National University
Bangladesh

Syllabus for Postgraduate Diploma in Information & Communication Technology (PGD in ICT)
Effective from the Session: 2023-2024

Last Updated on 04.06.2023

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First Semester (Five courses)

Course Code	Course Title	Credits
817401	Introduction to ICT	4
817403	Office Automation	4
817405	JAVA Programming	4
817407	Database Management Systems	4
817409	Multimedia Design and Developments	4
	Total	**20**

Second Semester (Four courses and project/ intern)

Course Code	Course Title	Credits
827411	System Maintenance & Troubleshooting	4
827413	Computer Networks Maintenance	4
827415	Mobile Application Development	4
827417	Web Application & Web Site Design	4
827418	**Project/ Intern**	4
	Total	**20**

Course Code	Course Title	Credits
827418	**Project/ Intern**	**4**

Course Outline

Duration of Program	One academic year consisting of two semesters			
Duration of each Semester	Six months			
Total Credit Hour	40			
Credit in each Course	4			
Course Structure		Course	Project Work	Total credit
	Semester I	05	-	4x5= 20
	Semester II	04	4 credit	(4x4)+4=20
			Grand Total Credit	20+20=40
			Grand Total Marks	1000

Detail Syllabus

Course Code : 817401		Cradit-4	Class Hours: 40
Course Title :		Introduction to ICT (Theory: 50%, Practical: 50%)	

Course Objectives	The objectives of this course are: 1. To learn the basic concepts of information technology 2. To learn the IT fundamentals and its applications. 3. To understand the basic terms regarding e-commerce, information security, and information management.
Course Contents	Fundamentals of ICT and its applications, impact, and effects of ICT**;** Computer fundamentals: organization, memories & I/O devices, software: Operating System. Programming language, computer network, data communication, video communication. Internet: browsers and search engines, email and digital communications, collaborative computing and social networking, IT security, ICT ethics and other issues. E-commerce: Electronic Payment Systems, Facebook marketing, Online Banking, Online publishing; E-governance, Virtual Learning**,** Multimedia, 4IR, IoT. Web conferencing: zoom, Google Meet. **Lab:** MS-office software (MS-word, MS- Excel, MS-PowerPoint, Outlook, etc.), Basic Internet: Browsing and Email, Google Drive, Google Classroom, Google web services (Google doc, Google sheet, Google slide, Google form, Google map, etc.), web conferencing using zoom, Google meet.
Learning Outcomes	After completing this course satisfactorily, a student will be able to: 1. Have a basic introduction to information and communication technologies and their application in the workplace. 2. Have a basic understanding of computer software, hardware, and associated technologies. 3. Have essential learning about using computers in the workplace. 4. Have basic knowledge of Internet technologies and how they can influence the workplace.
References	

Course Code: 817403		Cradit-4	Class Hours: 40
Course Title:		Office Automation (Theory: 50%, Practical: 50%)	

Course Objectives	The objectives of this course are: 1. To acquire knowledge about different office automation tools and techniques.
Course Contents	**Hardware setup:** Assembly of different components of a computer; CPU, RAM, Graphics card, network card, printer, scanner, webcam, keyboard, projector. **Software setup:** windows OS, Linux OS, driver software, software installation and maintenance, antivirus, remote desktop, **Web Application setup:** Web conference, virtual classroom, cloud services, online educational platform, online business platform, e-mail (outlook, thunderbird, etc.) **Graphics tools:** Adobe Photoshop, Adobe Illustrator, Flash **Smart Technology:** Features of Mobile Apps, Applications of Mobile Apps. IoT sensors, IoT-based Smart solutions, Industrial Internet of Things, and Industry 4. **Lab:** Based on theory
Learning Outcomes	After completing this course satisfactorily, a student will be able to: 1. Set up and use different hardware, application software, web application apps, and graphical tools 2. Use different types of operating systems 3. Know smart technologies and their applications.
References	1. Adobe Photoshop User Guide 2. Adobe Illustrator User Guide 3. Internet of Things (IoT) Concepts and Applications (2020), editor MansafAlam, KashishAra, and ShakilSamiya Khan, Springer Nature Switzerland.

Course Code: 817405		Cradit-4	Class Hours: 40
Course Title:	JAVA Programming (Theory: 50%, Practical: 50%)		

Course Objectives	The objectives of this course are: 1. To teach principles of object-oriented programming paradigm including abstraction, encapsulation, inheritance, and polymorphism. 2. To impart fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 3. To inculcate concepts of inheritance to create new classes from existing one & Design the classes needed to give a problem specification; 4. To familiarize the concepts of packages and interfaces. 5. To facilitate students in handling exceptions.
Course Contents	Introduction to programming and logic flow, the evolution of programming language, examples of different programming languages, programming language trends in different real-time problem solutions; procedural versus object-oriented programming, JAVA: Environment Setup, Basic Syntax, Objects & Classes, Basic Data types, Variable Types, Modifier Types, Basic Operators, Loop Control, Decision Making, Arrays, Regular Expressions, Date & Time, Methods, Files and I/O, Exceptions, Inner Classes, Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Socket Programming. **Lab:** Programming in Java
Learning Outcomes	After completing this course satisfactorily, a student will be able to: 1. Have a theoretical concept of JAVA programming language 2. Able to solve real-life problems using JAVA.
References	1. Marc Loy, Robert Eckstein, Dave Wood, (2002), Java Swing, O'Reilly Media inc, USA 2. Herbert Schildt, (2018), Java: A Beginner's Guide, Eighth Edition, McGraw-Hill 3. Harvey Deitel and Paul Deitel, (2018), Java How to Program, Early Objects, 11th Edition, Pearson

Course Code: 817407		Cradit-4	Class Hours: 40
Course Title:		**Database Management Systems (Theory: 50%, Practical: 50%)**	

Course Objectives	The objectives of this course are: 1. To list and explain the fundamental concepts of a relational database system. 2. To analyze database requirements and determine the entities involved in the system and their relationship to one another. 3. To develop the logical design of the database using data modeling concepts such as entity-relationship diagrams. 4. To create a relational database using a relational database package. 5. To manipulate a database using SQL.
Course Contents	Introduction to database, Relational model: structure, relational algebra, SQL and advanced SQL, Database design and the entity-relationship model, Relational database design and normalization, indexing, Database storage and file structure, transaction management, concurrency control recovery management, object database and database administration. Query structure, frontend-backend connection. **Lab:**MySQl using Navicat
Learning Outcomes	After completing this course satisfactorily, a student will be able to: 1. have a broad understanding of database concepts and database management system software 2. have a high-level understanding of major DBMS components and their function 3. be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model. 4. be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS. 5. be able to program a data-intensive application using DBMS APIs.
References	1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, (2019), Database System Concepts, Seventh Edition, McGraw-Hill, New Delhi, India 2. John Russel, (2019), SQL: The Ultimate Beginner's Guide to Learn SQL Programming and Database Management Step-by-Step, Including MySQL, Microsoft SQL Server, Oracle, and Access

Course Code: 817409		Cradit-4	Class Hours: 40
Course Title:	Multimedia Design and Developments (Theory: 50%, Practical: 50%)		

Course Objectives	The objectives of this course are: 1. To introduce the principles and current technologies of multimedia systems. Issues in effectively representing, processing, and retrieving multimedia data such as sound and music, graphics, images, and video will be addressed. 2. To gain hands-on experience in those areas by implementing some components of a multimedia streaming system as their term project. The latest Web technologies and some advanced topics in current multimedia research will also be discussed.
Course Contents	Introduction to multimedia: image, sound, video formats, and their different properties, Drawing: Basic image properties, How to set/change them in Photoshop, Concepts of layers, colors, text, texture, brightness, contrast, filters, and effects, Photoshop Print production, Photoshop Web Production, Introduction to Macromedia Director, Illustrator and Premier, Animation creating software (Media studio/ Video studio etc), its use, facts to concern while marketing, Multimedia-content creation, Video editing, Impact analysis of photo and video. Lab:
Learning Outcomes	After completing this course satisfactorily, a student will be able to: 1. Understand the principles and current technologies of multimedia systems. 2. Become familiar with the latest Web technologies and some advanced topics in current multimedia research.
References	1. Ze-Nian Li, Mark S. Drew, Jiangchuan Liu, (2021), Fundamentals of Multimedia, Third Edition, Springer

Course Code: 827411		Cradit-4	Class Hours: 40
Course Title:	System Maintenance and Troubleshooting (Theory: 50%, Practical: 50%)		

Course Objectives	The objectives of this course are: 1. To provide the concept of
Course Contents	**Hardware/device replacement** **Install components within the display of a laptop:** LCD, OLED, Wi-Fi antenna connector/ placement, Webcam, Microphone, Inverter, Digitizer/touchscreen **Laptop features:** Special function keys, Docking station, Port replicator, Physical laptop lock, and cable lock, Rotating/removable screens **Configure Basic Mobile Device Network Connectivity And Application Support.** **Mobile Device Synchronization** **Basic cable types and their connectors, features, and purposes.** Network cables, Peripheral cables, Video cables, Hard drive cables, Adapters, and Connector types **Install the appropriate RAM.** **Install storage devices:** Hard drives, SSDs, Drive configurations, Removable storage **Install and configure motherboards, central processing units (CPUs), and add-on cards.** Motherboard form factor, Motherboard connector types. Motherboard compatibility, Basic Input/Output System (BIOS)/Unified Extensible, CPU architecture, Expansion cards, cooling; **Install or replace the appropriate power supply;** **Configure multifunction devices/ printers and settings:** Properly unboxing a device, setup location considerations, Public/shared devices, Printer share, Print server, Configuration settings, Security, Device Connectivity, Network scan services, Automatic document feeder (ADF)/flatbed scanner, Use appropriate drivers for a given OS. **Install and replace printer consumables:** Laser, Inkjet, Thermal, Impact, 3-D printer; **Lab:**
Learning Outcomes	After completing this course satisfactorily, a student will be able to: 1. Troubleshoot System Unit, Component of Motherboard, Processor, Bus Architecture & Interfaces, Laptop De-assembly and Assembly, PC De-assembly and Assembly, Networking, Network troubleshooting and Maintenance. 2. Perform Common software problem and its solution, 3. Perform Data Backup and Recovery plan.
References	1. CompTIA A+ Complete Study Guide 2. D Balasubramanian, (2015), Computer Installation And Servicing, Second Edition, McGraw-Hill, New Delhi,India 3. Mark Minasi, (2005), The Complete PC Upgrade & Maintenance Guide, Sixteenth Edition, Sybex

Course Code: 827413	Cradit-4	Class Hours: 40
Course Title:	Computer Networks Maintenance (Theory: 50%, Practical: 50%)	

Course Objectives	The objectives of this course are: 1. To configure switches and end devices to provide access to local and remote network resources. 2. To explain how physical and data link layer protocols support the operation of Ethernet in a switched network. 3. To configure routers to enable end-to-end connectivity between remote devices. 4. To create IPv4 and IPv6 addressing schemes and verify network connectivity between devices 5. To explain how the upper layers of the OSI model support network applications. 6. To configure a network with security best practices. 7. To troubleshoot connectivity in a network.
Course Contents	**(TCP) and User Datagram Protocol (UDP) ports, protocols, and their purposes;** **Networking hardware:** Routers, Switches, Access points, Patch panel, Firewall, Power over Ethernet (PoE), Hub, Cable modem, Digital subscriber line (DSL), Optical network terminal (ONT), Network interface card (NIC), Software-defined networking (SDN), ; **Install and configure a basic wired/wireless SOHO network;** **Protocols for wireless networking;** **Internet Protocol (IP) addressing and subnet:** IPv4, IPv6; **Common network configuration concepts:** DNS, DHCP, Virtual LAN (VLAN), Virtual private network (VPN); **Internet connection types, network topologies, network types, and their features:** i. Internet connection types: Satellite, Fiber, Cable, DSL, Cellular, Wireless Internet service provider (WISP); ii. Network topologie**s:** Mesh, Star, Bus, Ring, Hybrid iii. Network types: LAN, WAN, PAN, MAN, SAN, WLAN; **Networking Tools:** Crimper, Cable stripper, Multimeter, Tone generator and probe, Cable tester, Loopback plug, Punchdown pool, Wi-Fi analyzer; Lab: Use of Network Simulation Program (example: Packet tracer) 10 lab experiments
Learning Outcomes	After completing this course satisfactorily, a student will be able to: 1. Build simple LANs, perform basic configurations for routers and switches, and implement IPv4 and IPv6 addressing schemes. 2. Configure routers, switches, and end devices to provide access to local and remote network resources and to enable end-to-end connectivity between remote devices. 3. Develop critical thinking and problem-solving skills using real equipment and Cisco Packet Tracer. 4. Configure and troubleshoot connectivity to a network using security best practices.
References	1. CompTIA A+ Complete Study Guide 2. CCNA- Todd Lammle, LLC 3. Data Communications and Networking - Behrouz A. Forouzan

Course Code: 827415		Cradit-4	Class Hours: 40
Course Title:		Mobile Application Development (Theory: 50%, Practical: 50%)	

Course Objectives	The objectives of this course are: 1. To provide comprehensive knowledge of basic java programming 2. To build up the trainees as successful Mobile Application Developers 3. To make the students familiar with Location-based service 4. To introduce them with basic to advanced topics of Android
Course Contents	**Android Overview** Course objectives, Introduction to Android framework, Development environment, Android SDK overview, Create a Hello World application in Android **Java Overview** Object Oriented Concept, Java Basics: Data Types, Conditions, Loops, Arrays, Classes and Objects **More on Java** Inheritances, Basic GUIs, Multi-threading, Writing Java applications **Basic Building Blocks of an Android Application** Component introduction, Activity, life cycle, View, Intent, Project organization (directories), Manifest, Resource directories, Debugging an Android application **Basic Android User Interface** Layouts, Widgets: Button, TextView, Event listeners, SlidingDrawer, ScrollView, TabWidget, Screen size and screen orientation **Advanced Android User Interface** OptionMenu, CheckBox, DatePicker/TimePicker, ImageButton, ProgressBar, RadioGroup/RadioButton, Dialog:Alert, Custom, List, Radio **Advanced Android System Components** Context, Application, BroadcastReceiever, Threads (intro/review), Handlers/Loopers/Message Queues, Main UI Thread, AsyncTask, Services (Local and Remote) **SQL Database** Introduction to SQLite, Creating, opening, and closing a database, Working with inserts, updates, queries and deletes, **Networking** Network Services, HTTP review, REST, JSON/XML/HTTP, ConnectivityManager **Multimedia and Content Providers in Android** Simple media playback, Simple video playback, Content providers MIME types, Adding, changing, and removing content **Mapping and Location Based Services** Using location based services, Setting up your emulator with location based services, Creating Map-based activities **Lab: Develop an Android app**
Learning Outcomes	1. The students will learn how to develop applications for Android mobile devices 2. The students will be eligible for millions of jobs around the world 3. The students will be able to develop mobile applications with underlying database supports 4. The students will be able to develop mobile applications that can smartly communicate with server applications 5. The students will be able to develop multimedia and location-based applications for Android devices
References	1. Bill Phillips, Brian Hardy, (2013), Android Programming: The Big Nerd Ranch Guide, First Edition, Addison-Wesley Professional 2. Rajiv Ramnath, Roger Crawfis, Paolo Sivilotti, (2011), Android 3 SDK Programming For Dummies, First Edition, Wiley

Course Code: 827417		Cradit-4	Class Hours: 40
Course Title:		Web Application &Web Site Design (Theory: 50%, Practical: 50%)	

Course Objectives	The objectives of this course are: 1. To get a clear concept of web applications 2. To get a clear concept of raw HTML and CSS. 3. To be familiar with html5 and CSS3, the up-to-date technology. 4. To secure the website and make it more interactive with the features of JavaScript and JQuery. 5. To learn to use Dynamic HTML. 6. To develop skills in CMS tools like WordPress, Joomla, etc. 7. To develop a website rapidly using the CMS tools by writing fewer lines of code.
Course Contents	Web application definition with example, the concept of cloud storage, Web database, e-commerce setup, payment gateway, SMS or mailing services. Content uploading, YouTube content management; ### HTML HTML Basic, Elements, Attributes, Headings, Paragraphs, Formatting, Links, Images, Tables, Lists, Blocks, Layout, Forms, Colors, Color names, Color values, DOCTYPE, Head, Scripts, Entities, URLs, URL Encode, Web server. ### XHTML XHTML Introduction, Elements, Attributes ### HTML5 HTML5 Introduction, New Elements, Video, Video/DOM, Audio, Drag and Drop, Canvas, SVG, Canvas vs. SVG, Input Types, Form Elements, Form Attributes. ### CSS CSS Introduction, Syntax, Id & Class, Styling: Backgrounds, Text, Fonts, Links, Lists, Tables. Box Model: Border, Outline, Margin, Padding. Advanced: Grouping/Nesting, Dimension, Display, Positioning, Floating, Align, Pseudo-class, Pseudo-element, Navigation Bar, Image Gallery, Image Opacity ### CSS3 CSS3 Introduction, Borders, Backgrounds, Text Effects, Fonts, 2D Transforms, 3D Transforms, Transitions, Animations, Multiple Columns, User Interface. ### JavaScripts Javascripts Basics: Introduction, Statements, Comments, Variables, Operators, Comparisons, If...Else, Switch, Popup Boxes, Functions, For Loop, While Loop, Break Loops, For...In, Events, Try...Catch, Throw, Special Text. Objects: Objects Introduction, String, Date, Array, Boolean, Math, RegExp. Advanced: Validation, Timing. ### DOM What is the DOM?, DOM Nodes, Node Parents, Children, and Siblings, HTML DOM Properties, HTML DOM Methods, Navigating Node Relationships, HTML DOM - Change HTML Elements. ### jQuery jQuery Introduction, Syntax, Selectors, Events, Effects, Callback, HTML,CSS ### DHTML DHTML Introduction, JavaScript, HTML DOM, Events, CSS. ### WordPress Introduction to Blogging, WordPress Semantics, Images in WordPress, Post Formats, Linking to Posts, Pages, and Categories, Using Smilies, Links Manager, WordPress Feeds, Customizing Feeds, Gravatars in WordPress, Writing Code in Posts, Password Protection. Design: Colour Scheme, Designing Headers, CSS Horizontal Menus, Dynamic Menu Highlighting, Good Navigation Links, Next and Previous Links, Styling for Print, Formatting Date and Time, Styling Lists with CSS, Designing Headings, Fonts, Favicon. Theme development.

	Joomla
	Joomla: editing an Article, creating a new Article, adding links to other pages, adding a table, adding a picture, splitting a long article, Manipulating and publishing Articles using the Front-end. Background: Back-end, controlling user access to a Joomla Site, design the content, Categories, design appearance using Menus and Modules, design appearance using default Templates, setting up a Joomla Site, Administration of a Joomla site. Lab: Design a website and develop a web-based application
Learning Outcomes	Students completing this course successfully will be able to - ● Design a highly professional, interactive, and dynamic website in a short time. ● Enriched with the knowledge of working with the latest technologies like html5 and CSS3 ● Design a reasonable, marketable, and professional website quickly using the CMS tools.
References	1. https://www.w3schools.com/(Online resources)

Course Code: 827418			
Course Title:	**Intern (100)**		

Course Objectives	
Course Contents	
Learning Outcomes	
References	