learning, Regression, and Classification models, Classification Models (Decision Trees, Random Forest, kNN), and Advanced Techniques like Clustering and Dimensionality Reduction. The latter weeks delve into Deep Learning, specifically Artificial Neural Networks (ANN) and



Convolutional Neural Networks (CNN) with Keras, and concluding with Big Data concepts, Cloud Computing, and Model Deployment using Flask.

Learning Outcomes

Upon completion of this course, students will be able to:

- Perform data wrangling and cleaning using Python data structures and the Pandas library.
- Apply data visualization techniques (Seaborn) and conduct Exploratory Data Analysis (EDA) to derive meaningful data insights.
- Understand and perform hypothesis testing for correlation and group analysis.
- Implement and evaluate various Supervised Learning algorithms, including Regression and Classification problems.
- Master advanced machine learning techniques such as Clustering, Dimensionality Reduction, and Ensemble Learning.
- Build, train, and deploy deep learning models, specifically Artificial Neural Networks (ANN) and Convolutional Neural Networks (CNN) using Keras for image classification.
- Understand basic concepts of Big Data and Cloud Computing.
- Deploy trained machine learning models using frameworks like Flask.

Instructors Guidelines

The curriculum emphasizes practical application with dedicated **Project Days (Day 5)** scheduled almost every week to consolidate learning and practice feature engineering and model training. Instructors should utilize recommended resources, such as "Deep Learning with Python by François Chollet". Projects should cover the full lifecycle, from data cleaning and hypothesis testing to model training, evaluation (cross-validation), and deployment.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (Weekly Projects/Final Project)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy



90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Python Data Structures — Lists, Tuples, Dictionaries, Sets
	Day 02	Introduction to Pandas — Series, DataFrames, Basic Operations
	Day 03	Data Wrangling with Pandas — Filtering, Grouping, Merging, Pivoting
	Day 04	Data Cleaning Techniques — Handling Missing Values, Duplicates, Outliers
	Day 05	Project: Clean and Analyze a Real-World Dataset
	Outcome	<p>By the end of Week 01, students will be able to:</p> <ul style="list-style-type: none"> • Use core Python data structures for data manipulation. • Load, explore, and manipulate datasets using Pandas. • Perform data wrangling tasks like filtering, merging, and reshaping. • Clean datasets by handling missing values, duplicates, and inconsistencies. • Complete an end-to-end mini-project applying all learned techniques.
Week 02	Day 01	Introduction to Data Visualization — Matplotlib Basics, Plot Types
	Day 02	Advanced Visualization with Seaborn — Styling, Categorical & Distribution Plots
	Day 03	Customizing Visualizations — Themes, Annotations, Multi-Plot Layouts
	Day 04	Project Day — Build a Complete Visual Story from a Dataset
	Day 05	Introduction to EDA — Exploratory Data Analysis Workflow & Insights
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> • Create basic and advanced visualizations using Matplotlib and Seaborn. • Customize plots for clarity, aesthetics, and storytelling. • Conduct exploratory data analysis to uncover patterns and insights. • Present data visually through a structured project. • Interpret and communicate findings from visual EDA.
Week 03	Day 01	Understanding Data Distributions — Histograms, PDF, CDF, Skewness, Kurtosis
	Day 02	Correlation and Hypothesis Testing Introduction — Pearson, Spearman, p-values
	Day 03	Hypothesis Testing Continued — T-tests, Z-tests, Assumptions, Interpretation
	Day 04	Advanced Hypothesis Testing — Chi-Square, ANOVA, Practical Applications
	Day 05	Hypothesis Testing for Groups — Comparing Means, Proportions, Real-World Cases
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> • Analyze and visualize data distributions and their properties. • Measure and interpret correlation between variables.



		<ul style="list-style-type: none"> Formulate and test hypotheses using statistical tests (T-test, Z-test, Chi-square, ANOVA). Apply hypothesis testing to compare groups and validate assumptions. Draw statistically sound conclusions from data.
Week 04	Day 01	Supervised Learning & Regression — Linear, Polynomial, Evaluation Metrics (MSE, R ²)
	Day 02	Classification Problems — Logistic Regression, Confusion Matrix, Accuracy, Precision, Recall
	Day 03	Model Training and Cross-Validation — Train/Test Split, K-Fold, Overfitting Prevention
	Day 04	Feature Engineering — Encoding, Scaling, Feature Creation, Selection Techniques
	Day 05	Mid Term Examination (Covers Weeks 01–04: Python, Pandas, Visualization, EDA, Stats, Regression, Classification)
	Outcome	<p>By the end of Week 04, students will be able to:</p> <ul style="list-style-type: none"> Understand and implement supervised learning models for regression and classification. Evaluate model performance using appropriate metrics. Train robust models using cross-validation techniques. Engineer features to improve model accuracy and generalization. Demonstrate comprehensive understanding of foundational data science concepts.
Week 05	Day 01	Decision Trees — Structure, Splitting Criteria, Visualization, Overfitting
	Day 02	Random Forest — Ensemble Method, Bagging, Hyperparameter Tuning
	Day 03	kNN Classifier & Model Comparison — Distance Metrics, k Selection, ROC/AUC, Model Benchmarking
	Day 04	Improve Classification Models — Hyperparameter Tuning, GridSearchCV, Class Imbalance Handling
	Day 05	Project Day — Build and Compare Multiple Classification Models on a Dataset
	Outcome	<p>By the end of Week 05, students will be able to:</p> <ul style="list-style-type: none"> Build and interpret Decision Tree and Random Forest models. Implement and tune k-Nearest Neighbors classifier. Compare model performance using advanced metrics (ROC, AUC, F1). Optimize models through hyperparameter tuning and handle class imbalance. Deliver a comparative classification project with insights and recommendations.
Week 06	Day 01	Clustering Techniques — K-Means, Hierarchical Clustering, Evaluation Metrics (Silhouette, Elbow)
	Day 02	Dimensionality Reduction — PCA, t-SNE, Visualization of High-Dimensional Data
	Day 03	Ensemble Learning Methods — Boosting (AdaBoost, Gradient Boosting), Voting, Stacking



	Day 04	Introduction to Artificial Neural Networks (ANN) — Perceptrons, Layers, Activation Functions
	Day 05	Training Neural Networks — Loss Functions, Optimizers, Backpropagation, Early Stopping
	Outcome	<p>By the end of Week 06, students will be able to:</p> <ul style="list-style-type: none"> • Apply unsupervised learning techniques like clustering and dimensionality reduction. • Reduce feature space while preserving information using PCA and t-SNE. • Build ensemble models using boosting and stacking methods. • Understand the structure and training process of Artificial Neural Networks. • Train and validate basic neural networks using modern frameworks.
Week 07	Day 01	Introduction to CNN — Architecture, Filters, Feature Maps, Use Cases in Image Data
	Day 02	Building a Simple CNN with Keras — Sequential API, Layers, Compilation, Training
	Day 03	Advanced CNN Techniques — Pooling, Dropout, Batch Normalization, Data Augmentation
	Day 04	CNN for Image Classification — CIFAR-10 / MNIST Projects, Transfer Learning Intro
	Day 05	Deploying CNN Models Using Flask — Model Serialization, API Creation, Web Interface
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> • Understand the architecture and purpose of Convolutional Neural Networks. • Build, train, and evaluate CNN models using Keras/TensorFlow. • Improve CNN performance using advanced techniques like dropout and augmentation. • Solve real-world image classification problems. • Deploy trained models via Flask to create interactive web applications
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why Digital Business is the Future”
	Day 02	Idea to Business — Brainstorm Skills, Map to Services, Write 3 Business Ideas + Group Feedback & Refinement
	Day 03	Building Teams & Communication — Role Distribution, Digital Tools (Email/Zoom), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding & Freelancing Setup — LinkedIn Optimization, Social Media for Business, Fiverr/Upwork Profile Creation
	Day 05	Final Exams (Covers Weeks 01–07: Data Science Core + Reflection on Freelancing, Branding, and Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> • Define digital entrepreneurship and relate it to real-world success stories in Pakistan. • Convert data science skills into marketable services or products.



		<ul style="list-style-type: none"> • Develop 3 viable digital business ideas and refine them through peer feedback. • Build collaborative teams and pitch ideas using digital communication tools. • Create a professional LinkedIn profile and business-ready social media presence. • Set up freelancing profiles on Fiverr/Upwork with optimized gigs and keywords. • Understand client acquisition, response etiquette, and scaling strategies. • Demonstrate mastery of data science fundamentals through final examination. • Leave the course with a personal roadmap to monetize their data science skills digitally.
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Data Science Assignment:

Freelance Image Classifier + API Deployment (10 Marks / \$10)

Focus: CNN, Image Preprocessing, Model Training, Flask API Deployment

Freelance Scenario:

You've been hired by a small online **art store** to create an AI tool that can automatically classify uploaded images of paintings into **three categories: Abstract, Portrait, and Landscape**. The client wants a **trained model** and a **web API** that can be integrated into their website to return predictions in real time.

Dataset:

Use a public image dataset OR create a sample one with 100–200 images across 3 classes.

Recommended for students:

- Use or create a dataset with folders:
 - data/
 - abstract/
 - portrait/
 - landscape/

Sample datasets (students can choose any):

- Flickr-style painting images
- [Custom: Use Google Images + download script]

Note: If dataset not provided, student can use dummy image data for structure.



Assignment Tasks:

1. Image Preprocessing & Data Augmentation (2 marks)

- Use `ImageDataGenerator` from Keras to:
 - Load and preprocess images (resize, rescale)
 - Apply basic augmentations: rotation, zoom, horizontal flip
- Visualize a few augmented images
- Split data into train/validation/test

2. Build and Train CNN Model (3 marks)

- Build a custom CNN (no transfer learning) using:
 - `Conv2D`, `MaxPooling2D`, `Dropout`
 - Flatten → Dense → Softmax output
- Compile and train with:
 - Categorical crossentropy
 - Adam or RMSProp optimizer
- Train for 10–15 epochs
- Show plots of training vs validation accuracy/loss

3. Model Evaluation (2 marks)

- Evaluate the model on test data and report:
 - Accuracy
 - Confusion matrix
 - Classification report
- Display sample predictions with actual vs predicted labels

4. Build Prediction API with Flask (2 marks)

- Create a simple **Flask API** with:
 - `/predict` route that accepts an image upload (via POST)
 - Loads the saved model
 - Preprocesses the uploaded image
 - Returns the predicted class (e.g., "Landscape")

Include:

- `requirements.txt`
- `model.h5`
- `app.py`
- Example test request using `curl` or Postman

5. Bonus (1 mark)



(0.5) Save final model using `.save('model.h5')`

(0.5) Code documentation:

- Clean, commented code
- Markdown sections (if notebook)
- Reusable functions for prediction, model building, etc.

Submission Requirements:

- Submit:
 - Jupyter Notebook or Python script
 - Trained model file `model.h5`
 - Flask app code (`app.py`)
 - Sample prediction test (image + response screenshot or `curl` output)
 - `requirements.txt`

Evaluation Rubric:

Task	Marks
Data Loading & Preprocessing	2
CNN Architecture & Training	3
Evaluation & Reporting	2
Flask API Development	2
Bonus: Save & Code Docs	1 (0.5 + 0.5)
Total	10

Estimated Time to Complete: 10–14 hours

This assignment simulates a **real freelance project** involving:

- Client requirements
- End-to-end development
- Functional deployment-ready code
- Real-world deliverables (model, API, predictions)

Data Science Quiz

Total Marks: 30

Instructions: Choose the correct option (a, b, c, or d).



Questions:

1. Which data structure is mutable in Python?
 - a) tuple
 - b) string
 - c) list
 - d) int
2. What does `df.dropna()` do in Pandas?
 - a) Removes duplicate rows
 - b) Removes NaN values
 - c) Removes columns
 - d) Replaces NaN with 0
3. Which method is used to inspect the structure of a Pandas DataFrame?
 - a) `df.info()`
 - b) `df.shape()`
 - c) `df.data()`
 - d) `df.describe()`
4. Which of the following is used for missing value imputation?
 - a) `df.fillna()`
 - b) `df.dropna()`
 - c) `df.replace()`
 - d) `df.remove()`
5. In Pandas, how can you rename columns?
 - a) `df.columns.rename()`
 - b) `df.rename_columns()`
 - c) `df.rename()`
 - d) `df.change_columns()`

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	c	11	c	21	b
2	b	12	c	22	c
3	a	13	c	23	b
4	a	14	c	24	b
5	c	15	d	25	b



Course Name: Digital Marketing & SEO



Course Overview

This 8-week course (40 sessions, 3 hours each) covers Digital Marketing strategies with a core focus on Search Engine Optimization (SEO) and its integration across various digital channels. The course starts with marketing fundamentals, the evolution of search engines, keyword types, and forms of SEO (On-page, Off-page, Technical, Local). It details Content Strategy (PESO model, funnels) and practical website setup/optimization using Wix. Significant time is devoted to Social Media Marketing (Facebook, Instagram, Twitter, LinkedIn, YouTube) and optimizing these platforms for SEO signals. Paid advertising is covered extensively, including Google Ads (Search, Display, Video, Shopping, Quality Score) and Google Merchant Center. The course also introduces MailChimp for Email Marketing, SMS/WhatsApp marketing, and concludes with essential Google Analytics 4 (GA4) skills for creating properties, events, conversions, and linking data to refine SEO/Ad strategies.

Learning Outcomes

Upon completion of this course, students will be able to:

- Explain the role and importance of Digital Marketing and all major forms of SEO (On-page, Off-page, Technical, Local).
- Develop a digital marketing strategy using content optimization techniques and understand the SEO funnel stages.
- Set up and optimize a website using platforms like Wix, focusing on mobile SEO and site verification.
- Utilize social media platforms (Facebook, Instagram, YouTube) to generate SEO signals and improve brand visibility.
- Create, manage, and optimize Google Ads campaigns, including Search, Display, Video, and Shopping Ads, while monitoring Quality Score.



- Implement email marketing campaigns using MailChimp, including audience setup, forms, and automation, and understand its role in SEO.
- Set up and utilize Google Analytics 4 (GA4) to track website performance, create custom events and conversions, and link data with Google Ads.
- Identify and pursue freelance opportunities related to SEO, content optimization, and analytics projects.

Instructors Guidelines

All 40 sessions are structured as Theory & Lab. Hands-on application is critical, requiring students to execute practical exercises such as using Canva for graphic optimization, setting up Wix SEO, creating Facebook Ads with different objectives, setting up MailChimp campaigns, configuring Google Merchant Center, and installing and configuring GA4. Instructors should also discuss the types of freelancing projects available for each topic.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (Practical Campaigns/SEO Strategy)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Introduction & Fundamentals — Marketing Evolution, Digital Marketing, SEO History, Keywords, Search Engines, AI in SEO
	Day 02	Content & Marketing Strategies — PESO Model, Inbound/Outbound, Marketing Funnels, SEO Strategy, Content Formats, SEO Distribution
	Day 03	Practical Digital Marketing — Social, Ads, Email/WhatsApp Marketing, Content Types (Written/Video/Audio), SEO Jobs, Content Funnel
	Day 04	Tools & Practical Applications — Canva, Video/Audio Tools, Website Audit Tools (Screaming Frog, SEMrush), On-Page SEO Practice
	Day 05	Wix.com & Blogging — Account Setup, Template Editing, Domain Connection, Mobile Optimization, On-Page SEO, Schema, Freelance SEO Jobs
	Outcome	By the end of Week 01, students will be able to:



		<ul style="list-style-type: none"> Define digital marketing and its evolution, with emphasis on SEO's role in 2024–25. Map content types and distribution channels to marketing and SEO funnels. Identify how social, email, and paid ads integrate with SEO strategy. Use tools like Canva and Wix to create and optimize SEO-friendly content and websites. Set up a basic Wix site with on-page SEO elements and understand freelance opportunities in website optimization.
Week 02	Day 01	Social Media Marketing — SMM Calendar, Canva for SEO Graphics, Image/Video SEO, Free Tools, Hashtag Strategy
	Day 02	Facebook Basics — Profile/Page Setup, Privacy, Publishing, SEO Optimization (NAP, Bio, Links, Hashtags)
	Day 03	Facebook Page Management — Roles, Messenger, Tabs, Organic/Paid Reach, Follower Growth Strategies
	Day 04	Facebook Ads Management — Boosting Posts, Ads Manager Setup, Objectives (Traffic), Payment Linking, SEO Impact of Ads
	Day 05	Practical Applications — Hands-on: Design posts in Canva, Create & Optimize Facebook Page, Launch Traffic Campaign
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> Create a social media content calendar aligned with SEO goals. Optimize Facebook profiles and pages for local and organic SEO signals. Manage page settings, roles, and engagement tools for business growth. Set up and launch Facebook ad campaigns targeting traffic and awareness. Execute integrated practical exercises across Canva, Facebook, and Ads Manager.
Week 03	Day 01	Advanced Facebook — Lead Gen Ads, Ad Performance Review, Meta Business Suite Setup, Asset & User Management
	Day 02	Facebook Ads & Meta Tools — Meta Pixel Installation, Event Tracking, Custom/Lookalike Audiences, Retargeting, Ad Library, Insights
	Day 03	Facebook Groups & Projects — Group Creation, Settings, Roles, Freelancing Project Types (Community Management, Moderation)
	Day 04	Instagram Marketing — Account Setup (Business/Creator), Mobile Optimization, Organic Growth, Ads via FB Manager, SEO Signals
	Day 05	Practical Applications — Hands-on: Run Lead Gen Campaign, Configure Meta Business Suite, Set Up Instagram Business Account
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> Launch and analyze lead generation campaigns with SEO-aligned goals. Install and configure Meta Pixel for conversion tracking and audience building. Manage Meta Business Suite for cross-platform asset and user control.



		<ul style="list-style-type: none"> Optimize Instagram profiles and content for discoverability and SEO value. Complete advanced practical setups across Facebook, Instagram, and Meta tools.
Week 04	Day 01	Review: SEO Fundamentals, Content Strategy, Wix/Blogging, Canva, Facebook Page & Ads Setup
	Day 02	Review: Meta Business Suite, Pixel, Audiences, Instagram Optimization, Freelance Project Types
	Day 03	Review: Lead Gen Campaigns, Retargeting, Group Management, Mobile SEO Practices
	Day 04	Practice Quiz + Q&A — Troubleshoot Campaign Errors, Optimize Meta Pixel, Fix Wix SEO Settings
	Day 05	Mid Term Examination (Covers Weeks 01–03: SEO, Content, Social Media, Facebook/Instagram Ads, Meta Tools, Wix, Freelancing Concepts)
	Outcome	<p>By the end of Week 04, students will be able to:</p> <ul style="list-style-type: none"> Demonstrate mastery of core digital marketing and SEO principles. Configure and optimize social media profiles and ad campaigns for SEO value. Use Meta Business Suite and Pixel for cross-channel tracking and audience building. Build and audit basic websites using Wix with SEO best practices. Identify knowledge gaps and solidify foundational concepts through mid-term assessment.
Week 05	Day 01	Twitter Marketing — Account Setup, Professional Switch, Organic Growth, Promoted Tweets, Analytics, SEO Impact, Freelance Projects
	Day 02	LinkedIn Marketing — Profile/Company Page Setup, Groups, Events, Job Posting, Campaign Manager, Lead Generation, SEO Value
	Day 03	YouTube Marketing — Channel Setup, Video Upload, YouTube SEO, TubeBuddy, Analytics, Thumbnails, Descriptions, Watch Time
	Day 04	YouTube & Freelancing — Monetization, Client Channel Management, SEO Growth Strategies, Freelance Project Types
	Day 05	Google Ads Intro — Account Setup, Auction, Quality Score, Campaign Structure, Keyword Research, Landing Pages, Extensions
	Outcome	<p>By the end of Week 05, students will be able to:</p> <ul style="list-style-type: none"> Optimize Twitter, LinkedIn, and YouTube profiles for brand visibility and SEO. Create and manage LinkedIn company pages and use Campaign Manager for lead gen. Apply YouTube SEO techniques using metadata, TubeBuddy, and analytics. Set up Google Ads accounts and understand Quality Score's relation to SEO. Identify freelance opportunities across all major social and search platforms.



Week 06	Day 01	Google Ads Campaigns — Search Ads Creation, Keyword Match Types, Ad Copy, Negative Keywords, Dashboard Walkthrough
	Day 02	Display & Video Ads — Formats, Best Practices, Creation, Reporting, Performance Analysis
	Day 03	Google Merchant Center — Account Setup, Website Verification, Shipping, Single/Multiple Product Upload (Google Sheets)
	Day 04	Merchant Center Advanced — Product Specs, Dashboard, Access Mgmt, Shopping Ads Creation, Freelance Projects
	Day 05	Email Marketing — MailChimp Setup, Audience Building, Signup Forms, Surveys, Segmentation, SEO Integration (UTM, Landing Pages)
	Outcome	<p>By the end of Week 06, students will be able to:</p> <ul style="list-style-type: none"> • Create and manage Google Search, Display, and Video ad campaigns. • Set up Google Merchant Center and launch Shopping Ads for e-commerce. • Build targeted email lists and campaigns using MailChimp with SEO tracking. • Understand how paid ads complement and inform organic SEO strategy. • Execute hands-on projects across Google Ads, Merchant Center, and MailChimp.
Week 07	Day 01	Advanced MailChimp — Email Templates, Campaign Types, Landing Pages, Embedded Forms, Report Analysis
	Day 02	MailChimp Integration — Customer Journeys, Postcards, Creative Assistant, Social/Website/Ad Integrations, SEO Projects
	Day 03	SMS Marketing — Platform Setup, Business Configuration, Campaign Creation, Compliance, SEO Synergy
	Day 04	WhatsApp Marketing — Business Account Setup, Settings, Campaign Creation, Broadcast Lists, CTA Integration
	Day 05	Review & Integration — Recap MailChimp, SMS, WhatsApp; Hands-on: Build Cohesive Cross-Channel Campaign; Final Q&A
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> • Design automated email journeys and landing pages using MailChimp. • Integrate email, SMS, and WhatsApp marketing for unified customer experiences. • Set up and manage SMS and WhatsApp Business accounts for marketing. • Apply SEO principles to cross-channel campaigns for tracking and optimization. • Deliver a complete, integrated digital marketing campaign across multiple platforms.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why SEO & Digital Marketing = Business Opportunities”
	Day 02	Idea to Business — Brainstorm Marketable Skills (SEO Audits, Google Ads, Social Media Growth), Map to Services, Write 3 Business Ideas + Peer Feedback



	Day 03	Building Teams & Communication — Role Distribution (SEO, Content, Ads, Analytics), Digital Tools (Slack, Trello, Google Workspace), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for Marketers — LinkedIn Optimization, Portfolio (Case Studies, Reports), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: HTML/CSS/JS, SEO, Google Ads, Social Media, Email/SMS Marketing, Analytics, Local Storage + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> • Define digital entrepreneurship through the lens of SEO and digital marketing professionals. • Convert technical skills (on-page SEO, campaign management, analytics, content strategy) into sellable freelance services or scalable businesses. • Develop 3 viable business ideas — e.g., “Local SEO for Pakistani SMEs”, “Google Ads for E-commerce Stores”, “Social Media Growth Packages”. • Build collaborative marketing teams and pitch data-driven strategies using professional tools. • Create a standout LinkedIn profile and online portfolio showcasing campaign results, audit reports, or growth metrics. • Set up and optimize Fiverr/Upwork profiles with compelling gigs like “I Will Rank Your Website on Google” or “I Will Manage Your Meta Ads”. • Understand how to land first clients, manage feedback, and scale into a digital marketing agency. • Demonstrate mastery of core digital marketing and technical SEO concepts — from keyword research to conversion tracking. • Leave the course with a personal roadmap to launch a freelance career or digital marketing business in Pakistan or globally.

Freelance-Style Assignment

Assignment Title: Develop a Comprehensive Digital Marketing Strategy for a Small Business

Total Marks: 100 (rubric below)

Deliverable Format: PDF or Word document (minimum 1500 words), plus any visuals (images, diagrams, Google Sheet, or CSV for calendar). Include sources if used.

Scenario (freelance brief)

You are hired by a local small business (choose one — café, boutique, fitness studio, online store). The client wants an integrated digital marketing plan to increase awareness, drive



traffic, and generate leads/sales in 3 months. They also want practical assets and a data-driven measurement plan.

Tasks (deliverables)

- 1. Executive Summary (5%)**
 - 150–250 words summarizing goals, target audience, core strategy, and KPIs.
- 2. Content Marketing Strategy (20%)**
 - Explain why "Content is King".
 - Identify 3 content types you'll prioritize (e.g., blog articles, short videos, email newsletters).
 - Provide 6 content ideas (titles/topics) and a content funnel mapping (awareness → consideration → conversion).
 - Describe SEO practices per content type (written, image, video, audio).
- 3. Social Media Plan & 1-Week Calendar (20%)**
 - Choose 2 primary platforms and justify (audience + goals).
 - Provide optimization checklist for profiles (SEO elements, bios, CTAs).
 - Produce a **detailed 1-week content calendar** (day, platform, post type, copy headline, assets needed, CTA, primary hashtag, UTM). Use a small table or paste a CSV.
- 4. Paid Ads Strategy (15%)**
 - Propose one Google Ads search campaign and one Facebook/Instagram campaign: objectives, audience targeting, budgets, bidding strategy, ad creatives (2 variations each), landing page requirements.
 - Include proposed KPIs for each campaign.
- 5. Email/SMS/WhatsApp Campaign (10%)**
 - Describe sequence for a lead nurture funnel (welcome, nurture, conversion).
 - Example subject lines, preview text, and a short email body for the first 2 emails.
 - How you'll integrate MailChimp (or similar) with website and Meta Pixel.
- 6. Website & SEO Optimization (10%)**
 - Key on-page items to audit and fix (meta titles, headings, structured data, Core Web Vitals).
 - Technical SEO checklist and two recommended audit tools.
 - A short plan to optimize product pages (if e-commerce) or service pages.
- 7. Analytics & Measurement Plan (10%)**
 - Google Analytics setup recommendations (GA4 events, conversions, audiences).
 - List the main metrics to track weekly and monthly.
 - Describe one dashboard (example columns) and how you'll use data to optimize.
- 8. Freelance Deliverables & Pricing (5%)**
 - List deliverables you will provide as a freelancer (e.g., 8 posts + 5 creatives + 2 email templates + campaign setup).
 - Provide a mock price (package rate) and timeframe.
- 9. Freelance Opportunities & Skills Mapping (5%)**



- List 3 freelance job types the client can outsource (e.g., Social Media Manager, SEO Specialist, Email Marketer) — include short role descriptions and expected deliverables.

10. Appendix: Assets & Implementation Notes

- Include 1 sample post creative (image mockup or description), sample UTM link, and example GA4 event naming convention.

Grading Rubric (detailed)

Criteria	Excellent (A)	Good (B)	Satisfactory (C)	Needs Improvement (D)	Weight
Executive Summary	Clear, concise, aligns with client goals and KPIs	Mostly clear, minor missing links	General summary, lacks specifics	Vague or missing	5%
Content Strategy	Deep insight, strong SEO integration, 6 high-quality ideas, funnel mapped	Good ideas, SEO ok, funnel present	Basic ideas, limited SEO	Poor or irrelevant content	20%
Social Media Plan & Calendar	Strong platform rationale, full optimization checklist, practical 1-week calendar with UTM & CTAs	Good calendar and checklist, some missing details	Calendar exists but lacks depth	Missing calendar or poor planning	20%
Paid Ads Strategy	Clear campaigns, audiences, budgets, creatives and KPIs with optimization plan	Good structure, minor gaps	Basic ad plan, lacks KPIs or budgets	No meaningful ad plan	15%
Email/SMS/Whats App	Clear nurture funnel, good copy examples, integration plan	Functional funnel and copy, some integration notes	Basic sequence only	Missing or unusable	10%



Website & SEO	Thorough checklist, tools recommended, product page optimizations	Good checklist, minor missing technical items	Basic SEO items listed	Little to no SEO value	10%
Analytics & Measurement	Practical GA4 events, conversions, dashboard sample, optimization actions	Good metrics and dashboard idea	Metrics listed but shallow	Not measurable	10%
Deliverables & Pricing	Reasonable package, clear timeline and deliverables	Good package, minor clarity issues	Vague pricing or timeline	Missing or unrealistic	5%
Freelance Opportunities	Clear roles & deliverables, realistic recommendations	Good roles listed	Basic list only	Missing or irrelevant	5%
Presentation & Sources	Well-structured, tables/diagrams included, sources cited	Good presentation, minor formatting issues	Acceptable but messy	Unclear and poorly formatted	included across criteria

Digital Marketing — Quiz

30-Question MCQ Quiz

Total Marks: 5

Instructions: Choose the correct option (a, b, c, or d).

1. What is considered the "king" in Digital Marketing?
 - a) Ads
 - b) Content
 - c) SEO
 - d) Social Media
2. Which of the following is NOT a type of written content?
 - a) Blogs
 - b) Infographics



- c) Emails
- d) Newsletters
- 3. Which platform is commonly used for graphic design in digital marketing?
 - a) Canva
 - b) Wix
 - c) Google Ads
 - d) Facebook
- 4. SEO optimization of images includes:
 - a) Alt text
 - b) File naming
 - c) Both A and B
 - d) None
- 5. Which tool is used to audit websites for SEO issues?
 - a) Canva
 - b) Screaming Frog
 - c) MailChimp
 - d) WhatsApp

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	b	11	a	21	b
2	b	12	a	22	d
3	a	13	c	23	b
4	c	14	a	24	b
5	b	15	a	25	a

Course Name: E-Commerce



Course Overview

This 8-week course (40 sessions, 3 hours each) provides an in-depth exploration of E-Commerce, ranging from technological foundations to advanced digital marketing execution. Initial topics cover E-Commerce models (B2B, B2C), global trends, and the technological building blocks (Internet, Web, Mobile). Students learn business strategies, including using SWOT analysis and Porter's 5 Forces Model, platform selection (Shopify vs WooCommerce), and building Direct-to-Consumer (DTC) brands. The curriculum covers critical operations: Product Selection, Pricing, Inventory Management (JIT, Dropshipping, SKU), Order Management Systems (OMS), Payment Gateways and Security, and Customer Experience (CX) through personalization and CRM tools. A significant portion of the course integrates Digital Marketing, including SEM, SEO, Google Ads (Search, Shopping), Meta Advertising (Facebook/Instagram), and specialized platforms like TikTok and YouTube Marketing.

Learning Outcomes

Upon completion of this course, students will be able to:

- Analyze and evaluate different E-Commerce models (B2B, B2C, C2C, C2B) and global trends.
- Apply strategic business analysis tools like SWOT and Porter's 5 Forces to E-Commerce scenarios.
- Compare and select appropriate E-Commerce platforms (Shopify, WooCommerce, Magento) based on business needs.
- Implement effective strategies for product selection, pricing, and inventory management (including dropshipping and SKU management).



- Ensure secure online transactions by understanding payment gateways, fraud detection, and security best practices.
- Enhance Customer Experience (CX) through data analytics, personalized product recommendations, and CRM tools.
- Execute and manage Search Engine Marketing (SEM) and SEO components, including Google Ads setup, keyword research, and bidding strategies.
- Set up and run effective paid advertising campaigns across Meta (Facebook/Instagram) and TikTok, optimizing for different ad formats and objectives.
- Utilize Google Analytics to track key E-Commerce metrics, user behavior, and conversions.

Instructors Guidelines

The course requires a combination of Theory Plus Class Activity (Lab). Instructors should utilize self-case studies (e.g., SWOT analysis for a new startup). Practical sessions must involve platform setup (e.g., Daraz or major platforms) and the hands-on creation of digital marketing campaign components, including ad copy, bidding strategies, and Google Merchant Center setup.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (E-Commerce Strategy/Platform Setup/Campaign Execution)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Overview of E-Commerce — Definition, Evolution, Models (B2B, B2C, C2C), Key Players, Global Trends, Benefits vs Traditional Commerce
	Day 02	E-Commerce Business Strategies — Business Models, B2C & B2B Deep Dive, Impact on People, Strategy, and Practices



	Day 03	Technology Infrastructure — Website Components, UX/UI Importance, Legal Aspects (GDPR, Taxes), Web Tech (HTTP, DNS), Cloud Computing
	Day 04	E-Commerce Platforms — Overview: Shopify, WooCommerce, Wix, Magento — Platform Setup, Hosting, Security, Backups
	Day 05	Shopify vs WooCommerce — Dashboard, Themes, Product Mgmt, Payments, Checkout, Shipping, Apps, Analytics, Support, Hosting
	Outcome	<p>By the end of Week 01, students will be able to:</p> <ul style="list-style-type: none"> • Define e-commerce and identify its core models and global trends. • Differentiate between B2B, B2C, C2C, and understand their strategic implications. • Explain the technological backbone of e-commerce websites and legal compliance needs. • Compare major platforms (Shopify vs WooCommerce) across key operational dimensions. • Set up a basic e-commerce store structure with awareness of hosting, security, and UX.
Week 02	Day 01	Business Models — Subscription, DTC, Marketplaces (Amazon, Etsy, Daraz), Live Stream Shopping, TikTok Shop
	Day 02	Environmental Analysis — SWOT & Porter's 5 Forces Applied to E-Commerce Startups (Self Case Study)
	Day 03	Consumer Behavior & Branding — Stimuli-Response Model, Decision Process, Diffusion of Innovation, Branding vs Product, Brand Models
	Day 04	Building a DTC Brand — Storytelling, Identity, Customer Acquisition/Retention, Data Analytics, Personalization, Logistics, Policies
	Day 05	E-Commerce Audit — Competitor Analysis Tools (SEMrush, Ahrefs), Success/Failure Metrics, Strategic Benchmarking
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> • Evaluate and select appropriate e-commerce business models for different markets. • Conduct SWOT and Porter's analysis to assess competitive positioning. • Understand consumer decision-making and apply branding models to digital products. • Develop a DTC brand strategy including customer experience, logistics, and data use. • Audit competitors and extract actionable insights using digital tools.
Week 03	Day 01	Product Selection & Catalog Mgmt — Market Research, Niche Identification, Lifecycle, Sourcing, Descriptions, Images, Reviews
	Day 02	Pricing Strategies — Types of Pricing, Discounts, Event Pricing, Psychological Pricing, Competitive Pricing Frameworks
	Day 03	Inventory Management — JIT, Dropshipping, Warehousing, Software Tools, SKU Mgmt, Dynamic Pricing, G-local Strategies
	Day 04	Order Management Systems (OMS) — Core Functions, Multi-Channel Integration, Automation, Analytics, Security, Implementation Challenges



	Day 05	OMS & Supply Chain — Role in Efficiency, AI/Automation/Blockchain, Forecasting, Cloud vs On-Premise Solutions
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> Identify profitable products using market research and differentiation strategies. Apply dynamic and psychological pricing models to maximize conversions. Manage inventory using modern techniques (JIT, dropshipping) and software tools. Implement and optimize Order Management Systems for multi-channel operations. Integrate OMS with supply chain for forecasting, automation, and scalability.
Week 04	Day 01	Review: E-Commerce Models, Platform Comparisons, DTC Strategy, SWOT/Porter's Analysis
	Day 02	Review: Product Sourcing, Pricing, Inventory, OMS, Supply Chain Integration
	Day 03	Review: Competitor Audits, Consumer Behavior, Branding, Catalog Management
	Day 04	Practice Quiz + Q&A — Case Study Simulations, Platform Setup Challenges, Pricing Scenarios
	Day 05	Mid Term Examination (Covers Weeks 01–03: Models, Platforms, Strategy, Consumer Behavior, Product, Pricing, Inventory, OMS)
	Outcome	<p>By the end of Week 04, students will be able to:</p> <ul style="list-style-type: none"> Demonstrate comprehensive understanding of e-commerce fundamentals and business models. Compare and evaluate platforms and operational strategies. Apply analytical frameworks (SWOT, Porter's) to real-world scenarios. Design product, pricing, and inventory strategies for online stores. Prepare for advanced topics in payments, personalization, analytics, and marketing.
Week 05	Day 01	Payment Gateways & Security — Types, Features, Fraud Prevention, PCI Compliance, SSL, Tokenization
	Day 02	Payment Trends & CX — Emerging Methods (Wallets, BNPL), Impact on UX, Best Practices, Future of Secure Payments
	Day 03	Personalization — Role in E-Commerce, Types (Product, Content, Behavioral), Data Collection, Recommendation Engines, Challenges
	Day 04	Case Studies — Amazon, eBay, Alibaba, TikTok Shop, Daraz — How Personalization Drives Sales & Loyalty
	Day 05	Customer Experience (CX) — Components, CRM Systems, Feedback Loops, Tech (Chatbots, AI, AR/VR), Journey Mapping
	Outcome	<p>By the end of Week 05, students will be able to:</p> <ul style="list-style-type: none"> Implement secure, user-friendly payment systems with fraud prevention. Leverage personalization engines to increase conversion and retention.



		<ul style="list-style-type: none"> Analyze and replicate successful personalization strategies from global leaders. Design end-to-end customer experiences using CRM and emerging tech. Measure CX success through feedback, analytics, and behavioral data.
Week 06	Day 01	E-Commerce Analytics — Key Metrics (CTR, CVR, AOV, LTV), Web & Product Analytics, Google Analytics Setup
	Day 02	M-Commerce — Mobile Marketing Features, Tools, Campaign Setup, Measurement, Optimization
	Day 03	Location-Based Marketing — Growth Trends, Platforms, Campaign Design, Geo-Targeting, ROI Measurement
	Day 04	Marketplace Analysis — Micro/Macro Environment, Digital Media Audit, Traffic Sources, Industry Ranking Tools
	Day 05	Digital Consumer Analysis — Customer Journey Mapping, RACE Model, SOSTAC Framework, Persona Development
	Outcome	By the end of Week 06, students will be able to: <ul style="list-style-type: none"> Track and interpret key e-commerce KPIs using analytics dashboards. Design and measure mobile and location-based marketing campaigns. Conduct digital media audits and competitor benchmarking. Map customer journeys and apply strategic models (RACE, SOSTAC). Build data-driven customer personas for targeted marketing.
Week 07	Day 01	Digital Marketing Comms — Campaign Goals, Segmentation, Value Prop, Persona, Big Idea, Media Mix, Budgeting
	Day 02	SEM & SEO Intro — Definitions, Differences, On-Page/Technical/Off-Page SEO, Google Search Console, Keyword Tools
	Day 03	Google Ads & SEM Mechanics — Auction Model, Bidding (CPC/CPA/ROAS), Ad Rank, Quality Score, Ad Types (Search/Display/Video)
	Day 04	Campaign Setup — Account Creation, Keyword Research (Match Types, Negatives), Ad Copy Writing, Landing Page Optimization
	Day 05	Optimization & Analytics — Ad Extensions, A/B Testing, Conversion Tracking, Google Analytics Integration, Merchant Center Intro
	Outcome	By the end of Week 07, students will be able to: <ul style="list-style-type: none"> Plan integrated digital marketing campaigns with clear goals and budgets. Differentiate and apply SEO and SEM strategies for visibility and traffic. Set up, manage, and optimize Google Ads campaigns with proper keyword targeting. Use analytics and A/B testing to improve campaign ROI. Integrate Google Merchant Center for product feed and shopping ads.



Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why E-Commerce is the Future of Business”
	Day 02	Idea to Business — Brainstorm Marketable E-Commerce Skills (Store Setup, SEO, Ads, Analytics), Map to Services, Write 3 Business Ideas + Peer Feedback
	Day 03	Building Teams & Communication — Role Distribution (Marketer, Analyst, Ops, Designer), Digital Tools (Slack, Trello, Zoom), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for E-Commerce Pros — LinkedIn Optimization, Portfolio (Shopify Store/Case Studies), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: Models, Platforms, Strategy, Consumer Behavior, Product, Pricing, Inventory, OMS, Payments, Personalization, SEM, Analytics + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> • Define digital entrepreneurship through the lens of e-commerce professionals. • Convert technical skills (store setup, Google Ads, analytics, inventory systems) into sellable freelance services or scalable businesses. • Develop 3 viable business ideas — e.g., “Shopify Store Factory”, “Google Ads for Daraz Sellers”, “E-Commerce Audit & Optimization”. • Build collaborative teams and pitch e-commerce solutions using professional communication tools. • Create a standout LinkedIn profile and online portfolio showcasing live stores, campaign results, or analytics dashboards. • Set up and optimize Fiverr/Upwork profiles with compelling gigs like “I Will Launch Your Shopify Store” or “I Will Optimize Your Google Shopping Ads”. • Understand how to land first clients, manage feedback, and scale into an e-commerce consultancy or agency. • Demonstrate mastery of core e-commerce concepts — from platform selection to SEM to customer experience. • Leave the course with a personal roadmap to launch a freelance e-commerce career or digital business.



E-Commerce Freelance Assignment

Assignment Title:

Build and Analyze a Basic E-Commerce Business Model

Objective:

Apply your understanding of e-commerce business models, platforms, and digital marketing tools to create a small-scale e-commerce project outline, and analyze its key components.

Assignment Tasks

Part 1: Choose Your E-Commerce Model (15 Marks)

Select one e-commerce business model (B2B, B2C, C2C, or C2B). Explain:

- The model you chose and why it suits your business idea.
- Describe the target customers and key players involved.
- Identify one real-world company using this model and briefly describe their approach.

Part 2: Platform Selection and Setup (20 Marks)

- Choose one e-commerce platform (Shopify, WooCommerce, Magento, Wix, or Square Space).
- Explain why this platform fits your business needs (consider budget, scalability, ease of use).
- Describe the basic setup steps you would take to launch your online store (including hosting, security, and backup considerations).

Part 3: Product Selection and Marketing Strategy (30 Marks)

- Select 3 products/services to sell. Explain why you chose these products (market research, niche, consumer needs).
- Develop a basic pricing strategy for your products.
- Outline your marketing strategy covering:
 - Digital marketing channels you will use (e.g., social media, SEM, email marketing).
 - Key messaging and branding concepts.
 - How you will personalize the customer experience (e.g., recommendations, customer service).

Part 4: Payment Gateway and Security (15 Marks)

- Identify the payment gateways you will use.
- Explain key security features needed to protect customer data and transactions.
- Discuss any legal considerations (like GDPR compliance or tax rules) relevant to your online store.



Part 5: Competitor Analysis and SWOT (20 Marks)

- Select two competitors in your niche.
- Conduct a SWOT analysis for your e-commerce business compared to these competitors.
- Suggest at least three strategies to gain a competitive advantage based on your analysis.

Submission Requirements:

- Length: Minimum 1500 words.
- Format: PDF or Word document.
- Include relevant screenshots or diagrams (optional but encouraged).
- Cite any external resources used.

Evaluation Criteria:

Criteria	Marks
Clarity and relevance of business model selection	15
Justification and explanation of platform setup	20
Product selection and marketing strategy	30
Payment gateway and security insights	15
Competitor analysis and SWOT strategy	20



E-Commerce Quiz: 30 MCQs

1. Which of the following is NOT a common E-Commerce business model?
 - a) B2B
 - b) B2C
 - c) P2P
 - d) ATM
2. What does B2C stand for?
 - a) Business to Consumer
 - b) Business to Company
 - c) Buyer to Customer
 - d) Business to Client
3. Which platform is primarily used for C2C E-Commerce?
 - a) Amazon
 - b) eBay
 - c) Alibaba
 - d) Shopify
4. What is the primary advantage of E-Commerce over traditional commerce?
 - a) Lower prices always
 - b) No need for marketing
 - c) 24/7 availability
 - d) Only local customers
5. Which technology is essential for running an E-Commerce website?
 - a) Blockchain
 - b) Internet
 - c) Satellite TV
 - d) Radio

Answer Key:

Q#	Answer	Q#	Answer	Q#	Answer
1	d	11	b	21	b
2	a	12	b	22	a
3	b	13	a	23	a
4	c	14	a	24	c
5	b	15	b	25	b



Course Name: Graphic Designing & UI/UX Design



Course Overview

This 8-week Graphic Designing course provides comprehensive training in design fundamentals, essential software, and professional application. The early weeks establish a foundation by covering design elements (Line, Shape, Color, Space) and principles (Balance, Contrast, Alignment). Students gain proficiency in industry-standard software: Adobe Photoshop (photo editing, retouching, color adjustments, layers, masks) and Adobe Illustrator (vector vs. raster, Pen Tool, creating logos and icons), alongside tools like Canva. Mid-course topics focus on advanced concepts like Color Theory (RGB vs. CMYK) and Typography (Hierarchy, Readability). The curriculum addresses professional layout design using Adobe InDesign (grids, brochures, magazine covers), and detailed steps for creating a complete Brand Identity Package. The course concludes with an introduction to Web Design Basics (UX/UI, responsive design, Figma/XD) and a Capstone Final Project centered on developing a full design package and building a professional portfolio website.

Learning Outcomes

Upon completion of this course, students will be able to:

- Understand and apply fundamental design elements (color, shape, line) and principles (balance, contrast, proportion).
- Create simple design assets like posters and color palettes using tools like Canva.
- Use Adobe Photoshop to perform photo editing, retouching, color correction, and utilize layers and masks for complex compositions.
- Utilize Adobe Illustrator to design scalable vector graphics, including professional logos and icon sets.



- Apply principles of layout design, grids, and typography hierarchy, primarily using Adobe InDesign for marketing materials (flyers, brochures).
- Develop a strong brand identity, including logo design principles, color scheme, typography guidelines, and create a complete branding guidelines document.
- Apply UX/UI fundamentals to create wireframes and responsive layout mockups for web design, using tools like Figma or Adobe XD.
- Compile, organize, and present finalized design work in a professional portfolio website.

Instructors Guidelines

The course is heavily structured around Practical Activities (Hands-on Labs). Instructors must ensure access to and proficiency training in Adobe Photoshop, Illustrator, and InDesign. Time allocation must be made for the final project development (Branding, Marketing Campaign, or Web Design Prototype) and dedicated sessions for Client Presentation Skills and Portfolio Development.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (Final Project/Portfolio Development)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Design a Brand Color Palette — Understand Brand, Define Objectives, Research Inspirations
	Day 02	Develop & Test Color Combinations, Finalize Palette, Create Specifications
	Day 03	Create a Brand Color Guide — Document Usage, Contrast, Accessibility, Export Formats
	Day 04	Create a Typographic Poster — Define Purpose, Choose Fonts, Apply Hierarchy
	Day 05	Design Enhancements, Fine-Tuning, Export Final Poster for Print/Digital Use
	Outcome	By the end of Week 01, students will be able to:



		<ul style="list-style-type: none"> Define brand personality and translate it into a functional color palette. Research, test, and finalize harmonious color combinations. Create professional brand color guides with usage specifications. Apply typographic hierarchy and font pairing in poster design. Export polished design assets for real-world use.
Week 02	Day 01	Introduction to Photoshop — Workspace, Tools, Layers, File Management
	Day 02	Photo Editing — Cropping, Retouching, Color Correction, Lighting Adjustments
	Day 03	Image Composition — Blending, Masking, Layer Effects, Basic Manipulation
	Day 04	Practical: Retouch a Portrait — Clean Skin, Enhance Features, Color Grade
	Day 05	Practical: Create a Social Media Banner — Use Layers, Masks, Text, and Export Assets
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> Navigate Photoshop’s interface and manage layers effectively. Retouch and enhance portrait photos professionally. Composite images using masks and blending modes. Design and export social media banners with visual hierarchy. Apply non-destructive editing techniques for flexible workflows.
Week 03	Day 01	Vector vs. Raster Graphics — Core Differences, Use Cases, File Formats
	Day 02	Illustrator Workspace — Artboards, Tools, Layers, Preferences Setup
	Day 03	Pen Tool Mastery — Drawing Shapes, Paths, Anchor Points, Curves
	Day 04	Typography & Shapes in Illustrator — Working with Text, Outlines, Compound Paths
	Day 05	Logo & Icon Fundamentals — Simplicity, Scalability, Versatility in Vector Design
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> Differentiate between vector and raster graphics and choose appropriately. Set up and navigate Adobe Illustrator efficiently. Use the Pen Tool to create precise vector shapes and paths. Combine text and shapes to design scalable logos and icons. Understand core principles of vector-based branding assets.
Week 04	Day 01	Review: Color Theory, Typography, Photoshop Retouching, Layer Masks
	Day 02	Review: Illustrator Tools, Pen Tool, Logo Design Principles, Vector Workflow
	Day 03	Review: Layout Composition, Branding Elements, Export Settings



	Day 04	Practice Quiz + Q&A Session — Troubleshoot Common Design Issues
	Day 05	Mid Term Examination (Covers Weeks 01–03: Color, Typography, Photoshop, Illustrator, Logo/Icon Basics)
	Outcome	By the end of Week 04, students will be able to: <ul style="list-style-type: none"> • Demonstrate mastery of foundational design principles. • Apply Photoshop and Illustrator tools to solve real design problems. • Create and export professional-grade color palettes, posters, and icons. • Prepare for advanced topics in layout, branding, and web design. • Identify strengths and areas for improvement through mid-term assessment.
Week 05	Day 01	Principles of Layout — Grids, Alignment, Whitespace, Visual Flow
	Day 02	Combining Text & Images — Balance, Contrast, Hierarchy, Readability
	Day 03	Introduction to Adobe InDesign — Workspace, Master Pages, Text Frames
	Day 04	Design a Flyer/Brochure — Layout Concept, Visual Style, Export for Print/Digital
	Day 05	Design a Magazine Cover — Image Selection, Typography, Layout Refinement
	Outcome	By the end of Week 05, students will be able to: <ul style="list-style-type: none"> • Apply layout design principles to create balanced, readable compositions. • Combine imagery and typography effectively for marketing materials. • Use Adobe InDesign to design multi-page or single-page layouts. • Export print-ready and digital-ready files with correct specs. • Present design work with professional polish and intentionality.
Week 06	Day 01	What is Branding? — Elements: Logo, Colors, Fonts, Voice, Guidelines
	Day 02	Logo Design Principles — Simplicity, Memorability, Scalability, Versatility
	Day 03	Create a Brand Identity Package — Logo, Color Palette, Typography System
	Day 04	Design Brand Assets — Business Cards, Letterheads, Social Media Kits
	Day 05	Create Branding Guidelines — Logo Usage, Color Codes, Typography Rules, Spacing
	Outcome	By the end of Week 06, students will be able to: <ul style="list-style-type: none"> • Define and articulate a brand’s core identity and values. • Design a complete, cohesive brand identity system. • Apply branding across multiple touchpoints (print, digital, social). • Develop comprehensive brand guidelines for client handoff.



		<ul style="list-style-type: none"> Present branding work as a professional deliverable package.
Week 07	Day 01	Introduction to Web Design — UX/UI Fundamentals, User Journey, Wireframing
	Day 02	Responsive Design — Mobile, Tablet, Desktop Layouts, Breakpoints
	Day 03	Web Typography & Colors — Readability, Accessibility, System Fonts, Web-Safe Palettes
	Day 04	Tools: Figma/Adobe XD — Creating Interactive Prototypes, Components, Auto-Layout
	Day 05	Practical: Design a Responsive Homepage — Wireframe, Mockup, Prototype, Test
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> Understand core UX/UI principles for digital products. Design responsive layouts that adapt across devices. Choose and apply web-friendly typography and color systems. Use Figma or Adobe XD to prototype interactive interfaces. Deliver a clickable homepage prototype with visual and functional polish.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why Design Skills = Business Opportunities”
	Day 02	Idea to Business — Brainstorm Marketable Design Skills (Logo, UI, Branding, etc.), Map to Services, Write 3 Business Ideas + Peer Feedback
	Day 03	Building Teams & Communication — Role Distribution (Designer, Developer, Marketer), Digital Tools (Figma, Slack, Zoom), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for Designers — LinkedIn Optimization, Portfolio Setup (Behance/Dribbble), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: Photoshop, Illustrator, Layout, Branding, UI/UX + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> Define digital entrepreneurship through the lens of design professionals. Convert design skills (branding, UI, illustration) into sellable freelance services or products. Develop 3 viable business ideas tailored to the creative industry. Build collaborative teams and pitch design projects using professional communication tools. Create a standout LinkedIn profile and online portfolio (Behance/Dribbble). Set up and optimize Fiverr/Upwork profiles with compelling gigs, thumbnails, and keywords. Understand how to land first clients, manage feedback, and scale into an agency.



		<ul style="list-style-type: none"> • Demonstrate mastery of core graphic and UI/UX design tools and principles. • Leave the course with a personal roadmap to launch a freelance design career or digital creative business.
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Graphics & UI/UX Assignment

Title: Freelance UI/UX + Branding Project (10 Marks / \$10)

Freelance Scenario:

You have been hired by a **small startup** (e.g. a local café, boutique, or personal brand) to design their **brand identity** and a **responsive landing page prototype**. The client expects you to deliver:

- A logo
- Brand color palette + typography guidelines
- A responsive homepage mockup/wireframe + prototype
- Client presentation and guidelines

This simulates a real freelance design engagement.

Assignment Tasks:

1. Brand Identity Design (3 marks)

- Choose or imagine the client (café, startup, personal brand).
- Design a **logo** (vector) using Illustrator or similar, applying shape, alignment, and simplicity principles.
- Create a **brand color palette** (3–5 colors) — provide hex codes and usage rules.
- Select **primary and secondary fonts** and define hierarchy (e.g. heading, body, accent).
- Prepare a **mini style guide** page (logo usage, color rules, font usage) for client.

Deliverable: Logo file (vector or high-res), style guide page PDF.

2. Wireframe & Prototype (3 marks)

- Sketch a **wireframe** (low-fidelity) of the landing/homepage (desktop + mobile).
- Using a prototyping tool (Figma, Adobe XD, Sketch, or similar), build a **clickable prototype** of the page.
 - Include header, hero section, about, features, call to action.
 - Make it responsive (desktop & mobile view).
- Add navigation between sections so it can be clicked through.

Deliverable: Wireframe images + prototype link or exported prototype.



3. High-Fidelity Mockup & UI Design (2 marks)

- Based on the wireframe and brand identity, design a **high-fidelity visual mockup** (desktop and mobile).
- Use the brand colors, typography, imagery.
- Include visual hierarchy, whitespace, alignment, and responsive design considerations.
- Export mockups as PNG or PDF.

Deliverable: Mockup files (desktop + mobile views).

4. Client Presentation & Report (2 marks)

- Prepare a **one-page client report / presentation** including:
 - Brand identity rationale (why colors, logo, fonts)
 - Screenshot / images of wireframe, prototype, and final mockups
 - Usability considerations and responsive design decisions
 - Next steps: how client or developer can implement this design (assets, specs)
- Include a simple **style specs page** (margins, grid, spacing, colors) for dev handoff.

Deliverable: PDF presentation or Word document.

Bonus: Source Files & Version Control (1 mark)

- (0.5) Provide full source files (e.g. Figma file, .ai, .xd files).
- (0.5) Use version control or file version history (e.g. Figma versioning or Git) and include README notes.

Submission Requirements:

- A compressed folder or repo containing:
 - Logo files (vector / high-res)
 - Style guide PDF
 - Wireframes (images)
 - Prototype link or exported prototype
 - Mockup images (desktop & mobile)
 - Client presentation / report
 - Source / design files (bonus)
 - README/instructions
- Prototype should be shareable (public link) or delivered as interactive HTML.

Evaluation Rubric:

Task	Marks
Brand Identity Design	3



Wireframe & Prototype	3
High-Fidelity Mockup & UI	2
Client Presentation & Report	2
Bonus: Source Files & Versions	1 (0.5 + 0.5)
Total	10

Estimated Time to Complete: 10–15 hours

This assignment gives students a **realistic freelance-style deliverable** combining branding, UI/UX prototyping, responsive design, and client communication.

Graphics & UI/UX Quiz

Total Marks: 5

Instructions: Choose the correct option (a, b, c, or d).

Questions:

1. What is one of the primary roles of “elements” in design?
 - a) To define the software used
 - b) To create form and structure (e.g. line, shape, color)
 - c) To manage user accounts
 - d) To control network traffic
2. Which principle emphasizes equal visual weight on both sides of a design?
 - a) Contrast
 - b) Proportion
 - c) Alignment
 - d) Balance
3. RGB color model is typically used for designs intended for:
 - a) Printing
 - b) Web / digital displays
 - c) Signboards
 - d) Fabric
4. CMYK color model is primarily used for:
 - a) Digital screens
 - b) Print media
 - c) Audio design
 - d) Video only
5. In typography, “hierarchy” means:
 - a) All text in the same size
 - b) Creating emphasis among text elements (headings, body)
 - c) Only using one font
 - d) Ignoring readability

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	b	11	c	21	b
2	d	12	b	22	b
3	b	13	b	23	c
4	b	14	b	24	b
5	b	15	c	25	b

Course Name: Java



Course Overview

This 8-week Java programming course (15 hours per week, split 6 hours Theory, 9 hours Practical) focuses on mastering Object-Oriented Programming (OOP) concepts within the Java language. The curriculum starts with foundational topics: defining Java, its architecture, the role of the Java Virtual Machine (JVM), and environment setup (JDK and IDE). Subsequent weeks systematically cover programming basics (Tokens,



Control Structures, Loops), the detailed concepts of Class and Object Relationships (Association, Aggregation), Encapsulation (Access Modifiers, Overloading, References), Inheritance (Super/Subclass, Method Overriding), and Polymorphism (Static, Dynamic, Upcasting, Downcasting). The course progresses to advanced topics including Abstract Classes and Interfaces, Graphical User Interface (GUI) implementation with layouts, and concludes with crucial enterprise skills: File Handling, JDBC (Java Database Connectivity), Exception Handling (try/catch), and Threading (Synchronization, Deadlock).

Learning Outcomes

Upon completion of this course, students will be able to:

- Set up the Java environment and explain the Java Architecture, JVM, and the role of Bytecode.
- Implement basic programming constructs, including variables, control structures (if/switch), and various loops (while, for).
- Apply the core OOP tenets: define classes and objects, establish class relationships (Association, Aggregation), and implement methods.
- Implement Encapsulation using access modifiers (public, private, protected) and understand method and constructor overloading.
- Utilize Inheritance (extends, super, Multilevel Hierarchy) and demonstrate Polymorphism (method overriding, casting).
- Design programs using Abstract Classes and Interfaces, and implement basic Graphical User Interfaces (GUI) with event handling.
- Handle data input/output via Text and Binary Files (e.g., Data/Object Input/Output Stream).
- Implement robust Exception Handling (try/catch/finally block) and manage concurrent execution using Threads and Synchronization.
- Connect Java applications to a database using JDBC.

Instructors Guidelines

The course mandates a dedicated split of 6 hours of Theory and 9 hours of Practical (LABs) per week. Instructors should utilize the practical sessions extensively for hands-on implementations of every OOP concept, GUI design, and database integration (JDBC). Troubleshooting environment setup and common errors is a key part of the initial practical sessions.

Assessment Guidelines



Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (LABs/JDBC Database Implementation)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Introduction to Java: Definition, History, Role in IT, Internet Context, Java Architecture, JVM, Bytecode
	Day 02	Java Programming Basics: Procedure-Oriented vs. Object-Oriented Programming, Java's Compilation & Execution Model
	Day 03	Setting Up Java Environment: Installing JDK, Choosing and Setting up IDE (e.g., IntelliJ, Eclipse, VS Code)
	Day 04	Hands-on Lab: Writing, Compiling, and Running "Hello World" — Understanding the Build Process and Common Errors
	Day 05	Practical Lab: Environment Troubleshooting, Compilation/Execution Practice, Error Handling Scenarios
	Outcome	By the end of Week 1, students will be able to: <ul style="list-style-type: none"> • Understand Java's history, architecture, and platform independence via JVM and bytecode. • Differentiate between procedural and object-oriented paradigms. • Install and configure JDK and an IDE for Java development. • Write, compile, run, and debug a basic Java program. • Recognize and resolve common setup and runtime errors.
Week 02	Day 01	Tokens and Expressions: Data Types (Primitive & User-Defined), Declarations, Variables, Constants, Type Conversion & Casting
	Day 02	Expressions and Arrays: Working with Expressions, Command-Line Arguments, Declaring and Using Arrays of Primitive Types
	Day 03	Control Structures – Branching: if, if-else, nested if, switch-case statements with practical example
	Day 04	Control Structures – Looping: while, do-while, for loops — syntax, use cases, common patterns and pitfalls
	Day 05	Control Structures – Jumping: break, continue, return; Practical Labs: Implementing control flow in real programs
	Outcome	By the end of Week 2, students will be able to: <ul style="list-style-type: none"> • Identify and use Java tokens, data types, variables, and constants correctly. • Perform type casting and handle command-line arguments.



		<ul style="list-style-type: none"> • Declare and manipulate arrays of primitive data types. • Implement branching logic using if and switch statements. • Use looping constructs (for, while, do-while) effectively in programs. • Control program flow using break, continue, and return. • Build small console applications applying expressions and control structures.
Week 03	Day 01	Introduction to OOP Concepts: OO Software Development Life Cycle, Classes vs. Objects, State, Behavior, and Messages
	Day 02	Class Fundamentals: Class Definition, Declaration, Components (Fields, Methods, Constructors), Creating and Using Objects
	Day 03	Class Relationships: Association and Aggregation — Understanding “has-a” relationships with real-world examples
	Day 04	Built-in Java Utility Classes: Deep Dive into String, StringBuilder, and Math classes — usage, immutability, and performance
	Day 05	Hands-on Lab: Creating User-Defined Classes, Implementing Fields and Methods, Testing Object Behavior and Relationships
	Outcome	<p>By the end of Week 3, students will be able to:</p> <ul style="list-style-type: none"> • Understand the Object-Oriented Software Development Life Cycle. • Define and declare classes with fields, methods, and constructors. • Differentiate between class and object — instantiate and use objects effectively. • Model real-world relationships using Association and Aggregation. • Use built-in utility classes: String, StringBuilder, and Math. • Design and implement simple user-defined classes with proper state and behavior. • Send messages between objects and understand encapsulation basics.
Week 04	Day 01	Method Deep Dive: Overloading Methods & Constructors, Automatic Type Conversion, Using Objects as Parameters
	Day 02	Argument Passing in Java: Call by Value vs. Reference (Myth & Reality), Passing Objects to Constructors, Returning Objects
	Day 03	Access Control & Modifiers: public, private, protected, static, final — Purpose, Scope, and Best Practices
	Day 04	Advanced Class Features: Nested Classes, Inner Classes (including block-scoped), Accessors (Getters) & Mutators (Setters)
	Day 05	Mid Term Examination (Covers Weeks 01–04: Java Basics, Control Structures, Classes/Objects, Encapsulation, Method Handling)
	Outcome	<p>By the end of Week 04, students will be able to:</p> <ul style="list-style-type: none"> • Overload methods and constructors effectively with type conversion rules. • Pass and return objects between methods and constructors. • Understand Java’s argument-passing mechanism (call by value). • Apply access modifiers (public, private, protected) to enforce encapsulation.



		<ul style="list-style-type: none"> • Use static and final keywords appropriately for constants and shared behavior. • Create and use nested and inner classes within different scopes. • Implement encapsulation using accessors and mutators for data protection. • Demonstrate mastery of core OOP concepts through mid-term assessment.
Week 05	Day 01	Introduction to Inheritance: Concept, extends keyword, Superclass vs. Subclass, Advantages and Real-World Use Cases
	Day 02	Inheritance in Practice: Extending Existing Classes, Referencing Subclass Objects with Superclass Variables, Role of super
	Day 03	Constructors in Inheritance: How Constructors are Called in Hierarchies, Using super() to Invoke Parent Constructors
	Day 04	Method Overriding: Rules, Purpose, and Dynamic Method Dispatch — Differentiating from Overloading
	Day 05	Hands-on Lab: Implementing Inheritance — Building Class Hierarchies, Overriding Methods, Using super, and Testing Polymorphic Behavior
	Outcome	<p>By the end of Week 05, students will be able to:</p> <ul style="list-style-type: none"> • Define and implement inheritance using the extends keyword. • Differentiate between superclass and subclass, and understand IS-A relationships. • Use super to access parent class members and invoke parent constructors. • Build and navigate multilevel inheritance hierarchies. • Override methods correctly and understand runtime polymorphism. • Apply inheritance to extend and reuse existing code effectively. • Implement practical class hierarchies through lab exercises.
Week 06	Day 01	Introduction to Polymorphism: Static (Compile-Time) vs. Dynamic (Runtime) Polymorphism — Concepts and Differences
	Day 02	Method Overriding Deep Dive: Achieving Dynamic Polymorphism, Binding at Runtime, Real-World Examples
	Day 03	Reference Types and Casting: Upcasting (Implicit) and Downcasting (Explicit) — Rules, Risks, and Use Cases
	Day 04	The instanceof Operator: Safe Type Checking Before Downcasting, Avoiding ClassCastException
	Day 05	Hands-on Lab: Implementing Polymorphism — Building Hierarchies, Overriding Methods, Using Up/Down Casting, and instanceof
	Outcome	<p>By the end of Week 06, students will be able to:</p> <ul style="list-style-type: none"> • Differentiate between static and dynamic polymorphism. • Implement runtime polymorphism using method overriding. • Safely perform upcasting and downcasting between superclass and subclass references. • Use the instanceof operator to validate object types before casting.



		<ul style="list-style-type: none"> Design flexible and extensible code using polymorphic behavior. Build and test polymorphic systems through practical lab exercises.
Week 07	Day 01	Abstract Classes: Purpose, Syntax, Rules, and Use Cases — Why and When to Use Abstract Classes with Examples
	Day 02	Interfaces: Declaration, Implementation, “Weak Inheritance”, Default & Static Methods (Java 8+), Functional Interfaces
	Day 03	Abstract Class vs Interface: Key Differences, When to Use Which, Design Implications, and Modern Java Practices
	Day 04	Introduction to GUI in Java: AWT/Swing Overview, Event Handling Model, Layout Managers (FlowLayout, BorderLayout, GridLayout)
	Day 05	Hands-on Lab: GUI Implementation — Building Windows with Text Fields, Buttons, Choice Components, Menus, and Dialog Boxes
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> Define and use abstract classes to enforce partial implementation in subclasses. Create and implement interfaces to define contracts and enable multiple inheritance of type. Differentiate between abstract classes and interfaces — and choose appropriately based on design needs. Understand Java’s event-driven programming model for GUI applications. Use layout managers to organize components in windows. Build interactive GUIs with text input, buttons, menus, choice controls, and dialog boxes. Handle user events (e.g., button clicks) using listeners.
Week 08	Day 01	Introduction to Digital Entrepreneurship: Definition, Case Studies (Pakistan Startups), Group Discussion on Digital Business Future
	Day 02	Idea to Business: Brainstorm Skills, Map to Products/Services, Write 3 Business Ideas + Group Feedback & Refinement
	Day 03	Building Teams & Communication: Role Distribution, Digital Tools (Email/Zoom/WhatsApp), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding & Online Presence: LinkedIn Setup Workshop, Social Media for Business (FB/IG), Portfolio & Content Planning
	Day 05	Final Exams (Covers Java OOP Weeks 01–07 + Reflection on Digital Entrepreneurship & Freelancing Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> Define digital entrepreneurship and relate it to local success stories. Convert personal skills into marketable digital business ideas. Build and pitch a startup team using digital communication tools. Create a professional LinkedIn profile and business social media presence. Understand freelancing platforms and profile setup (Fiverr, Upwork). Develop strategies for first clients, reviews, and scaling services.



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|--|--|-------------------------------------------------------------------------------------------------------------------|
| | | <ul style="list-style-type: none">• Demonstrate Java programming mastery through final examination. |
|--|--|-------------------------------------------------------------------------------------------------------------------|

Java Assignment:

Inventory Management System (10 Marks / \$10)

Freelance Scenario

You have been hired by a small retail store, **ShopSmart**, to develop a Java-based inventory management application. The app must handle products, suppliers, sales, and users using **OOP principles**, provide a **GUI** for staff, and connect to a **database via JDBC**.

The system should support **100–300 daily sales** and be scalable to **~1,000 transactions**, with **exception handling** and **basic multithreading** for concurrent updates.

Project Resources

- No fixed dataset. Students should design classes and populate sample data:
 - ≥ 20 products
 - ≥ 10 suppliers
 - ≥ 50 users/customers
 - ≥ 100 sales
- Use **MySQL or PostgreSQL (via JDBC)** for persistence.
- Local files may be used for **sample data and logs**.

Assignment Tasks

1. OOP Design & Class Implementation (3 marks)

- Design classes: **Product** (ID, name, price, stock), **Supplier**, **Sale**, **User**, and any base classes/interfaces (e.g., *Item*, *Calculable*).
- Implement **encapsulation** (private fields + getters/setters), at least one example of **inheritance**, one **interface**, and **method overriding** where appropriate.
- Provide a brief **UML/class diagram** or class list.



2. GUI & Event Handling (2 marks)

- Build a basic **GUI (Swing/JavaFX)** with product listing, sale entry, and simple menus/dialogs.
- Use **event handling** for user actions (buttons, combo boxes) and validate inputs (**loops/if-switch**).
- Include at least one **dialog for success/error messages**.

3. File Handling & Database Connectivity (2 marks)

- Implement **file-based logging or export** using streams (e.g., *FileOutputStream*, *ObjectOutputStream*).
- Connect to **MySQL or PostgreSQL using JDBC** to persist products, sales, and users.
- Demonstrate **INSERT/UPDATE queries** and **transaction handling** with *try-catch-finally*.

4. Concurrency, Exceptions & Advanced Elements (2 marks)

- Implement basic **multithreading** for at least one concurrent task (e.g., background stock updates) and use **synchronized** where needed.
- Include **exception handling** (*try-catch-finally*) for IO/DB operations.
- Show use of **static/final constants** (e.g., tax rate).

5. Sample Data, Demo & Readme (1 mark)

- Populate the system with the required **sample data**.
- Provide a short **demo** (screenshots or brief video/GIF).
- Include a **README** explaining how to run the app, DB setup (JDBC URL, credentials), and any assumptions.

Submission Requirements

- Source code (**.java files**) or a **zipped project**.
- **SQL script** to create necessary tables and sample inserts (for MySQL/PostgreSQL).



- **UML/class diagram** or class list.
- **Screenshots** (or short demo) showing the GUI and a successful sale transaction.
- **README** with setup/run instructions and brief design notes.

Evaluation Rubric

Task	Marks
OOP Design & Classes	3
GUI & Event Handling	2
File Handling & JDBC	2
Concurrency & Exception Handling	2
Sample Data & README/Demo	1
Total	10

Estimated Time to Complete: 8–12 hours

Java Quiz

Total Marks: 5

Instructions: Choose the correct option (a, b, c, or d).

Questions:

1. What is the primary role of the Java Virtual Machine (JVM)?
 - a) Compiling Java code into machine code
 - b) Executing bytecode on any platform
 - c) Managing hardware resources directly
 - d) Designing graphical user interfaces
2. How does Java differ from compiled languages like C++?
 - a) Java uses bytecode interpreted by JVM
 - b) Java compiles directly to machine code
 - c) Java requires no environment setup
 - d) Java is procedure-oriented only



3. What is the main difference between procedure-oriented and object-oriented programming?
 - a) POP focuses on data; OOP on functions
 - b) OOP divides programs into objects; POP into functions
 - c) POP uses objects; OOP uses procedures
 - d) OOP is top-down; POP is bottom-up

4. Which control structure in Java is used for multiple conditional branches?
 - a) if-else
 - b) while
 - c) switch
 - d) for

5. What does type casting in Java refer to?
 - a) Converting one data type to another
 - b) Declaring variables
 - c) Creating arrays
 - d) Handling exceptions

Answer Key:

Q#	Ans	Q#	Ans
1	b	11	b
2	a	12	a
3	b	13	b
4	c	14	a
5	a	15	a

Course Name: Mobile App Development



Course Overview

This 8-week course, totaling 120 credit hours, is designed to teach mobile application development fundamentals for Android and iOS, centered around the continuous development of a University Management System (UMS) app. The curriculum covers introduction, project setup, and mastering design principles (Wireframes, User Flows, Navigation). Core focus areas include User Interface (UI) Development, mastering layouts, styles, and themes for screens like the student profile and course registration. Students will learn essential backend integration skills, including Firebase Authentication and Firestore Database Integration for real-time data management. Advanced topics include Course and Grade Management (with API integration), implementing advanced device features like Push Notifications with Firebase Cloud Messaging (FCM), Camera/Image Upload, and Contact access. The course concludes with detailed sessions on deployment, marketing, version management, and a dedicated week for guiding students through their individual project design and completion.

Learning Outcomes

Upon completion of this course, students will be able to:

- Understand mobile app development fundamentals for both Android and iOS platforms.
- Design effective user flows and build user-friendly interfaces by utilizing mobile design principles and wireframe implementation.
- Develop, customize, and test UI components, including utilizing XML Layouts, styles, and themes for various app screens (e.g., student profile, course registration).



- Integrate cloud services like Firebase for crucial app functionality, including user authentication and real-time data storage using Firestore.
- Develop and implement core business logic modules, such as Course Management and Grade Management, incorporating data validation and external API integration.
- Implement advanced features, including push notifications using Firebase Cloud Messaging (FCM), camera access, image uploads, and emergency contact management.
- Prepare, finalize, and deploy a mobile application capable of handling real-world tasks.
- Manage individual project design, testing, and deployment processes.

Instructors Guidelines

The course should be taught using the structured lab manual approach and is heavily project-based, focusing on the incremental development of the UMS application. The weekly structure consists of 5 days per week, with 2 sessions per day (1.5 hours per session). Instructors must dedicate Week 8 to one-on-one guidance for students developing, completing, testing, and deploying their individual projects. Emphasis should be placed on data validation, security, and code refactoring.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (UMS App Development/Individual Project)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Introduction to Course & Project Setup — Android Studio Installation, SDK Setup, Emulator Configuration, Git/GitHub Intro
	Day 02	Project Structure & Layout Basics — Android Project Anatomy, Activity Lifecycle, XML Layout Fundamentals, ConstraintLayout
	Day 03	UI Components & Event Handling — TextView, Button, EditText, OnClickListener, Toast Messages, Basic Interactivity
	Day 04	Create Your First Android App — “Hello UMS” App, Connecting UI to Logic, Running on Emulator/Device



	Day 05	Understanding Android Project Structure — Manifest, Gradle, Resources, Java/Kotlin Packages, Debugging Basics
	Outcome	<p>By the end of Week 01, students will be able to:</p> <ul style="list-style-type: none"> • Set up Android Studio and configure development environment. • Understand core Android project structure and file roles. • Design basic UI layouts using XML and common widgets. • Handle user interactions with event listeners and display feedback. • Build, run, and debug a simple Android application on emulator/device.
Week 02	Day 01	Design Principles & Wireframes — Mobile UX Best Practices, Sketching UMS Screens (Login, Dashboard, Profile, Courses)
	Day 02	Design Principles Details — Typography, Spacing, Color, Accessibility, Platform Guidelines (Material Design)
	Day 03	User Flows & Wireframe Implementation — Login → Dashboard → Course Registration Flow, Low-Fi Prototyping
	Day 04	Navigation in Mobile Apps — Intents, Activity Transitions, Back Stack, Passing Data Between Screens
	Day 05	Project Planning & Core Features — Define UMS Modules (Auth, Profile, Courses, Grades), Task Breakdown, Git Branching Strategy
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> • Apply mobile UX/UI principles to design intuitive app interfaces. • Create wireframes and user flows for core UMS features. • Implement screen navigation using Intents and manage data passing. • Plan project scope, features, and version control strategy. • Translate design mockups into development-ready specifications.
Week 03	Day 01	UI Elements & Home Screen — RecyclerView, Cards, Icons, App Bar, Bottom Navigation, Dashboard Layout
	Day 02	Layouts & Student Profile — ScrollView, Form Fields, ImageViews, Edit Profile Logic, Data Binding Basics
	Day 03	Course Registration Screen — Spinners, Checkboxes, Dynamic Lists, Form Validation, Submit Logic
	Day 04	UI Customization — Styles, Themes, Colors, Typography, Vector Drawables, Adaptive Icons, Dark Mode Support
	Day 05	Project Recap & UI Testing — Cross-Device Testing, Accessibility Checks, UI Consistency Review, Bug Fixes
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> • Build complex, scrollable UIs with RecyclerView and dynamic components. • Implement editable profile and course registration forms with validation. • Customize app appearance using themes, styles, and vector assets. • Ensure UI consistency and responsiveness across device sizes. • Conduct usability and accessibility testing on completed screens.



Week 04	Day 01	Review: Android Setup, Project Structure, UI Components, Navigation, Design Principles
	Day 02	Review: Home Screen, Profile, Course Registration Logic, Styling, Testing
	Day 03	Review: Git Workflow, Task Planning, Wireframing, User Flows
	Day 04	Practice Quiz + Mini Debugging Challenge — Fix Broken Navigation, Style Inconsistencies, Form Validation Errors
	Day 05	Mid Term Examination (Covers Weeks 01–03: Android Fundamentals, UI/UX Design, Navigation, Project Planning, Core UMS Screens)
	Outcome	By the end of Week 04, students will be able to: <ul style="list-style-type: none"> • Demonstrate mastery of Android app structure, UI components, and event handling. • Navigate confidently between activities and manage user data flow. • Apply design principles to create polished, user-friendly interfaces. • Identify and resolve common UI/UX and logic bugs. • Prepare for backend integration and data persistence topics
Week 05	Day 01	Firebase Auth — Email/Password, Google Sign-In, User Registration/Login, Auth State Listener
	Day 02	Firestore Database — NoSQL Structure, Collections/Documents, Reading/Writing Data, Security Rules
	Day 03	Course Management Module — Fetch/Display Courses, Enroll/Unenroll, Real-time Updates, Error Handling
	Day 04	Grade Management Module — Display Grades by Course, Calculate GPA, Permissions (Student vs Admin)
	Day 05	Data Validation & Input Handling — Form Validation, Error Messages, Loading States, Empty Views
	Outcome	By the end of Week 05, students will be able to: <ul style="list-style-type: none"> • Integrate Firebase Authentication for secure user login/signup. • Structure and manage app data using Firestore NoSQL database. • Build real-time course enrollment and grade display features. • Implement client-side validation and graceful error handling. • Secure data access using Firebase Security Rules.
Week 06	Day 01	Push Notifications (FCM) — Firebase Cloud Messaging Setup, Send/Receive Notifications, Deep Linking
	Day 02	Camera & Image Upload — Capture/Select Images, Compress, Upload to Firebase Storage, Display in Profile
	Day 03	Device Contacts Integration — Request Permissions, Read Contacts, Set Emergency Contact in UMS
	Day 04	Final Testing & Refactoring — Unit/UI Testing, Code Cleanup, Performance Optimization, Memory Leak Checks
	Day 05	Project Finalization — Feature Freeze, Bug Bash, Documentation, Prepare for Deployment (APK/AAB)
	Outcome	By the end of Week 06, students will be able to: <ul style="list-style-type: none"> • Implement push notifications for course updates or grade releases.



		<ul style="list-style-type: none"> Integrate device camera and cloud storage for profile image uploads. Access device contacts (with permissions) for emergency features. Write testable, maintainable code and optimize app performance. Finalize UMS app for deployment with complete feature set.
Week 07	Day 01	App Deployment — Generate Signed APK/AAB, Google Play Console Setup, Internal Testing Track
	Day 02	App Store Optimization (ASO) — Title, Description, Keywords, Screenshots, Feature Graphic, Ratings Strategy
	Day 03	Marketing & User Acquisition — Social Media Launch, Landing Page, Email Campaigns, Influencer Outreach
	Day 04	Version Management — Semantic Versioning, Changelog, Rollback Strategy, Feature Flags, A/B Testing Intro
	Day 05	Post-Launch & Maintenance — Crash Reporting (Firebase Crashlytics), User Feedback, Roadmap Planning, OTA Updates
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> Deploy Android app to Google Play Store via internal/closed testing. Optimize store listing for discoverability and conversions. Execute a basic app launch marketing campaign. Manage app versions, updates, and feature rollouts systematically. Monitor app health post-launch and plan iterative improvements.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why Mobile App Skills = Business Opportunities”
	Day 02	Idea to Business — Brainstorm Marketable App Dev Skills (Firebase Apps, UI/UX Design, API Integration, Deployment), Map to Services, Write 3 Business Ideas + Peer Feedback
	Day 03	Building Teams & Communication — Role Distribution (Frontend, Backend, QA, Designer), Digital Tools (Figma, GitHub, Slack, Trello), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for App Developers — LinkedIn Optimization, Portfolio (GitHub, Play Store Links, APK Demos), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: Android Studio, UI/UX, Navigation, Firebase Auth/Firestore, Notifications, Camera, Deployment, Marketing + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> Define digital entrepreneurship through the lens of mobile app developers. Convert technical skills (Firebase integration, UI design, API consumption, app deployment) into sellable freelance services or scalable products. Develop 3 viable business ideas — e.g., “Custom UMS for Pakistani Universities”, “Firebase-Powered Business Apps”, “App Prototyping for Startups”.



		<ul style="list-style-type: none"> • Build collaborative dev teams and pitch app solutions using professional tools and agile communication. • Create a standout LinkedIn profile and online portfolio showcasing live projects, GitHub repos, or Play Store listings. • Set up and optimize Fiverr/Upwork profiles with compelling gigs like “I Will Build Your Android App with Firebase” or “I Will Design & Deploy Your MVP”. • Understand how to land first clients, manage feedback, and scale into a mobile app development agency. • Demonstrate mastery of core mobile development concepts — from UI design to cloud integration to store deployment. • Leave the course with a personal roadmap to launch a freelance app dev career or tech-enabled business in Pakistan or globally.
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Mobile Application Development Assignment:

Intermediate Level Recipe App

Freelance Scenario:

You have been hired as a freelance mobile app developer by a food blog startup, "FlavorFinder." They want to create a mobile application to showcase their recipes. The app needs to fetch recipe data from a source, display a list of recipes, and allow users to view detailed information for each recipe. This project requires a solid understanding of multi-screen navigation and handling dynamic data.

Project Details:

Your task is to build a two-screen recipe application. The first screen will be a "Recipe List" that displays a scrollable list of recipes. The second screen will be a "Recipe Detail" screen that shows the ingredients and instructions for a selected recipe. The app will simulate fetching data from a simple API by loading a local JSON file.

Assignment Tasks:

1. Project Setup & UI Navigation (2 Marks)

- **Set up the project** in a mobile development environment (e.g., Android Studio, Xcode, Flutter, or React Native).
- **Implement a two-screen structure** with a clear navigation flow from the Recipe List screen to the Recipe Detail screen.
- **Design the Recipe List screen** with a scrollable view (e.g., RecyclerView, ListView, or FlatList) to display a list of recipe titles and a thumbnail image for each.



- **Design the Recipe Detail screen** to show the full-size image, recipe title, a list of ingredients, and detailed instructions.

2. Data Handling & Display (4 Marks)

- **Simulate API integration** by loading and parsing a local JSON file that contains a list of recipe data (e.g., name, image URL, ingredients, and instructions). The JSON file should be included in your project.
- **Dynamically populate the Recipe List screen** with data loaded from the JSON file.
- **Implement an on-click listener** for each item in the recipe list. When a user taps a recipe, navigate to the Recipe Detail screen and pass the selected recipe's data to it.
- **Populate the Recipe Detail screen** with the information from the selected recipe.

3. UX & Code Quality (2 Marks)

- **Implement a third-party library** for image loading (e.g., Glide for Android, Kingfisher for iOS, or a similar package for your chosen framework) to efficiently display recipe images from their URLs.
- **Add a back button** to the Recipe Detail screen to allow users to easily return to the list.
- **Handle potential errors gracefully**, such as a failure to load the JSON file or a missing image URL.
- **Write clean, well-commented, and modular code.** Use functions and classes to separate concerns, such as a data service to load the JSON and a separate component for the UI.

4. Project Summary & Future Features (2 Marks)

- **Write a brief summary** (minimum 150 words) describing the app's functionality, structure, and the technical choices you made.
- **Explain how you would extend this app** with a future feature, such as a "favorites" system or a search function. Describe the components and logic that would be needed to implement your suggested feature.

Submission Requirements:

- Submit your project files in a single compressed folder (ZIP).
- Include a short video or GIF demonstrating the app's functionality (showing the list, navigating to a detail page, and going back).
- Include the JSON file used for the recipe data.
- Include a text file or markdown document with your project summary and future feature suggestions.

Evaluation Rubric:



Task	Marks
Project Setup & UI Navigation	2
Data Handling & Display	4
UX & Code Quality	2
Project Summary & Future Features	2
Total	10

Estimated Time to Complete: 15-20 hours

This assignment requires students to apply intermediate mobile development skills, focusing on multi-screen navigation, dynamic data handling, and integrating third-party libraries—all essential skills for real-world app development.

Mobile App Development Quiz

Total Marks: 5

Instructions: Choose the correct option (a, b, c, or d).

Questions:

1. What is the official IDE for Android development, which supports Java, Kotlin, and C++?
 - a) Xcode
 - b) Android Studio
 - c) Visual Studio
 - d) IntelliJ IDEA
2. Which operating system is described as an open-source mobile OS developed by Google?
 - a) iOS
 - b) Windows Phone
 - c) Android
 - d) Symbian
3. What is the official IDE for iOS development, with support for Swift and Objective-C?
 - a) Android Studio
 - b) Xcode
 - c) Eclipse
 - d) Visual Studio Code



4. Which of the following is NOT one of the 7 key steps of the mobile app development process mentioned in the manual?
- a) App Development
 - b) Application Testing
 - c) Marketing
 - d) Deployment
5. What is the primary purpose of the AndroidManifest.xml file?
- a) It stores all non-code assets like images and layouts.
 - b) It defines the project dependencies and build types.
 - c) It provides essential information about the app, such as its name, icon, and permissions.
 - d) It is the main file for writing the app's business logic.

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	b	11	c	21	b
2	c	12	b	22	b
3	b	13	c	23	b
4	c	14	c	24	b
5	c	15	a	25	a



Course Name: Python Development



Course Overview

This 8-week Python Programming Bootcamp provides a structured path for learning essential programming principles and advanced application techniques. The course follows an incremental development model, starting with core concepts: Python Basics, Variables, Control Flow (If Statements, Loops), and Input/Output. It progresses to mastering Python data structures, including Lists, Tuples, and Dictionaries, alongside foundational concepts like Functions, Error Handling, and Debugging. Mid-course topics cover File Handling and basic Project Structuring, followed by a deep dive into Object-Oriented Programming (OOP), covering Classes, Inheritance, and Polymorphism. Advanced weeks focus on integrating APIs and utilizing External Libraries, introductory Data Manipulation (Pandas), and Data Visualization techniques. The final week is dedicated to reviewing key concepts, utilizing Git and Version Control, and deploying the final project.

Learning Outcomes

Upon completion of this course, students will be able to:

- Understand fundamental programming concepts and apply control flow structures (if statements, while/for loops).
- Implement and manipulate standard Python data structures, including Lists, Tuples, and Dictionaries.
- Define and use functions effectively, and apply error handling and debugging techniques.
- Manage data persistence through File Handling operations.



- Apply Object-Oriented Programming (OOP) principles, including defining Classes, implementing Inheritance, and utilizing Polymorphism.
- Integrate External Libraries and interact with APIs to enhance projects.
- Perform introductory data manipulation tasks using Pandas and create basic data visualizations.
- Utilize version control (Git) and successfully deploy a complete Python project.

Instructors Guidelines

The course follows an incremental development approach. Instructors must ensure that Project Day (Day 5) sessions are implemented every week, allowing students to continuously build and enhance a working project using the concepts learned. The final week requires a structured review, followed by project deployment and a Final Project Presentation.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (Weekly Projects/Final Deployment)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Introduction to Programming Concepts — What is Programming, Python's Role, Setting Up Environment, Writing First Program
	Day 02	Variables and Arithmetic Operations — Data Types, Operators, Expressions, Type Conversion, Variable Naming Rules
	Day 03	Input and Output — Using input(), print(), Formatting Output, Type Casting, Building Interactive Mini Programs
	Day 04	Control Flow — If/Else Statements, Comparison & Logical Operators, Nested Conditions, Building Decision-Based Programs
	Day 05	Project Day — Build a Simple Calculator or Quiz Game Applying Variables, I/O, and Conditional Logic
	Outcome	By the end of Week 01, students will be able to: <ul style="list-style-type: none"> • Understand core programming concepts and Python's syntax. • Declare and manipulate variables with different data types. • Accept user input and produce formatted output. • Implement decision-making logic using if/else statements.



		<ul style="list-style-type: none"> Apply learned concepts to build a functional mini-project.
Week 02	Day 01	While Loops — Syntax, Use Cases, Infinite Loops, Break/Continue, Menu-Driven Programs
	Day 02	For Loops — Syntax, Range(), Iterating Over Sequences, Nested Loops, Loop Control Statements
	Day 03	Combining Loops & Conditions — Complex Logic, Input Validation, Pattern Printing, Game Loops
	Day 04	Lists — Creation, Indexing, Slicing, Methods (append, remove, pop), Iterating, List Comprehensions (Intro)
	Day 05	Project Day — Build a To-Do List Manager or Number Guessing Game Using Loops and Lists
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> Use while and for loops to automate repetitive tasks. Combine loops with conditions for complex program flow. Create, modify, and iterate over lists to manage collections of data. Apply control structures to build interactive, logic-driven applications. Deliver a working project integrating loops, conditions, and list operations.
Week 03	Day 01	Functions — Defining Functions, Parameters, Return Values, Scope, Built-in vs User-Defined Functions
	Day 02	Advanced Lists — Slicing, Nested Lists, List Methods (sort, reverse, index), List Comprehensions, Copying Lists
	Day 03	Tuples & Dictionaries — Immutable Tuples, Key-Value Pairs, Dictionary Methods, Iterating, Nested Structures
	Day 04	Error Handling — Try/Except Blocks, Handling Common Errors (ValueError, KeyError), Debugging Techniques
	Day 05	Project Day — Build a Contact Book or Inventory System Using Functions, Dictionaries, and Error Handling
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> Modularize code using functions for reusability and clarity. Manipulate advanced data structures like tuples and dictionaries. Handle runtime errors gracefully to build robust applications. Debug common Python errors using print statements and exception handling. Create a structured project applying functions, data structures, and error handling
Week 04	Day 01	Review: Variables, I/O, Conditionals, Loops, Lists, Functions
	Day 02	Review: Tuples, Dictionaries, Error Handling, Project Logic from Weeks 01–03
	Day 03	Review: Debugging Techniques, Common Mistakes, Best Practices
	Day 04	Practice Quiz + Mini Project Debugging — Fix Broken Code, Optimize Logic, Add Features
	Day 05	Mid Term Examination (Covers Weeks 01–03: Syntax, Data Types, Control Flow, Functions, Data Structures, Error Handling, Projects)
	Outcome	By the end of Week 04, students will be able to:



		<ul style="list-style-type: none"> • Demonstrate mastery of Python fundamentals and core programming logic. • Debug and refactor code for efficiency and readability. • Apply best practices in variable naming, function design, and error handling. • Identify knowledge gaps and solidify core concepts through mid-term assessment. • Prepare for advanced topics: file handling, OOP, APIs, and data visualization.
Week 05	Day 01	File Handling — Opening/Closing Files, Read/Write Modes, Reading Line by Line, Writing Data
	Day 02	File Handling Continued — Context Managers (with), CSV Files, Exception Handling with Files, File Paths
	Day 03	Project Structuring — Modules, Importing, name == "main", Folder Organization, Reusable Code
	Day 04	Project Day Prep — Plan To-Do List with File Persistence, Define Functions, Structure Modules
	Day 05	Project Day — Build a File-Based To-Do List — Save/Load Tasks from Text or CSV Files
	Outcome	By the end of Week 05, students will be able to: <ul style="list-style-type: none"> • Read from and write to files for data persistence. • Use context managers for safe file handling. • Structure Python projects using modules and proper folder hierarchy. • Build applications that store and retrieve data between sessions. • Deliver a project that combines file I/O with structured, modular code.
Week 06	Day 01	OOP — Classes & Objects, Attributes, Methods, self, Constructors (<code>__init__</code>)
	Day 02	OOP Continued — Encapsulation, Getters/Setters, Class vs Instance Variables, Method Types
	Day 03	Inheritance & Polymorphism — Parent/Child Classes, Method Overriding, <code>super()</code> , Abstract Concepts
	Day 04	OOP in Projects — Refactor To-Do List Using Classes (Task, TaskManager), Apply Inheritance for Priority Tasks
	Day 05	Project Day — Build a Bank Account System or Library Management System Using Full OOP Principles
	Outcome	By the end of Week 06, students will be able to: <ul style="list-style-type: none"> • Define and instantiate classes with attributes and methods. • Apply encapsulation, inheritance, and polymorphism in real projects. • Structure complex applications using object-oriented design. • Refactor procedural code into OOP for scalability and maintainability. • Deliver an OOP-based project demonstrating class relationships and real-world modeling.
Week 07	Day 01	APIs — What is an API, REST Basics, Requests Library, GET/POST, JSON Handling



	Day 02	External Libraries — Installing with pip, Popular Libraries (requests, matplotlib, pandas), Virtual Environments
	Day 03	Integrating APIs — Fetching Data (e.g., Weather, Quotes), Parsing JSON, Displaying Results
	Day 04	Project Enhancement — Add API Features to To-Do List (e.g., Weather Widget, Motivational Quotes)
	Day 05	Project Day — Build an API-Driven App — e.g., Currency Converter, Movie Info Fetcher, or News Headline Display
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> • Explain how APIs work and make HTTP requests using Python. • Install and manage external libraries using pip and virtual environments. • Parse and use JSON data from public APIs. • Enhance projects by integrating live data from external sources. • Build standalone applications that consume APIs and deliver dynamic content.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why Python Skills = Business Opportunities”
	Day 02	Idea to Business — Brainstorm Marketable Python Skills (Automation, Web Scraping, Data Analysis, API Integration), Map to Services, Write 3 Business Ideas + Peer Feedback
	Day 03	Building Teams & Communication — Role Distribution (Developer, Data Analyst, QA, Project Manager), Digital Tools (GitHub, Slack, Trello), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for Developers — LinkedIn Optimization, Portfolio (GitHub, Replit, Streamlit Apps), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: Variables, Loops, Functions, OOP, File Handling, APIs, Pandas, Projects + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> • Define digital entrepreneurship through the lens of Python developers. • Convert technical skills (automation scripts, data projects, API integrations) into sellable freelance services or scalable products. • Develop 3 viable business ideas — e.g., “Excel Automation for SMEs”, “Web Scraping for Market Research”, “Custom API Integrations for Startups”. • Build collaborative dev teams and pitch Python-based solutions using professional tools and communication. • Create a standout LinkedIn profile and online portfolio showcasing GitHub repos, data visualizations, or live web apps. • Set up and optimize Fiverr/Upwork profiles with compelling gigs like “I Will Automate Your Tasks with Python” or “I Will Build Your Data Dashboard”.



		<ul style="list-style-type: none"> • Understand how to land first clients, manage feedback, and scale into a Python development agency. • Demonstrate mastery of core Python concepts — from file handling to OOP to API consumption. • Leave the course with a personal roadmap to launch a freelance Python career or tech-enabled business in Pakistan or globally.
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Python Assignment:

Data Cleaning, EDA & Visualization (10 Marks / \$10)

Freelance Scenario:

You have been hired by an e-commerce startup to clean and analyze their customer orders data. The dataset is messy and contains missing values, inconsistent formats, and requires deep analysis to uncover sales trends and customer behaviors.

Dataset:

Use the “E-Commerce Sales Dataset” from Kaggle (or any similar dataset). Here’s a popular one you can suggest to students:

Dataset

link:

<https://www.kaggle.com/datasets/carrie1/ecommerce-data>

(Students should download `ecommerce.csv` which contains order data including InvoiceNo, StockCode, Description, Quantity, InvoiceDate, UnitPrice, CustomerID, Country.)

Assignment Tasks:

1. Data Loading and Initial Inspection (1 mark)

- Load the `ecommerce.csv` file using `pandas`.
- Display dataset info: number of rows/columns, data types, missing values.
- Display the first 10 rows to understand the structure.
- Identify and list columns that need cleaning or preprocessing.

2. Data Cleaning and Preprocessing (3 marks)

- **Handle missing values:**
 - Drop rows where `CustomerID` or `Description` is missing.



- Fill missing values in other columns if any, with suitable methods and justify your approach.
- **Remove duplicates** in the dataset.
- Correct data types:
 - Convert `InvoiceDate` to datetime format.
 - Ensure numerical columns (`Quantity`, `UnitPrice`) are in the correct numeric format.
- **Remove invalid data:**
 - Remove rows with negative or zero `Quantity` or `UnitPrice` as they indicate returns or errors.
- Add these new columns:
 - `TotalPrice = Quantity × UnitPrice`
 - Extract `Year`, `Month`, `Day` and `Hour` from `InvoiceDate`

3. Exploratory Data Analysis (EDA) (4 marks)

Perform these analyses with visualizations:

- **Sales Trends Over Time:**
 - Plot monthly total sales (`TotalPrice`) over the entire time period (line chart).
 - Analyze peak sales months/seasons.
- **Top 10 Products by Revenue:**
 - Identify and plot (bar chart) the top 10 products based on total revenue.
- **Country-wise Sales:**
 - Plot sales distribution across different countries (horizontal bar chart or pie chart).
- **Customer Purchase Behavior:**
 - Visualize the distribution of `Quantity` purchased per order.
 - Plot the number of unique customers over time.

Use appropriate chart types, titles, axis labels, and legends.

4. Data Insights & Summary (2 marks)

- Write a detailed summary (minimum 150 words) based on your EDA findings:
 - Which months are best for sales?
 - Which products and countries generate most revenue?
 - Any interesting customer purchase patterns?
- Provide recommendations for the e-commerce company based on your insights.

5. Export Cleaned Data (Bonus 0.5 marks)

- Save the cleaned and processed dataset as `ecommerce_cleaned.csv`.

6. Code Quality & Documentation (Bonus 0.5 marks)

- Provide clean, modular code with comments explaining each step.



- Use functions where appropriate.
- Include markdown cells (if notebook) to describe sections and insights.

Submission Requirements:

- Submit your Jupyter Notebook (.ipynb) or Python script (.py).
- Include the cleaned CSV file `ecommerce_cleaned.csv`.
- All visualizations should be embedded or saved as images.
- Clear and concise explanations and observations.

Evaluation Rubric:

Task	Marks
Data Loading & Inspection	1
Data Cleaning & Preprocessing	3
Exploratory Data Analysis	4
Summary & Business Insights	2
Bonus: Export & Documentation	1 (0.5 + 0.5)
Total	10

Estimated Time to Complete: 8-12 hours

This will require students to carefully explore the dataset, apply data cleaning best practices, create meaningful visualizations, and provide actionable insights — mimicking a real freelancing job.

Python Quiz

Total Marks: 5

Instructions: Choose the correct option (a, b, c, or d).

Questions:

1. What keyword is used to create a function in Python?
a) fun
b) def

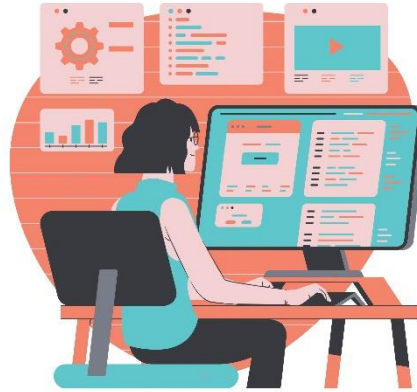


- c) function
d) define
2. Which symbol is used to comment a single line in Python?
a) //
b) #
c) <!-- -->
d) /* */
3. What is the output of `print(2 + 3 * 4)`?
a) 20
b) 14
c) 24
d) 10
4. Which data type is used to store text?
a) int
b) float
c) str
d) bool
5. How do you start a for loop in Python?
a) `for i in range(5):`
b) loop i = 0 to 5
c) `for (i=0; i<5; i++)`
d) `foreach i in range(5):`

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	b	11	b	21	a
2	b	12	c	22	c
3	b	13	b	23	b
4	c	14	b	24	a
5	a	15	b	25	b

Course Name: Social Media Management



Course Overview

This 8-week Social Media Management course covers the strategic, practical, and analytical aspects of managing multi-platform social media campaigns, with a strong focus on freelancing outcomes. Initial weeks cover foundational algorithms, user engagement, and platform management for Facebook, Instagram (Ads), and LinkedIn. The curriculum emphasizes Content Strategy (Calendar, Storytelling) and practical design skills using Canva and video editing for Reels. Students will learn about Paid Promotions (KPIs, Targeting), and specialized platform strategies for YouTube (SEO-Friendly Publishing), TikTok (Trends, Duets), and Twitter/X. Key managerial skills taught include using management tools (Buffer, Hootsuite, Meta Business Suite), running A/B tests, and performing in-depth Analytics and Reporting using Facebook Insights, Instagram Analytics, and Google Analytics basics. The final phase concentrates on end-to-end Campaign Design, execution, monitoring, and advanced freelancing topics like pricing strategies, client retention, and contract management.

Learning Outcomes

Upon completion of this course, students will be able to:

- Analyze platform algorithms and optimize content for maximum user engagement across key social media channels.
- Develop a core Content Strategy, including calendar planning and brand storytelling.
- Design and execute effective visual content using Canva and short video/Reels editing techniques.



- Set up and manage paid advertising campaigns on Instagram and Facebook (Meta Ads Manager), defining KPIs and targeting strategies.
- Implement platform-specific organic and paid strategies for LinkedIn (Thought Leadership), YouTube (SEO), TikTok, and Twitter/X Campaigns.
- Utilize social media management tools like Meta Business Suite for scheduling and community management.
- Measure campaign success using key metrics (Reach, CTR, and Conversion Rates) and perform client-ready reporting using platform insights and Google Analytics.
- Design and execute a comprehensive, multi-platform campaign strategy from goal setting to budgeting and real-time monitoring.
- Develop a professional portfolio, write winning proposals, conduct client simulations, and scale freelancing services.

Instructors Guidelines

The course is structured to integrate Theory, Practice, and Freelancing elements across all weeks. Instructors must use Client Simulations, Mock Briefs, Pitching Sessions, and Portfolio Reviews to mimic real-world scenarios. The culmination is the Final Capstone Project, which requires students to develop a 3-Month Campaign Strategy, including creative samples and a simulated analytics dashboard.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (Final Capstone Project/Campaign Execution)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	Understanding Platform Algorithms & User Engagement (Theory)
	Day 02	Creating Instagram Ads — Setup & Execution (Practice)
	Day 03	Managing a Facebook Page — Posts, Groups, Events (Practice)



	Day 04	LinkedIn for Branding — Posts, Articles, Thought Leadership (Practice)
	Day 05	Freelancing: Writing Winning Proposals for Social Media Ad Management
	Outcome	<p>By the end of Week 01, students will be able to:</p> <ul style="list-style-type: none"> • Understand how social media algorithms drive engagement. • Set up and run Instagram ad campaigns. • Manage a professional Facebook Page with content and community tools. • Build personal or brand authority on LinkedIn through strategic posting. • Write compelling, client-winning proposals for social media management gigs.
Week 02	Day 01	Core Principles of Content Strategy — Calendar, Storytelling, Consistency (Theory)
	Day 02	Designing Visuals with Canva (Practice)
	Day 03	Shooting & Editing Short Videos/Reels (Practice)
	Day 04	Engagement Activities — Comments, DMs, Community Building (Practice)
	Day 05	Freelancing: Packaging Content Creation Services for Clients
	Outcome	<p>By the end of Week 02, students will be able to:</p> <ul style="list-style-type: none"> • Plan and schedule content using strategic calendars. • Create professional-grade visuals using Canva. • Shoot, edit, and publish engaging short-form videos. • Drive interaction and build communities through comments and DMs. • Bundle and pitch content creation services to freelance clients.
Week 03	Day 01	Paid Promotions vs. Organic Reach — KPIs, Targeting Strategies (Theory)
	Day 02	YouTube Channel Setup + SEO-Friendly Video Publishing (Practice)
	Day 03	TikTok Content Strategy — Trends, Sounds, Duets (Practice)
	Day 04	Twitter/X Campaigns — Threads, Polls, Hashtags (Practice)
	Day 05	Freelancing: Client Simulations — Mock Brief & Pitching Ad Strategy
	Outcome	<p>By the end of Week 03, students will be able to:</p> <ul style="list-style-type: none"> • Differentiate paid vs. organic strategies and measure success with KPIs. • Set up a YouTube channel and optimize videos for search and discovery. • Create trend-aligned content for TikTok using sounds and duets. • Run engagement-driven campaigns on Twitter/X using threads and polls. • Simulate real client scenarios — interpret briefs and pitch winning ad strategies.
Week 04	Day 01	Metrics, KPIs, and Targeting Strategies (Theory)
	Day 02	A/B Testing Ads & Posts (Practice)
	Day 03	Portfolio Review + Polishing Case Studies (Practice)



	Day 04	Final Project Presentations — Campaign Execution (Practice)
	Day 05	Mid Term Examination (Covers Weeks 01–04: Platform Algorithms, Content, Ads, KPIs, Freelancing Pitches)
	Outcome	By the end of Week 04, students will be able to: <ul style="list-style-type: none"> • Define and track key social media KPIs and targeting metrics. • Design and analyze A/B tests for ads and organic posts. • Polish and present portfolio case studies effectively. • Deliver final campaign presentations with confidence. • Demonstrate mastery of first-half concepts through mid-term assessment.
Week 05	Day 01	Social Media Management Tools — Buffer, Hootsuite, Meta Business Suite (Theory)
	Day 02	Creating & Scheduling a 1-Week Content Calendar (Practice)
	Day 03	Running A/B Tests on Ads & Posts (Practice)
	Day 04	Engagement Activities & Community Management (Practice)
	Day 05	Freelancing: Creating a Social Media Manager Portfolio
	Outcome	By the end of Week 05, students will be able to: <ul style="list-style-type: none"> • Navigate and use major social media scheduling tools. • Build and execute a 1-week content calendar. • Run and interpret A/B test results for optimization. • Manage online communities and boost engagement. • Compile a professional portfolio showcasing campaign work and results.
Week 06	Day 01	Metrics & KPIs — Reach, Engagement, CTR, CPC, Conversion Rates (Theory)
	Day 02	Using Facebook Insights & Instagram Analytics (Practice)
	Day 03	Google Analytics Basics — Website & Campaign Tracking (Practice)
	Day 04	Creating Client-Ready Reports — Visualized Dashboards (Practice)
	Day 05	Freelancing: Positioning Analytics Skills in Proposals
	Outcome	By the end of Week 06, students will be able to: <ul style="list-style-type: none"> • Understand and explain core social and web analytics metrics. • Extract insights from Facebook, Instagram, and Google Analytics. • Build clean, visual dashboards for client reporting. • Communicate data-driven results to non-technical clients. • Highlight analytics expertise in freelance proposals to win higher-value projects.
Week 07	Day 01	End-to-End Campaign Design — Goals, Strategy, Budgeting, Execution (Theory)
	Day 02	Group Project — Multi-Platform Campaign (Instagram + Facebook) (Practice)
	Day 03	Running Ad Simulations — Budget Allocation & Targeting (Practice)
	Day 04	Monitoring Campaigns in Real-Time — Adjusting Strategy Based on Data (Practice)



	Day 05	Freelancing: Pitching Campaigns + Handling Q&A — Client Simulations
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> • Design complete social media campaigns from goal-setting to execution. • Collaborate in teams to launch cross-platform campaigns. • Simulate ad budgeting and targeting for optimal ROI. • Monitor live campaign performance and make real-time adjustments. • Confidently pitch campaign strategies and handle client questions in simulated meetings.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion on Digital Future
	Day 02	Idea to Business — Map Skills to Products, Write 3 Business Ideas + Group Feedback
	Day 03	Building Teams & Communication — Role Distribution, Digital Tools, 3-Minute Team Pitch
	Day 04	Personal Branding & Online Presence — LinkedIn Setup, Social Media for Business, Portfolio Basics
	Day 05	Final Exams (Covers Social Media Strategy Weeks 01–07 + Reflection on Freelancing & Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> • Define digital entrepreneurship and relate it to local success stories. • Convert personal skills into viable digital business ideas. • Build and pitch a startup team using digital communication tools. • Create a professional LinkedIn profile and business social media presence. • Set up freelancing profiles and understand platform mechanics (Fiverr, Upwork). • Develop strategies for first clients, reviews, and scaling services. • Demonstrate mastery of social media campaign design and execution. • Leave with a personal roadmap to start earning digitally — including LinkedIn, freelancing accounts, and a refined business idea.

Social Media Management – Freelance-Based Assignment

Title: Client-Based Social Media Campaign Strategy

Total Marks: 10

Context: Simulating a real freelance client brief.

Scenario:



You have been hired by a local **fitness studio** to build and manage a **4-week social media campaign** across **Instagram, Facebook, and TikTok**. The studio wants to:

- Increase brand awareness
- Gain followers
- Drive signups for a new class series

Tasks:

1. Content Strategy & Calendar (3 Marks)

- Define campaign goals and KPIs (engagement, reach, CTR).
- Choose 2–3 content themes (e.g., motivation, behind-the-scenes, testimonials).
- Create a **1-week content calendar** (platform, caption idea, format type, publish time).
- Explain how this strategy aligns with the client’s business goal.

Deliverable: PDF content calendar + 200-word strategy summary

2. Visuals & Ad Mockups (2 Marks)

- Design 2–3 static social media post visuals using Canva or similar.
- Create 1 ad mockup for Instagram or Facebook (image or video reel).
- Use brand-aligned colors, typography, and messaging.

Deliverable: Image exports or PDF of designs

3. Ad Campaign Strategy (2 Marks)

- Define ad objective (e.g., traffic, leads, reach).
- Set up an **ad plan** including:
 - Platform
 - Target audience (age, interest, geo)
 - Budget
 - Call-to-action (CTA)
- Include 2 creative variations (A/B testing concept)

Deliverable: 1-page campaign strategy doc

4. Performance Reporting Template (2 Marks)

- Create a **mock analytics dashboard** for client reporting
 - Include placeholders for Reach, Engagement, CTR, CPC
 - Use tables or charts
- Add a short client summary template (100–150 words)

Deliverable: PDF analytics report template



5. Proposal Document (1 Mark)

- Write a short freelance proposal (~200 words) including:
 - Campaign scope
 - Deliverables
 - Timeline
 - Price (mock value)
 - Call-to-action

Deliverable: Proposal in PDF or DOCX

Bonus (Optional – 1 Mark):

- Submit project files (Canva/Figma links, .docx, editable report templates)
- Record a 2-minute **mock client pitch video** or presentation

Submission Requirements:

- One zipped folder or Drive folder containing:
 - Content calendar + strategy
 - Visuals (JPEG/PNG or PDF)
 - Campaign strategy doc
 - Reporting template
 - Proposal
 - (Bonus) Source files or pitch video

Evaluation Rubric

Task	Marks
Content Calendar & Strategy	3
Visuals + Ad Mockup	2
Ad Campaign Strategy	2
Analytics Template	2
Freelance Proposal	1
Bonus (Files or Pitch)	+1
Total	10+1



Social Media Management — Quiz

Total Questions: 30

Total Marks: 5

Instructions: Choose the correct answer from the options (a, b, c, or d)

Multiple Choice Questions

- Which of the following best describes a social media algorithm?
 - A rule for measuring revenue
 - A program that sorts and shows content based on user behavior
 - A manual ranking tool for admins
 - A privacy control feature
- Instagram favors content that is:
 - Static and untagged
 - Shared from external links
 - Timely, engaging, and uses Reels
 - Text-heavy and long-form
- Facebook Groups are mainly useful for:
 - Private content storage
 - Community engagement and niche discussions
 - Sending cold emails
 - Paid advertisements only
- What is a “thought leadership” post on LinkedIn?
 - A meme
 - An unoriginal share
 - Insightful, original content that positions you as an expert
 - Job advertisements
- What is an important element of a freelance proposal?
 - Random pricing
 - Unclear scope
 - Clear deliverables and timeline
 - Only portfolio links

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	b	11	c	21	c
2	c	12	c	22	b
3	b	13	c	23	c
4	c	14	d	24	c
5	c	15	c	25	c



Course Name: Web Development



Course Overview

This 8-week Web Development course focuses on foundational and advanced front-end development, specifically building the Shop Master Project. The journey begins with HTML Fundamentals, including semantic structure, forms, tables, and nesting. The core styling component, CSS, covers syntax, selectors, the Box Model (margin/padding/borders), and advanced layouts using Flexbox for responsive design. Advanced CSS techniques include Transitions, Key frame Animations, debugging, and implementing a Mobile-First Design Approach using Media Queries. The latter half introduces JavaScript, covering basic syntax, Conditionals, Functions, Loops, and core DOM Manipulation. Students will advance to use Arrays, Objects, Array Methods, handle events, perform form validation, and integrate external data using the Fetch API and Async/Await. The course concludes with crucial deployment-readiness skills: implementing Local/Session Storage (for cart functionality), designing product details/checkout pages, and ensuring Cross-Browser Compatibility.

Learning Outcomes

Upon completion of this course, students will be able to:

- Construct a well-structured web page using HTML, applying semantic tags, creating forms, and working with nested elements.
- Style web pages effectively using CSS syntax, selectors, and accurately applying the CSS Box Model (padding, margin, borders).
- Create complex, responsive layouts using Flexbox techniques.
- Implement a Mobile-First design strategy and utilize Media Queries to adjust layouts for different screen sizes.



- Enhance user experience by applying CSS Transitions, Hover Effects, and Key frame Animations.
- Write fundamental JavaScript code using variables, functions, conditionals (if/else), and loops (for/while).
- Dynamically update content and structure via Document Object Model (DOM) manipulation.
- Handle asynchronous data fetching using the Fetch API and A sync /Await to integrate dynamic data into the project.
- Manage client-side data, such as cart information, using Local Storage and Session Storage, and implement form validation.
- Utilize Developer Tools for debugging JavaScript and CSS, and ensure cross-browser compatibility before final presentation.

Instructors Guidelines

The curriculum is organized around practical Hands-On Tasks and Exercises. The incremental development of the "Shop Master Project" should be emphasized weekly to connect theoretical concepts to a real application. Instructors must teach comprehensive debugging skills using browser Developer Tools (Dev Tools) starting in Week 3. Week 8 should focus on final refinement, testing (including mobile responsiveness and cross-browser compatibility), and the Project Presentation.

Assessment Guidelines

Assessment Item	Weighting (Marks)
Mid Term Examination	30 Marks
Final Examination	30 Marks
Project (ShopMaster Project/Final Presentation)	30 Marks
Earning Marks	10 Marks
Total Marks	100 Marks
Passing Threshold	60 Marks

Attendance Policy

90% Attendance is mandatory for all scheduled sessions in this course.

Course Lesson Plan

Week	Days	Topic
Week 01	Day 01	HTML Fundamentals — Document Structure, Basic Tags (Headings, Paragraphs, Lists, Links)
	Day 02	Page Structure — Semantic HTML, Navigation, Linking Pages Together
	Day 03	Forms & Inputs — Form Structure, Input Types, Labels, Placeholder, Fieldset, Search Bar



	Day 04	Nesting, Tables & Divs — Grouping with <div>, Table Creation, Merging Cells (colspan/rowspan)
	Day 05	Project Integration — Build Header, Hero Section, Product Grid for “ShopMaster” Landing Page
	Outcome	By the end of Week 01, students will be able to: <ul style="list-style-type: none"> • Structure web pages using core and semantic HTML elements. • Create functional forms with proper labels and input types. • Organize content using divs, nesting, and accessible tables. • Apply learned concepts to build the foundational layout of a real-world project. • Understand how HTML serves as the skeleton of all websites.
Week 02	Day 01	CSS Basics — Syntax, Selectors, Linking CSS, Styling Text, Backgrounds, Borders
	Day 02	Box Model — Margin, Padding, Border, Box-Sizing, Building a Product Card
	Day 03	Flexbox Intro — Container & Item Properties, Building Responsive Navigation
	Day 04	Advanced Flexbox — Nested Layouts, Alignment, Media Queries, Portfolio Layout
	Day 05	Project: Responsive Product Grid — Build & Style ShopMaster Grid with Hover Effects & Media Queries
	Outcome	By the end of Week 02, students will be able to: <ul style="list-style-type: none"> • Style web pages using CSS selectors, typography, and backgrounds. • Master the CSS Box Model to control spacing and layout. • Build responsive layouts using Flexbox and media queries. • Create interactive product cards with hover states. • Apply layout techniques to develop a mobile-first, responsive project.
Week 03	Day 01	CSS Transitions & Hover Effects — Properties, Timing, Creating Hover Menus
	Day 02	CSS Animations & Smooth Scrolling — Keyframes, Animation Properties, Scroll Behavior
	Day 03	Responsive Design — Media Queries, Breakpoints, Mobile-First Approach, DevTools Testing
	Day 04	Debugging & Polishing — Chrome DevTools, Cross-Browser Testing, Final UI Refinements
	Day 05	Component Integration — Add Animations, Hover Menus, Smooth Scrolling to ShopMaster Project
	Outcome	By the end of Week 03, students will be able to: <ul style="list-style-type: none"> • Add interactivity and polish using transitions, animations, and scroll effects. • Implement fully responsive designs using media queries and mobile-first principles. • Debug layout and styling issues using browser DevTools. • Ensure cross-browser compatibility and UI consistency. • Integrate all visual components into a cohesive, production-ready landing page.
	Day 01	Review: HTML Structure, Forms, Semantic Tags, Project Layout



Week 04	Day 02	Review: CSS Box Model, Flexbox, Media Queries, Responsive Grids
	Day 03	Review: Transitions, Animations, Debugging, Cross-Browser Issues
	Day 04	Practice Quiz + Q&A — Troubleshoot Common Errors, Mini Project Review
	Day 05	Mid Term Examination (Covers Weeks 01–03: HTML, CSS, Responsive Design, Debugging, Project Integration)
	Outcome	By the end of Week 04, students will be able to: <ul style="list-style-type: none"> • Demonstrate mastery of HTML structure and semantic best practices. • Apply CSS layout techniques (Box Model, Flexbox) to build responsive interfaces. • Enhance UX with animations, transitions, and smooth interactions. • Debug and optimize websites for performance and compatibility. • Identify knowledge gaps and solidify front-end fundamentals through mid-term assessment.
Week 05	Day 01	JavaScript Intro — Syntax, Variables, Data Types, Console, Linking JS to HTML
	Day 02	Conditionals & Functions — if/else, switch, function declaration, parameters, return values
	Day 03	Loops & DOM Intro — for/while loops, selecting/manipulating elements (getElementById, querySelector)
	Day 04	Arrays & Objects — Creation, Access, Methods, Combining with Loops for Dynamic Data
	Day 05	Project Integration — Dynamic Product Grid, Interactive Buttons, Basic Form Validation
	Outcome	By the end of Week 05, students will be able to: <ul style="list-style-type: none"> • Write basic JavaScript syntax, variables, and control structures. • Create reusable functions and handle user logic with conditionals. • Manipulate the DOM to dynamically update content and styles. • Store and manage data using arrays and objects. • Bring static pages to life by integrating JS into the ShopMaster project.
Week 06	Day 01	Fetch API & Promises — Making GET/POST requests, handling JSON, error handling
	Day 02	Async/Await — Simplifying async code, chaining API calls, loading dynamic content
	Day 03	Advanced Array Methods — forEach, map, filter — Transforming & Displaying API Data
	Day 04	Error Handling & Debugging — try/catch, debugging async code, DevTools breakpoints
	Day 05	Project: Dynamic Cart & Login — Load products via API, handle user login/register with feedback
	Outcome	By the end of Week 06, students will be able to:



		<ul style="list-style-type: none"> • Connect websites to real APIs using Fetch and Async/Await. • Process and display dynamic data using modern array methods. • Handle errors gracefully in both sync and async JavaScript. • Debug complex JS applications using browser tools. • Implement dynamic cart and user authentication features using API data.
Week 07	Day 01	Local & Session Storage — Saving cart data, user preferences, managing state client-side
	Day 02	Dynamic Product Details — Load & display product info based on URL/route, add to cart
	Day 03	Checkout & Validation — Form validation, calculating totals, simulating checkout flow
	Day 04	Account Page — Displaying user data, editing profile, managing orders (simulated)
	Day 05	Final Integration — Connect cart, product, checkout, and account pages using Local Storage & JS
	Outcome	<p>By the end of Week 07, students will be able to:</p> <ul style="list-style-type: none"> • Persist user data and application state using Web Storage API. • Build dynamic, single-page-like experiences without a backend. • Validate forms and calculate dynamic totals for e-commerce flows. • Create a simulated user account system with editable profiles. • Deliver a fully functional, interactive front-end web application.
Week 08	Day 01	Introduction to Digital Entrepreneurship — Case Studies (Pakistan Startups), Group Discussion: “Why Web Dev Skills = Business Opportunities”
	Day 02	Idea to Business — Brainstorm Marketable Web Dev Skills (Landing Pages, E-commerce, APIs), Map to Services, Write 3 Business Ideas + Peer Feedback
	Day 03	Building Teams & Communication — Role Distribution (Frontend, Backend, QA), Digital Tools (GitHub, Slack, Figma), Mini-Project: 3-Minute Team Pitch
	Day 04	Personal Branding for Developers — LinkedIn Optimization, Portfolio (GitHub Pages/CodePen), Freelance Profiles (Fiverr/Upwork), Social Media for Client Acquisition
	Day 05	Final Exams (Covers Weeks 01–07: HTML, CSS, JavaScript, DOM, APIs, Local Storage, Project Integration + Reflection on Freelancing, Branding, Entrepreneurship Concepts)
	Outcome	<p>By the end of Week 08, students will be able to:</p> <ul style="list-style-type: none"> • Define digital entrepreneurship through the lens of web developers. • Convert technical skills (responsive design, JS interactivity, API integration) into sellable freelance services or products.



		<ul style="list-style-type: none"> • Develop 3 viable business ideas — e.g., “Landing Page Factory”, “E-commerce Mini-Sites”, “API-Powered Web Apps”. • Build collaborative dev teams and pitch web solutions using professional tools and communication. • Create a standout LinkedIn profile and online portfolio showcasing live projects, code repositories, and case studies. • Set up and optimize Fiverr/Upwork profiles with compelling gigs like “I Will Build Your Responsive Website” or “I Will Fix Your JavaScript Bugs”. • Understand how to land first clients, manage feedback, and scale into a web development agency. • Demonstrate mastery of core web development concepts — from semantic HTML to dynamic cart systems. • Leave the course with a personal roadmap to launch a freelance web dev career or tech-enabled business.
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Web Development Assignment:

E-commerce Website Landing Page

Freelance Scenario:

You have been hired as a freelance web developer by a new e-commerce startup, "TrendyBazaar." They need a professional, responsive, and modern landing page to showcase their new line of sustainable fashion. The page must be visually appealing, user-friendly, and demonstrate an understanding of core front-end and back-end concepts. The client has provided a basic wireframe and content, and your task is to bring it to life while ensuring clean, well-documented code.

Project Details:

Your main task is to create a single-page website that serves as a landing page for "TrendyBazaar." The page should be designed to entice visitors to explore the products and brand. Think about the user's journey: they land on the page, are presented with a clear value proposition, see some featured products, and have a way to engage with the brand (e.g., through a newsletter). The design should reflect the "sustainable" theme with a clean, modern aesthetic.

Assignment Tasks:

1. HTML Structure (2 Marks)

This task focuses on building the semantic foundation of the page.

- **Create the basic HTML structure** for the landing page using HTML5 standards. Your file should be named `index.html`.
- **Implement a header** with the company name "TrendyBazaar" and a navigation menu. The menu should include placeholder links like Home, Shop, About Us, and Contact.



- **Include a main hero section.** This should be the first thing a user sees. It must contain a prominent headline (e.g., "Sustainable Style, Effortless Elegance"), a sub-headline, and a call-to-action (CTA) button labeled "Shop Now".
- **Create a product showcase section.** This section should display at least three featured products. For each product, you must include an image, the product name (e.g., "Organic Cotton T-Shirt"), and the price.
- **Add a footer** with copyright information (e.g., "© 2025 TrendyBazaar") and placeholder links to social media profiles.
- **Use semantic HTML tags** where appropriate (e.g., <header>, <nav>, <main>, <section>, <footer>) to improve accessibility and search engine optimization.

2. CSS Styling and Responsiveness (4 Marks)

This task involves making the page look good and function correctly on different devices.

- **Style the page** using a separate external CSS file named `style.css`. Avoid using inline styles.
- **Apply a consistent color scheme and typography** to match a modern e-commerce brand. Consider using a limited palette of 3-4 colors and a clean, legible font for the body text.
- **Make the page responsive** using CSS media queries to ensure it looks good on both desktop and mobile devices. For example, the product cards in the showcase section should stack vertically on smaller screens, and the navigation menu should transform.
- **Add hover effects** to interactive elements like buttons and links for a more dynamic user experience. For example, change the background color of the "Shop Now" button when a user hovers over it.
- **Implement a flexible layout** for the product showcase section using either CSS Grid or Flexbox. This is crucial for a responsive design.

3. JavaScript Interactivity (2 Marks)

This task requires you to add dynamic functionality to the page.

- **Implement a "hamburger" menu functionality** using a JavaScript file named `script.js`. On a mobile viewport, clicking a hamburger icon should show the hidden navigation links, and clicking it again should hide them.
- **Add a form to the page** (e.g., a newsletter sign-up form) that validates user input using JavaScript. The form must prevent submission if the email input field is empty or contains an invalid format (i.e., missing the "@" symbol).
- **Show a confirmation message** upon successful form validation. This message (e.g., "Thank you for subscribing!") should appear temporarily to provide user feedback.

4. Backend Mockup & Deployment (2 Marks)

This task bridges the gap between front-end design and back-end logic.

- **Simulate a simple backend interaction.** Instead of sending the form data to a real server, create a dummy JavaScript function that logs the form data to the browser's console upon submission. This shows you understand the first step of a server-side request.



- **Describe the concepts** of what would happen if a form like this was to be submitted to a live server. In a separate text file or as comments in your code, explain the role of an API endpoint, a server-side language (e.g., Python or Node.js), and a database in a real-world scenario.
- **Explain the role of a server** in a web application.

Submission Requirements:

- Submit your project files in a single folder.
- The folder should contain `index.html`, `style.css`, and `script.js`.
- The code must be clean, well-indented, and include comments explaining complex sections.
- All features must be fully functional.

Evaluation Rubric:

Task	Marks
HTML Structure & Semantics	2
CSS Styling & Responsiveness	4
JavaScript Interactivity	2
Backend Mockup & Explanation	2
Total	10

Estimated Time to Complete: 8-12 hours

This assignment requires students to plan the page structure, apply web design best practices, create a responsive layout, and demonstrate a foundational understanding of front-end and back-end concepts—mimicking a real freelancing job

Web Development Quiz

Total Marks: 5

Instructions: Choose the correct option (a, b, c, or d).

Questions:



1. What does HTML stand for?
 - a) HyperText Markup Language
 - b) HighText Machine Language
 - c) Hyper Transfer Markup Language
 - d) Home Tool Markup Language
2. Which HTML tag is used to create the largest heading?
 - a) <h6>
 - b) <heading>
 - c) <h1>
 - d) <head>
3. Which attribute is used in <a> tag to define the destination URL?
 - a) src
 - b) href
 - c) link
 - d) url
4. Which HTML element is used for inserting a line break?
 - a) <break>
 - b)

 - c) <lb>
 - d) <newline>
5. Which of the following is a semantic HTML element?
 - a) <div>
 - b)
 - c) <section>
 - d)

Answer Key:

Q#	Ans	Q#	Ans	Q#	Ans
1	a	11	d	21	d
2	c	12	d	22	b
3	b	13	a	23	b
4	b	14	b	24	c
5	c	15	b	25	c