



CENTRE OF EXCELLENCE IN INFORMATION TECHNOLOGY (CEIT)



UNIVERSITY OF PAPUA NEW GUINEA



CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

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Independent State of
PAPUA NEW GUINEA

Centre of Excellence in IT

A premier institute for training and enhancement of Information Technology skills funded by the Government of the Republic of India in collaboration with the government of the Independent State of Papua New Guinea and operated in association with University of Papua New Guinea (UPNG) and Centre for Development of Advanced Computing (C-DAC).

Vision

Create a pool of knowledge workers and generate employment opportunities by producing world class IT professionals.

Mission

- To emerge as a premier platform in Information and Communication Technologies in Papua New Guinea country for human advancement.
- To generate knowledge with the dissemination of cutting edge ICT programs, for promoting professional and economic growth.
- To groom the students to work on current technology as well as prepare them to keep pace with the changing face of technology and the requirements of the growing IT industry.
- To create an industry-ready talent pool to cater the Information and communications technology (ICT)

About CEIT

“Centre of Excellence in IT” in Papua New Guinea- National Capital District at University of Papua New Guinea (UPNG), is the outcome of the interest of the Papua New Guinea government in seeking assistance from India for development of ICT in Papua New Guinea.

A MoU was signed between the two countries for training in the specialized field of IT and expanding the area of cooperation between the two countries in these fields. The Government of India proposed the setting up of CEIT having international outreach for imparting ICT education in Papua New Guinea. The Ministry of External Affairs (MEA), Government of India, entrusted the responsibility for setting up of a CEIT at UPNG in Papua New Guinea- National Capital District, to Centre for Development of Advanced Computing (C-DAC).

CEIT is targeted to offer courses on basic IT education, intermediate and advanced level certificate courses as well as courses to bridge the gap between academia and industry.

CEIT offers latest courseware and reference books for training of Teachers, Students, Government Officials & Working Professionals.

Through its state-of-the-art training methodology, it will fulfill its objective of creating highly skilled IT resources and will be recognized by major corporate in Papua New Guinea. Majority of the students will get placed and shall acquire high positions in the industry. At one front, the Institute will assist Papua New Guinea to leapfrog into IT and at the other hand will bridge the digital divide of urban and rural students.

CEIT will produce value-added human capital for research & software development in Papua New Guinea. The quality of education at other higher learning institutions in the other region of Papua New Guinea will be improved by CEIT educated faculty & trained students

About C-DAC

Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the Ministry of Electronics and Information Technology (MeitY) for carrying out R&D in IT, Electronics and associated areas.

C-DAC has today emerged as a premier R&D organization in IT&E (Information Technologies and Electronics) in the country working on strengthening national technological capabilities in the context of global developments in the field and responding to change in the market need in selected foundation areas.

As an institution for high-end Research and Development (R&D), C-DAC has been at the forefront of the Information Technology (IT) revolution, constantly building capacities in emerging/enabling technologies and innovating and leveraging its expertise, caliber, skill sets to develop and deploy IT products and solutions for different sectors of the economy, as per the mandate of its parent, the Ministry of Electronics and Information Technology, Ministry of Communications and Information Technology, Government of India and other stakeholders including funding agencies, collaborators, users and the market-place.

Advanced Computing Training School (ACTS)

CDAC had set up the Advanced Computing Training School (ACTS) as the top finishing school in IT training to meet the ever-increasing skilled manpower requirements of the IT industry as well as supplement its intellectual resource base for cutting edge R&D. Through its state-of-the-art training methodology, it is fulfilling its objective of creating highly skilled IT resources and recognized by major corporate in India to be a preferred high-end provider of skilled manpower in areas of ICT.

International Cooperation Division (ICD)

Over the years International Cooperation Division (ICD) CDAC Delhi has progressively grown to build an eco-system and institutional framework and acquired necessary expertise, strength and technical resources by implementing, supervising and managing large bi-lateral projects in developing countries. Till today CDAC-ICD Delhi has successfully implemented over 50 projects in Africa, East Europe, South-East Asia, Central Asia, Middle East, Arab, Latin America and Pacific Island Countries in close association with Ministry of External Affairs (MEA) and Ministry of Electronics & IT(MeitY), Government of India.

About UPNG

The University of Papua New Guinea (UPNG) is a university located in Port Moresby, capital of Papua New Guinea. It was established by ordinance of the Australian administration in 1965.

The UPNG offers various programs in Medicine, Pharmacy, Health Sciences, Physical and Natural Sciences, Law, Business, Humanities, Social Sciences, Sustainable Development fields.

Vision

The Vision of the University of Papua New Guinea is to be the Premier University dedicated to excellence and providing quality education, research, and service to Papua New Guinea and the Pacific.

Mission

The Mission of the University of Papua New Guinea is to deliver excellent education and research results for nation building and global advancement towards an innovative and empowered society.



Offered Courses

SL No	Certificate Courses	Duration (Hours)	Fee
1	Certificate Course in Advanced Web Technology	320	K – –
2	Certificate Course in Java Programming	320	K – –
3	Certificate Course in Database Management	320	K – –
4	Certificate Course in Android Programming	320	K – –
5	Certificate Course in Linux System Administration	320	K – –
6	Certificate Course in Network Security	320	K – –
7	Certificate Course in Data Communication and Networking	144	K – –
8	Certificate Course in Office Automation	144	K – –
9	Certificate Course in Information Technology	180	K – –
10	Certificate Course in Software Testing	320	K – –
11	Certificate Course in MS.Net	320	K – –
12	Certificate Course in Internet of Things	320	K – –
13	Certificate Course in Big Data Technologies	320	K – –
14	Certificate Course in Big Data Analytics	320	K – –
15	Certificate Course in Ethical Hacking & Information Security	320	K – –
16	Certificate Course in Network Administration	320	K – –
17	Certificate Course in Multimedia Website Designing	320	K – –
SL No	PG Diploma Courses	Duration (Hours)	Fee
18	PG-Diploma in Advanced Computing	900	K – –
19	PG-Diploma in IT Infrastructure, Systems and Security	900	K – –
20	PG-Diploma in Big Data Analytics	900	K – –
21	PG-Diploma in Artificial Intelligence	900	K – –

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Certificate Course in Office Automation	26
Certificate Course in Multimedia Website Designing	26
Certificate Course in Data Communication and Networking	27
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PG-Diploma in IT Infrastructure, Systems and Security	32
PG-Diploma in Big Data Analytics	36
PG-Diploma in Artificial Intelligence	40

Certificate Course in Big Data Technologies

The objective of this course is to provide the student with an expertise in Big Data Technologies. This includes concepts and use of big data technologies along with concepts of Linux programming, Python programming, Data mining. After doing the course, the student will be able to use and provide various solutions using Big Data Technologies.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

The objective of Certificate Course in Big Data Technology (CCBDT) is to provide the student with an expertise Big data analytic domain. Analyze the big data using intelligent techniques. Applications using Map Reduce Concepts. After the completion of the course, students can work in Big Data hadoop, Map Reduce, HBase, Hive.

Course Content

SL No	Modules	Hours
1	Fundamentals of Linux programming	40
2	Python Programming	40
3	Database Concepts and Data Collection	40
4	Big Data Technologies	100
5	Effective Communication and Soft Skills	60
6	Project	40

Detailed Syllabus

Fundamentals of Linux programming (40 Hrs)

Linux History and Operation, Installing and Configuring Linux, Shells, Commands and Navigation, Common Text Editors, Administering a Linux Printer Queue, Introduction to Users and Groups, Linux kernel, The Ext2 File-system, Linux shell scripting.

Python Programming (40 Hrs)

Introduction to Python, Basic Syntax, Data Types, Variables, Operators, Input/output, Flow of Control (Modules, Branching), If, If- else, Nested if-else, Looping, For, While, Nested loops, Control Structure, Break, Continue, Pass, Strings and Tuples, Accessing Strings, Basic Operations, String slices, Working with Lists, Introduction, Accessing list, Operations, Function and Methods, Files, Modules, Dictionaries, Functions and Functional Programming, Declaring and calling Functions, Declare, assign and retrieve values from Lists, Introducing Tuples, Accessing tuples.

Database Concepts & Data Collection (40 Hrs)

Database Concepts (File System and DBMS), Database Storage Structures (Tablespace, Control files, Data files), Structured and Unstructured data, SQL Commands (DDL, DML & DCL), Dataware Housing concept and tools (ETL tools), No-SQL, Data Models – XML, working with MongoDB).

Big Data Technologies (100 Hrs)

Introduction to Big Data– Big data definition, enterprise / structured data, social /unstructured data, unstructured data needs for analytics, What is Big Data, Big Deal about Big Data, Big Data Sources, Industries using Big Data, Big Data challenges.

Hadoop

Introduction of Big data programming–Hadoop, History of Hadoop, The ecosystem and stack, The Hadoop Distributed File System (HDFS), Components of Hadoop, Design of HDFS, Java interfaces to HDFS, Architecture overview, Development Environment, Hadoop distribution and basic commands, Eclipse development, The HDFS command line and web interfaces, The HDFS Java API (lab), Analyzing the Data with Hadoop, Scaling Out, Hadoop event stream processing, complex event processing, MapReduce Introduction, Developing a Map Reduce Application, How Map Reduce Works, The MapReduce Anatomy of a Map Reduce Job run, Failures, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features, Real–World MapReduce.

Introduction to Pig and HIVE

Programming Pig: Engine for executing data flows in parallel on Hadoop, Programming with Hive: Data warehouse system for Hadoop, Optimizing with Combiners and Partitioners (lab), More common algorithms: sorting, indexing and searching (lab), Relational manipulation: map–side and reduce–side joins (lab), evolution, purpose and use, HDFS – Overview and concepts, data flow (read and write), interface to HDFS (HTTP, CLI and Java API), high availability and Name Node federation, Map Reduce developing and deploying programs, optimization techniques, Map Reduce Anatomy, Data flow framework programming Map Reduce best practices and debugging, Introduction to Hadoop ecosystem, integration R with Hadoop.

Effective Communication and Soft Skills (60 Hrs)

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non–verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Internet of Things

Certificate Course in IoT aims to groom the students to enable them to work on technologies such as NodeJS and Python for development and embedded Linux to develop for IoT.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

Candidates will be trained in communication protocols, tools like NodeJS and Python for development and embedded linux.

After the completion of the course, students can work as a Software Developer or Programmer /IT Support staff/ Trainee / Technical Support for the IoT based products and its associated service sectors.

Course Content

SL No	Modules	Hours
1	Fundamentals of IoT	30
2	IoT prototyping using NodeJS	30
3	Python Programming	30
4	Embedded Linux	35
5	Wireless Network	30
6	Communication models and IoT Protocols	30
7	Cloud Platforms for IoT	35
8	Management Development Program	60
9	Project	40

Detailed Syllabus

Fundamentals of IoT (30 Hrs)

IOT Architecture, building blocks, Things in IOT, Terminology

- end nodes/sensor nodes
- gateways
- servers/cloud platforms

Applications of IOT standards, history, IOT-A Reference model, architecture Enabling technologies talking to environments – available sensors, actuators, sensor nodes, connectivity solutions, gateway solutions cloud platforms, Challenges in IOT – power optimization, mobility, connectivity, security.

IoT prototyping using NodeJS (30 Hrs)

Nodejs:–Setting up Nodejs, Simple scripts, console operations, variables, data types, operators, control structures, functions, arrays, string handling, classes & objects, event handling, error handling, package management, importing libraries.

NodeRED:–

Setting up nodered on target machine, Available nodes, Inject, Debug, significant function nodes, Creating simple flows, sub flows, Writing functions, Importing, Exporting flows, Context management, Storing Data, Adding additional nodes, UI development using NodeRED.

Python Programming (30 Hrs)

Setting up python interpreter, Simple programs, console i/o operations Data types, variables, literals, operators, Conditional branching, loops Arrays & Strings, Functions, Modules, Package management, Regular expressions, pattern matching, Error handling, Standard Library.

Embedded Linux (35 Hrs)

Architecture of embedded linux – kernel, system calls, libraries, Internals – Process, Thread, File Handling, Getting familiar with Linux command line, Environment Variables, Basic Administration, Deploying Linux on target board, rootfs image, File System Hierarchy, Understanding boot loaders for target boards. System Monitoring & Tracing techniques – procs, sysfs

Package management on Linux, Understanding cross tools, Cross compiling applications, Peripheral interfacing using libraries:

- ADC
- GPIO, PWM
- UART

Wireless Network (30 Hrs)

Network layer model for IOT
Physical channels for communication (wired/wireless)
IPv4 concepts, TCP, UDP Protocols, Socket Programming
IEEE 802.11(WLAN)
Bluetooth, Bluetooth Low Energy (BLE) – protocols, profiles
RFID concepts

IoT Protocols and Communication models (30 Hrs)

- M2M vs IOT, Communication models
- Request Response, Publish Subscribe, Push Pull, Exclusive Pair, Communication Protocols:
- MQTT, CoAP, Websockets, HTTP REST (GET, POST, PUT, DELETE)
- Available tools & libraries for above protocols, Protocol Bridging, Interoperability.

Cloud Platforms for IoT (35 Hrs=17 T + 18 L)

Virtualization concepts, Cloud Architecture, Cloud services – SaaS, PaaS, IaaS, Study of IOT Cloud platforms, Supporting protocols and connectivity, Data Visualization, Dashboards.

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Big Data Analytics

The objective of this course is to provide the student with hands on experience in Big Data Analytics.

Duration	: 320 Hours	Fee	: PKG ---
Eligibility	: Minimum of Grade 12 Certificate	NSQF Level	: 7

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming, Database Technology and Java Programming.

Outcome

The objective of Certificate Course in BigData Analytics (CCBDA) is to provide the student with an expertise Big data analytic domain. Analyze the big data using Statistics with R, Data Visualization – Analysis and Reporting, Business Analytics. After the completion of the course, students can work in Statics with R, Data Visualization, Business Analytics.

Course Content

SL No	Modules	Hours
1	Big Data Fundamentals	30
2	Statics with R	90
3	Data Visualization – Analysis and Reporting	40
4	Business Analytics	60
5	Effective Communication and Soft Skills	60
6	Project	40

Detailed Syllabus

Big Data Fundamentals (30 Hrs)

Big Data – Beyond the Hype, Big Data Skills and Sources of Big Data, Big Data Adoption, What is Big Data?, Characteristics of Big Data – The Four V's, Understanding Big Data with Examples, The Big Data Platform, Technical Details of Big Data Components, Text Analytics and Streams, Cloud and Big Data.

Statics with R (90 Hrs)

Probability & Statistics: Introduction to Statistics– Descriptive Statistics, Summary Statistics Basic probability theory, Statistical Concepts (uni-variate and bi-variate sampling, distributions, re-sampling, statistical Inference, prediction error), Probability Distribution (Continuous and discrete– Normal, Bernoulli, Binomial, Negative Binomial, Geometric and Poisson distribution), Bayes' Theorem, Central Limit theorem, Data Exploration & preparation, Concepts of Correlation, Regression, Covariance, Outliers etc.

R Programming : Introduction & Installation of R, R Basics, Finding Help, Code Editors for R, Command Packages, Manipulating and Processing Data in R, Reading and Getting Data into R, Exporting Data from R, Data Objects–Data Types & Data Structure. Viewing Named Objects, Structure of Data Items, Manipulating and Processing Data in R (Creating, Accessing, Sorting data frames, Extracting, Combining, Merging, reshaping data frames), Control Structures, Functions in R (numeric, character, statistical), working with objects, Viewing Objects within Objects, Constructing Data Objects, Building R Packages, Running and Manipulating Packages, Non parametric Tests– ANOVA, chi-Square, t-Test, U-Test, Introduction to Graphical Analysis, Using Plots(Box Plots, Scatter plot, Pie Charts, Bar charts, Line Chart), Plotting variables, Designing Special Plots, Simple Liner Regression, Multiple Regression.

Data Visualization – Analysis and Reporting (40 Hrs)

Information Visualization, Data analytics Life Cycle, Analytic Processes and Tools, Analysis vs. Reporting, Modern Data Analytic Tools, Visualization Techniques, Visual Encodings, Visualization algorithms, Data collection and binding, Cognitive issues, Interactive visualization, Visualizing big data – structured vs unstructured, Visual Analytics, Geomapping, Dashboard Design,

Business Analytics (60 Hrs)

Introduction to Business Analytics using some case studies, Making Right Business Decisions based on data, Exploratory Data Analysis – Visualization and Exploring Data, Descriptive Statistical Measures, Probability Distribution and Data, Sampling and Estimation, Statistical Interfaces, Predictive modeling and analysis, Regression Analysis, Forecasting Techniques, Simulation and Risk Analysis, Optimization, Linear, Non linear, Integer, Decision Analysis, Strategy and Analytics, Overview of Factor Analysis, Directional Data Analytics, Functional Data Analysis.

Effective Communication and Soft Skills (60 Hrs)

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective,

Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Ethical Hacking & Information Security

This course is aimed to provide skills on security programming which will help the students who want to make a career in security domain.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Candidate should have knowledge of computer & networking fundamentals and Basic Computer Programming with OOPs concepts.

Outcome

This course is aimed to provide skills on security programming which will help the students who want to make a career in security domain as well as prepare them to keep pace with the changing face of technology and the requirements of the growing IT industry.

These candidates will be trained in Application Security, Ethical Hacking and Management skills. After the completion of the course, students can work in the area of Application Security or Ethical Hacking.

Course Content

SL No	Modules	Hours
1	Java Programming with Crypto API	80
2	Application Security	70
3	Ethical Hacking	70
4	Management Development Program	60
5	Project	40

Detailed Syllabus

Programming with Crypto API

Introduction to Java, Java Overview, Data types, Arrays, Decision statements, Loops, Classes, Package, java.lang, java.util, Java Interfaces, Exception Handling, Networking with Java, JSP & Servlets, Cryptography, Java Cryptography Architecture, Java Cryptography Extension, SSL and TLS protocols, A Basic of SSL client and Server, Client side Authentication, Managing SSL Session Information, Dealing with HTTPS.

Application Security

MySQL , Introduction to MySQL , Installing and Configuring MySQL , Creating and Dropping Database Queries in MySQL , Overview of Regular Expression , Web Application Security , Web application Security Risks , Identifying the Application Security Risks , Threat Risk Modelling , OWASP Top 10 , Secure Coding with Java , Fundamentals , Denial of Service , Injection and Inclusion , Buffer Overflows and Input Validation , Access Control , Python , Introduction to Python , Python Objects , Strings , Numbers , Lists , Sorting , Dictionaries and Files , Sockets with Python

Ethical Hacking

Basics of Information System , The changing nature of Information System , Threats of Information System , Threats and attacks , Classification of Threads and attacks , Protecting Information System Security , Security in mobile and Wireless Computing , Credit Card frauds in mobile and wireless Computing , Security Policies and Measures in Mobile Computing , Information Security Management , Security Policy, Standards , Responsibility for Information Security Management , Building Blocks of Information Security , Basic principal of Information Systems Security , Information Security risk analysis , Term and Definitions for Risk Analysis of Information Security , Risk Management and Risk Analysis , Data Privacy Fundamentals , The Business Aspects of Penetration Testing , The Technical Foundations of Hacking , Foot printing and scanning , Enumeration and Step-by-Step System Hacking , Linux and Automated Security Assessment Tools , Trojans and Back-doors , Sniffers, session Hijacking and Denial of Service , Web Server Hacking, Web application Vulnerabilities and Database Attacks , Wireless Technologies, Security and Attacks , IDS, Honeypots and Firewalls

Cryptographic Attacks and Defenses , Social Engineering and Physical Security , Overview of Malware Reverse Engineering

Malware Reverse Engineering , Types of Malware , Malicious code Families , Latest Trends in Malware , Analysis of Malware

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Android Programming

The objective of this course is to provide the student with an expertise in Android Programming. This includes Core Java and Mobile and Wireless Technologies modules. After doing the course, the student will be able to design, develop and maintain android applications effectively.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

The course aims to groom the students to enable them to work on current web technology scenarios as well as prepare them to keep pace with the changing face of technology and the requirements of the growing IT industry. These candidates will be trained in android Programming, Java Programming and Management skills. After the completion of the course, They can start career as software Android Developer/Web Developer/ Web Designer.

Course Content

SL No	Modules	Hours
1	Fundamentals of Computer	20
2	Java Programming	70
3	Mobile and Wireless Technologies	20
4	Android Programming	110
5	Management Development Program	60
6	Project	40

Detailed Syllabus

Fundamentals of Computer (20 Hours)

Uses of Computer, Hardware, Accessories, , Interfaces and their functions, Computer hardware connectivity , Primary and Secondary storage , Input–output devices , Software, types of software, Operating Systems , Computer language, Different types of Programming Languages , Operating System (Introduction, The Need of Operating System, Functions of Operating System User Interface) , Introduction to RDBMS , Overview of OORD (Oracle) , Introduction SQL *Plus , DDL, DML and DCL

Java Programming (70 hours)

Object Oriented concepts, Classes and Objects Access Specifiers, Overloading, Inheritance, Polymorphism, Data Types, Operators and Language, Constructs, Classes and Objects, Inner Classes and Inheritance , Interface and Package, Exceptions, Threads, Java.lang, Java.util, Java.io, Java.swing, Introduction to servlet & JSP

Mobile and Wireless Technologies (20 hours)

Basics of Wireless Technologies, Cellular Communication: Single cell systems, multi–cell systems, frequency reuse, analog cellular systems, digital cellular systems, GSM standard: Mobile Station, BTS, BSC, MSC, SMS sever, call processing and protocols , CDMA standard: spread spectrum technologies, 2.5G and 3G Systems: HSCSD, GPRS, W–CDMA/UMTS, 3GPP and international roaming, Multimedia services, CDMA based cellular mobile communication systems , Wireless Personal Area Networks: Bluetooth, IEEE 802.11a/b/g standards, Mobile Handset Device Interfacing: Data Cables, IrDA, Bluetooth, Touch– Screen Interfacing, Wireless Security, Telemetry, Introduction to WAP, WML Script and XHTML, Introduction to Multimedia Messaging Services (MMS), NFC (Near Field Communication)

Android Programming (110 hours)

Introduction of android, Why develop for android, Android SDK features, Creating android activities, Fundamental android UI design, Intents, adapters, dialogs, Android Technique for saving data, Data base in Androids, Maps, Geocoding, Location based services, Toast, using alarms, , Instant messaging, Using blue tooth, Using Telephony, Introducing sensor manager, Managing network and wi–fi connection, Advanced androids development, Linux kernel security, Push Notification in Android, Android cloud

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non–verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Advanced Web Technology

The objective of this course is to provide the student with an expertise in Website development.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

The Certificate Course in Advanced Web Technology (CCAWT) course aims to groom the students to enable them to work on current web technology scenarios as well as prepare them to keep pace with the changing face of technology and the requirements of the growing IT industry. After the completion of the course, students can work as Web Developer / Web Designer / IT Support staff.

Course Content

SL No	Modules	Hours
1	Computer and Programming Concepts	40
2	Web Programming –1 (HTML,CSS,XML,Ajax)	70
3	Database Concepts	20
4	Web Programming –2 (PHP, Javascripts)	80
5	Internet Terminologies	20
6	Management Development Program	60
7	Project	40

Detailed Syllabus

Computer & Programming Concepts (40 Hours)

Fundamentals of Computers, Uses of Computer, Hardware, Accessories, Interfaces and their functions, Computer hardware connectivity, Primary and Secondary storage, Input-output devices, Software, types of software, Operating Systems, Software used in Academic departments and other area., Computer language, Different types of Programming Languages, Operating System, Programming concepts, Algorithm, Flow charts, Introduction to loops, functions

Web Programming – I (HTML, CSS, Ajax) (60 Hours)

HTML 5.0 programming, Overview of Internet and Web Pages, Introduction to HTML Tags, Introduction to Web Browser / Composer, Introduction to HTML Editor, CSS Introduction, CSS Syntax, CSS Id & Class, CSS How To, CSS Styling, CSS Box Model, CSS Summary, Introduction to Ajax, Web services and Ajax, Ajax using HTML, CSS

Database Concepts (20 Hours)

Database Concepts, RDBMS Technologies, Codd's Rules, Normalization Techniques, SQL and PL/SQL, Overview of OORD (Oracle), Introduction SQL *Plus, DDL, DML and DCL, Tables, Indexes and Views

Web Programming – II (PHP, Java scripts) (80 Hours)

Java Script Introduction, JS output, JS statement, JS Comments, JS Variable, JS data types, JS Switches, loops, Introduction to PHP, Working with arrays, Functions, Forms, Handling date and Times, Working with Files, Working with database, PHP and AJAX

Internet Terminologies (20 Hours)

Web services, Deployments of application on Internet, Maintenance of application

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in MS.Net

The objective of this course is to provide the student with an expertise in .Net Programming. This course familiarize with Microsoft.Net, C#, VB.NET and ASP.NET technologies.

Duration : 320 Hours Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate NSQF Level : 7

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

After doing the course, the student will be able to design, develop and maintain web-based enterprise applications effectively. The student will be able to understand the different concepts and features of .NET coding, debugging and developing of Windows and web applications.

After the completion of the course, students can work as a Software Developer or Programmer /IT Support staff/ Trainee / Technical Support and associated service sectors.

Course Content

SL No	Modules	Hours
1	Fundamentals of Computer & OOPs Concepts	26
2	Software Development Life Cycle	12
3	Database Technologies	30
4	Foundations of Web Technologies	32
5	MS .Net Window programming	50
6	MS .Net Web based programming	70
7	Management Development Program	60
8	Project	40

Detailed Syllabus

Fundamentals of Computer & OOps Concepts (26 Hours)

Fundamentals of Computers , Uses of Computer, Hardware, Accessories, , Interfaces and their functions, Computer hardware connectivity , Primary and Secondary storage , Input-output devices , Software, types of software, Operating Systems , Software used in Academic departments and other area. , Computer language, Different types of Programming Languages , Operating System (Introduction, The Need of Operating System, Functions of Operating System User Interface) , Object oriented concepts , Classes and Objects , Access Specifiers , Overloading , Inheritance , Polymorphism

Software Development Life Cycle (12 Hours)

Software Engineering , Brief concept of Software Life Cycle Models , Agile Techniques for software development , Software Development Tools & Techniques , Introduction to Coding Standards , Software Testing

Database Technologies (30 Hours)

Database Concepts: Client/Server Computing , RDBMS Technologies , Codd's Rules , Data Models , Normalization Techniques , ER Diagrams

SQL and PL/SQL , Overview of OORD (Oracle) , Introduction SQL*Plus , DDL, DML and DCL , Tables, Indexes and Views , Generic PL/SQL

Foundations of Web Technologies (32 Hours)

Architecture of the Web , HTML 5.0 programming , DHTML , CSS , DOM , JavaScript , jQuery , The Purpose and Nature of XML , XML Syntax and Structure rules , XML Document Type Declaration , XML and Data Binding XML linking mechanisms , XML style language , XML parsers.

MS .Net Window programming (50 Hours)

MS .NET 4.5 Framework (10 hours) , Introduction to NET 4.5 Frameworks , Application Domain , Language Interoperability, .NET Framework Class Library , Assemblies , Introduction of Windows Presentation Foundation, Introduction of Windows Workflow Foundation, Introduction of Windows Communication Foundation.

C# .NET 4.5 (40 Hours)

Need of C# , Operators , Namespaces & Assemblies , Arrays , Preprocessors , Delegates and Events , Boxing and Unboxing , Regular Expression , Collections , Exceptions Handling , Introduction to Win Forms , Working with database , Windows Communication Foundation.

MS .Net Web based programming (70 Hours)

Introduction and difference between ASP and ASP .Net Application, The goals of Asp .Net 4.5, Additional new features of Asp.net 4.5, ASP .NET Server Controls and client-side scripts, ASP .NET Web Server Controls, Validation Controls, User Controls in ASP .NET, Working with Master-Detail relationship, ASP .NET State Management, ASP .NET Web Application Security, Transaction Management, Building .NET components, ADO.NET 4.5, Querying with LINQ, Master Pages, Themes and skins, Difference between Web Services and Windows Communication foundation, MVC Architecture, MS.NET MVC Framework, View master pages and view user control, Understanding HTML Helpers, Working with AJAX, jQuery, Authenticating users, Understanding Routing, Deploying ASP .NET MVC application.

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Linux System Administration

The objective of this course is to provide the student with an expertise in OS Administration.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Candidate should have basic knowledge of computer, Operating system and networking fundamentals with logical approach.

Outcome

These candidates will be trained in networking, System Administration and Linux Administration skills. Linux System administrators can work in a variety of industries, ranging from telecommunications to security exchanges. Jobs for Linux System administrators are expected to increase at an average rate over the next several years.

After the completion of the course, students can work as Linux Administrator/Operations Engineer/Site Reliability Engineer/Devops Engineer.

Course Content

SL No	Modules	Hours
1	Basic of Linux Administration	50
2	Fundamentals of Networking	40
3	System Administration	130
4	Management Development Program	60
5	Project	40

Detailed Syllabus

Basic of Linux Administration (50 Hours)

Introducing Linux , Installing Linux , History , Distributions , Devices and Drives in Linux , File system Hierarchy , Components: Kernel, Distribution, XFree86, Sawfish, Gnome. , GNOME Basics. Changing the desktop background, adding menu items, plugins.

Changing the screen resolution , Evolution – the default e-mail client in Fedora. , Mozilla – Web browser , OpenOffice – Productivity tools. Word processor, spreadsheet, presentation software. , gaim – Chat application , XScreenSaver
How user preferences are stored in your home directory , Updating your system with up2date / yum. , How to restart X11: Ctrl-Alt-Backspace , The command-line (shells, tab completion, cd, ls) , file management: cd, df, find, locate , nano, the text editor that replaces pico. , man pages – the help system , ssh – secure text-based connectivity to other machines. Demonstrate X-Forwarding.

Handling compressed archives with zip and tar. , GNU screen – The ability to resume command-line sessions from anywhere. , Adding users, groups , su – the obsoleted way to become the root user. , sudo – the modern way to run processes as another user. , Changing users' passwords with the passwd command. , Printing with CUPS. , Installing new software with yum (if Fedora) or YaST (if SUSE) , Installing new software with rpm , Installing webmin for easy web based systems administration

Fundamentals of Networking (40 Hours)

Introduction to computer Networking , Categories of Networking according to size (LAN, WAN, DAN, MAN), Types of connections, Network classifications (Wired, Wireless) Network Hardware Devices (Hub, Switch, Modem, Router, Bridge, firewall etc) , TCP/IP overview, IP addressing, IPv6, Sub-netting, super-netting, Planning and Implementing, Architecture of Internet and intranet, Port Security, Spanning tree Protocol, Troubleshooting

System Administration (130 Hours)

logfiles: Using tail -f to watch /var/log/messages , Configuring Kerberos authentication , Explaining file permissions, including setuid. , How to enable and disable services , ntp – Setting up time synchronization , Setting DNS settings by editing /etc/resolv.conf , Changing XFree86 settings in /etc/XFree86/XFree86.conf

Apache and MySQL administration : About the Apache webserver, about the MySQL database engine, about the PHP scripting language, enabling the Apache with PHP and MySQL services, using MySQL Administrator, PHPMyAdmin – web based administration and query console for MySQL, Adding a MySQL user in phpmyadmin, Installing WordPress – a popular blogging software that uses MySQL, Installing Coppermine – a popular photo gallery software that uses MySQL.

Windows Integration : Connecting to your Linux machine from Windows using PuTTY and WinSCP, WINE – free Windows API compatibility layer, for running Windows applications in Linux. We will use mIRC as a sample application, Samba basics, Configuring Samba to authenticate using ADS, rdesktop – Windows Terminal Server Client, smbclient – an FTP-like client for SMB shares, smbmount – Mounting samba shares to a local directory (explain mount), smb4k.

Automation : cut – cutting out the good parts of your input, sort – sorting files, uniq – finding the unique lines in a set of input, sed – searching and replacing, tail, head, find –exec – running a command on a large set of files, Writing a shell script, Scheduling tasks with cron.

System Administration, Mounting disks, Killing processes with kill, Fetching files with wget.

Compiling software: configure, make, make install, fstab , Reviewing find and du for finding out where your disk space went to. , Single user mode , X: Networking Tools , ping – check if a host is online , traceroute – see your hops between hosts , telnet – diagnostics , nmap – seeing what ports are open on a host , xinetd – the “internet super server”. TCP/IP service manager. , lsof – list open ports and files , ethereal – Packet Sniffer Extraordinaire.

Customizing your user environment : symbolic links , The Z Shell , aliases, including –s types in zsh. , variables , PATH , prompts , Terminal transparency , adding things to your X startup

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Software Testing

The objective of this course is to provide skills to those students who want to make a career in Software Testing field.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Candidate should have basic knowledge of computer and networking fundamentals with logical approach.

Outcome

The Certificate Course in Software Testing (CCST) course this course is to provide essential knowledge of programming and expertise in Testing. Students who will complete this course can work in software testing.

These candidates will be trained in Software Testing – Manual & Automation and testing Management skills. After the completion of the course, They can start career as software Test Engineer /Tester/Quality engineer and move to Test lead.

Course Content

SL No	Modules	Hours
1	Fundamentals of Computer & OS Concepts	20
2	C Programming	30
3	Software Development Life Cycle	10
4	OOP with C++ with DS	40
5	Database Technology	20
6	Software Testing – Manual	50
7	Software Testing – Automation	50
8	Management Development Program	60
9	Project	40

Detailed Syllabus

Fundamentals of Computer & OS Concepts (20 Hours)

Computer Fundamental: Uses of Computer, Hardware, Accessories, Types of computer, Hardware and Software, Operating System, Process Management, Threads, Process Scheduling, Memory Management, Virtual Memory, Input Output Management, File Management, Deadlocks, Inter – process Communication, Classification of Computers, Introduction to windows operating systems, The desktop, The window, application window, document window, Dialog Window, The Icons, Explore Your Computer, The Start Button and Taskbar, My Computer, Windows Explorer, Starting and Closing Programs, Installing Operating System, Performing a New Installation for Windows, Installing a Software other than OS, Setting up a printer, Uninstalling software.

C Programming (30 Hours)

Introduction to Programming Language, C Fundamentals, Operators and Expressions, Data Input and Output, Control statement, Functions, Arrays, Pointers, Structures and Unions.

Software Development Life Cycle (10 Hours)

Software: A Process, Various Phases in s/w Development, Software life cycle agile model, Introduction to Coding Standards.

OOP with C++ with DS (40 Hours)

OOP concepts, Programming constructs, Functions, Access Specifiers, Classes and Objects, Overloading, Inheritance, Polymorphism, Templates.

Database Technologies (20 Hours)

Introduction to DBMS, Introduction to Oracle, SQL* Plus, DDL, DML and DCL, Tables, Indexes and Views, PL/SQL, Cursors, Stored Procedures, Triggers.

Software Testing – Manual (50 Hours)

Software Testing Fundamentals, Importance of Testing, Term and modification of testing, Fundamental Test process, Types of testing, Life cycle of testing, Introduction to Tested application, Essentials of Testing, Economics of testing, Fundamentals of Quality, Test management, Testing concepts and fundamentals.

Testing Principles and Fundamentals, Testing Approaches– Black box Testing (Black Box testing Techniques), White Box Testing (White Box Testing), Testing Technique – Static Testing, Dynamic testing, Testing Process, Test Planning, Administrative Plan, Risk management, Test Focus, Test Objectives, Test Strategy, The Build Strategy, Problem management and Control, Test case Design, “V” Model and levels of testing.

Unit Testing, Integration Testing, Bottom Up, Top Down, Big bang, Sandwich, System testing, GUI, Usability, Configuration, Compatibility, Availability, Reliability, Installation, System Integration Testing, User Acceptance Testing, Alpha Testing, Beta testing, Testing Types, Functional testing, Structure Testing, Specialized Testing, Planning Your TEST efforts.

Software Testing – Automation (50 Hours)

Test Plan, Test Design, Writing Test cases, Test procedures, Test data, Defect Management – Using Test Director, Test Reports, Problem management, Change Management, Measuring the Success/Test Metrics and defect Life cycle, Automated Testing and Tools, Automated Vs Manual Testing, Benefits of Automation, Types of Test case Management Tools, Automation Tools, Defect Management Tools, Test Director (Test Case Management Tool).

Creating a New Project, Creating a Test Plan, Designing Tests, Running Tests, Tracking Defects, Win Runner (Automation Testing Tool), Introducing Win Runner, Setting Up the GUI Map, Recording Tests, Synchronizing Tests, Checking GUI Objects, Checking Bitmaps, Programming Tests with TSL Creating Data, Reading Text, Creating Batch Tests, Maintaining Your Test Scripts.

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Database Management

The objective of this course is to provide the student with an expertise in Database Administration.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Candidate should have basic knowledge of computer, Operating system and networking fundamentals with logical approach.

Outcome

These candidates will be trained in Database Technologies and Administration skills. After the completion of the course, students can work as Database Administrator/Database Developer

Course Content

SL No	Modules	Hours
1	Fundamentals of Computer and OS concepts	20
2	C Programming	40
3	Software Development Life Cycle	16
4	Database Technologies	80
5	Database Administration	64
6	Management Development Program	60
7	Project	40

Certificate Course in Java Programming

The objective of this course is to provide the student with an expertise in Java Programming. This includes both the Core Java and Advanced Java programming. After doing the course, the student will be able to design, develop and maintain web-based enterprise applications effectively.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

Java is one of the most popular languages in the IT industry and many existing/upcoming technologies like android, hadoop uses java framework, which java assures demand for java professional in the IT market in the coming future. After the completion of the course, students can work as a Software Developer or Programmer / IT Support staff / Trainee / Technical Support in associated service sectors.

Course Content

SL No	Modules	Hours
1	Fundamentals of Computer and OOPS concepts	26
2	Software Development Life Cycle	12
3	Database Technologies	30
4	Foundations of Web Technologies	32
5	Core Java	50
6	Enterprise Java	70
7	Management Development Program	60
8	Project	40

Detailed Syllabus

Fundamentals of Computer & OOPs Concepts (26 Hours)

Fundamentals of Computers , Uses of Computer, Hardware, Accessories, , Interfaces and their functions, Computer hardware connectivity , Primary and Secondary storage , Input–output devices , Software, types of software, Operating Systems , Software used in Academic departments and other area. , Operating System (Introduction, The Need of Operating System, Functions of Operating System User Interface) , Integer representation and number conversion , Linux Commands , Fundamentals of Algorithms , Mathematical Analysis for recursive and non recursive algorithm. , Object Oriented concepts , Classes and Objects , Access Specifiers , Overloading , Inheritance , Polymorphism

Software Development Life Cycle (12 Hours)

Software Engineering , Brief concept of Software Life Cycle Models , Agile Techniques for software development , Software Development Tools & Techniques , Introduction to Coding Standards , Software Testing

Database Technologies (30 Hours)

Database Concepts , Client/Server Computing , RDBMS Technologies , Codd's Rules , Data Models , Normalization Techniques , ER Diagrams
SQL and PL/SQL, Overview of OORD (Oracle), Introduction SQL*Plus, DDL, DML and DCL, Tables, Indexes and Views, Generic PL/SQL.

Foundations of Web Technologies (32 Hours)

HTML 5.0 programming, Overview of Internet and Web Pages, Introduction to HTML Tags, Introduction to Web Browser / Composer, Introduction to HTML Editor, CSS Introduction, CSS Syntax, CSS Id & Class, CSS How To, CSS Styling, CSS Box Model, CSS Summary, Java Scripting, JS Introduction, JS Statements, JS Comments, JS Variables, JS Operators, JS Comparisons, JS Popup Boxes, JS Functions, JS Events, JS Special Text, JS Objects, JS RegExp, jQuery, Introducing to jQuery, Selecting the elements, Bringing pages to life with jQuery, JQuery Events, Energizing pages with animations and effects, DOM with jQuery utility functions, The Purpose and Nature of XML, XML Syntax and Structure rules, XML Document Type Declaration, XML and Data Binding XML linking mechanisms, XML style language, XML parsers.

Core Java (50 Hours)

Data Types, Operators and Language, Constructs, Inner Classes and Inheritance, Interface and Package, Exceptions, Threads , Java.lang , Java.util , Java.awt , Java.io , Java.applet , Java.swing

Enterprise Java (70 Hours)

Servlets, Java Server Pages , Remote Method Invocation , JDBC , JavaBeans, Enterprise Java Beans , Java Security , Naming Services , Java Mail , Java Messaging Services , Transactions , Introduction to Struts Framework , Introduction to hibernate, HQL , J2EE (struts) and hibernate , Introduction to JSF

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Network Security

The objective of this course is to provide skills to those students who want to make a career in Network defence and IT Infrastructure Management.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Candidate should have basic knowledge of computer and networking fundamentals with logical approach.

Outcome

The Certificate Course in Network Security (CCNS) course aimed to provide skills on networking and its maintenance and will help the students to make carrier in Network management.

After the completion of the course, students can work as Network Administrator/Operations Engineer/Site Reliability Engineer/security Engineer/ IT Infrastructure Engineer/Information Security Assurance.

Course Content

SL No	Modules	Hours
1	Network Fundamentals	40
2	Network Defense and Countermeasures	100
3	IT Infrastructure Management	80
4	Management Development Program	60
5	Project	40

Detailed Syllabus

Network Fundamentals

Introduction to computer Networking , Categories of Networking according to size (LAN,WAN,DAN,MAN) , Types of connections , Network classifications (Wired, Wireless) , Network Hardware Devices (Hub, Switch, Modem, Router, Bridge, Repeaters, firewall etc) Overview , TCP/IP overview , IP addressing, Sub-netting, super-netting , IPv6 , Planning and Implementing , Architecture of Internet and intranet , Port Security , Spanning tree Protocol , Troubleshooting

Network Defense and Countermeasures

Security Fundamentals, Firewalls, Define the Types of Firewalls , Application Layer Firewalls Packet Filtering Firewalls, Hybrids, Intrusion Detection And Prevention , Intrusion risks , Security policy , Monitoring traffic and open ports, Detecting modified files, Investigating and verifying detected intrusions , Recovering from, reporting and documenting intrusions , Define the Types of intrusion Prevention Systems , Setup an IPS , Manage an IPS , Understand Intrusion Prevention , Issues with Intrusion Prevention , IP Signature and Analysis , Risk Analysis , Virtual Private Networks , Define Virtual Private Networks , Deploy User VPNs , Benefits of user VPNs , Managing User VPNs , Issues with User VPNs, Deploy Site VPNs, Benefits of Site VPNs, Managing Site VPNs, Issues with Site VPNs.

IT Infrastructure Management

Introduction to ITIL , Service Strategy , Service Design , Service Transition , Service Operation , Continual Service Improvement , Data Centre Management , Introduction to DCM , Data Centre design , Best Practices in IT , Server Security , Storage area network.

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Network Administration

This course is aimed to provide skills on networking and its maintenance and will help the students to make a career in Network management.

Duration	: 320 Hours	Fee	: PKG ---
Eligibility	: Minimum of Grade 12 Certificate	NSQF Level	: 7

Course Prerequisite

Candidate should have basic knowledge of computer, Operating system and networking fundamentals with logical approach.

Outcome

These candidates will be trained in networking, Network Administration and Network Defense & Countermeasures skills. Network administrators can work in a variety of industries, ranging from telecommunications to security exchanges.

After the completion of the course, students can work as System Administrator / Network Administrator / Network Support in associated service sectors.

Course Content

SL No	Modules	Hours
1	Fundamentals of Networking	40
2	Network Administration	100
3	Network Defense and Countermeasures	80
4	Management Development Program	60
5	Project	40

Detailed Syllabus

Fundamentals of Networking

Introduction to computer Networking Categories of Networking according to size (LAN,WAN,DAN,MAN), Types of connections, Internetworking, Configuration and IOS Management Commands, Network classifications (Wired, Wireless), Network Hardware Devices (Hub, Switch, Modem, Router, Bridge, Repeaters, firewall etc) Overview, TCP/IP overview, IP addressing, Sub-netting, super-netting, IPv6, Planning and Implementing, Architecture of Internet and intranet, Port Security, Spanning tree Protocol, Managing Traffic with Access Lists, Troubleshooting.

Network Administration

Managing Hardware Devices & Drivers, Managing Resources, Managing User Accounts, Managing Network Protocols & Services, Managing Security, Installing Windows 2008 Server, Managing Network Protocols, Managing Domain Name System, Managing Domain Name System, Managing DHCP, Managing Microsoft Windows Internet

Name Service (WINS), Managing Network Address Translation (NAT), Managing Microsoft Certificate Services, Introduction to Active Directory Service, Installing & Configuring Active Directory Directory Service, Managing Domain Name System for Active Directory Directory Service, Managing Active Directory Components, Managing Desktop Configurations Using Group Policy and Remote Installation Services, Managing Active Directory Security Solutions, Internet Services, Advanced File Systems, Microsoft Windows 2008 Security

Network Defense and Countermeasures

Security Fundamentals ,Firewalls , Define the Types of Firewalls , Application Layer Firewalls , Packet Filtering Firewalls,Hybrids , Intrusion Detection And Prevention , Intrusion risks , Security policy , Monitoring traffic and open ports , Detecting modified files , Investigating and verifying detected intrusions , Recovering from, reporting and documenting intrusions , Define the Types of intrusion Prevention Systems , Set Up an IPS, Manage an IPS , Understand Intrusion Prevention , Issues with Intrusion Prevention , IP Signature and Analysis , Risk Analysis , Virtual Private Networks , Define Virtual Private Networks , Deploy User VPNs , Benefits of user VPNs , Managing User VPNs,Issues with User VPNs , Deploy Site VPNs , Benefits of Site VPNs , Managing Site VPNs , Issues with Site VPNs.

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Information Technology

The objective of this course is to enable the student to understand office Automation tools, PC and Networking concepts.

Duration : 180 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Sound knowledge of Basic Computer Fundamentals

Outcome

The Certificate Course in Information Technology provides essential knowledge on how to work in office automation Tools and networking.

Course Content

SL No	Modules	Hours
1	Computer Fundamentals	20
2	Selecting Components and Preparing PC	32
3	Office Automation Tools	60
4	Database Concepts and MS Access	14
5	Communication using PC	18
6	Overview of Networking	36

Certificate Course in Office Automation

The objective of this course is to enable the student to understand the Operating System and office Automation tools.

Duration : 144 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Sound knowledge of Basic Computer Fundamentals

Outcome

The Certificate Course in Office Automation provides essential knowledge on how to work in office automation Tools and client operating systems.

Course Content

SL No	Modules	Hours
1	Computer Fundamentals	14
2	Client Operating System (Windows 10, Ubuntu)	20
3	Database Concepts	30
4	MS Office 2016	60
5	Database Management using MS access	20

Certificate Course in Multimedia Website Designing

The objective of this course is to provide knowledge to the participants who complete this course and to make a career in web designing & Animation activities.

Duration : 320 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

These candidates will be trained in Flash Animation, Scripting and UI Designing skills. Website Designer can work in a variety of industries, ranging from telecommunications to security exchanges.

After the completion of the course, students can work as Website Designer in associated service sectors.

Course Content

SL No	Modules	Hours
1	Introduction to Computers	20
2	HTML Scripting	80
3	UI Designing	40
4	Interactive Flash Animation	80
5	Management Development Program	60
6	Project	40

Detailed Syllabus

Introduction to Computers

Computer organization, Essentials Computer (Hardware, Peripherals and Software), Primary and Secondary storage, Input-output devices, Classification of computers, Basic type of Computer software, Overview of Operating systems, Process and Thread, Memory management system, Introduction to Networks, Network topologies, Central and distributed computing, Wide area and global networks, The World Wide Web using the Internet and email services, Overview of Multimedia, User Interface Design & Graphics, HTML & WebBased Multimedia.

HTML Scripting

Basic HTML5.0, Text Formatting, Creating Web Images, Page Layout, Hyper Links, Lists, Tables and Structure, HTML Frames, HTML Forms, Multimedia, Cascading Style Sheets (CSS), Setting up Style Sheets, Formatting Text with Styles, Layout with Styles, Introduction to JavaScript, Using JavaScript in HTML pages, jQuery, HTML Troubleshooting, Testing Website.

UI Designing

Basics of UI, Designing concepts, Building Blocks, Buttons, Backgrounds, Shapes, Logo.

Interactive Flash Animation

The Concepts of Multimedia Authoring, Introduction to Authoring Tools, Organization of Contents, Visualization of script/storyboard, Collection of Visual Materials, Recording and Digitization of Audio/Video Scripts, Content Integration and Scripting Basics, Scripting of Interactivity, Application Development.

Management Development Program

Introduction to communication, Barriers to communication, Kind of communication, Confidence building Non-verbal Communication, Fluency and vocabulary, Synonyms, Antonyms, Grammar, Noun Pronoun, Verb, Adjective, Preposition, Conjunction, Words of Idioms & phrases, Sentence Construction, Fill up the blanks, Pronunciation, Conversation practice, Polite Conversation, Greeting, Logical reasoning, General Aptitude, Writing: Covering letter, Resume, Email, Presentation Skill, group discussion, Interview skills, Mock interview.

Certificate Course in Data Communication and Networking

The objective of this course is to enable the student to understand the basic networking concepts, design a local area network and supervise the physical implementation of the same.

Duration : 144 Hours

Fee : PKG ---

Eligibility : Minimum of Grade 12 Certificate

NSQF Level : 7

Course Prerequisite

Basic understanding on peripheral devices, computer hardware and software, memory, storage devices, some common PC utilities, Internet concepts

Outcome

After the completion of the course, Student should be able to perform all administrative operations on a Local Area Network independently, including configuring software in the Windows environment, connecting and configuring peripherals such as printers, scanners etc., granting and restricting access to the network and the internet through a proxy server.

Course Content

SL No	Modules	Hours
1	Introduction to Networking	26
2	Windows Server 2016	54
3	Introduction to Linux OS administration and configuration	48
4	Configuration of Routers and Switches using Simulation Tool	16

Detailed Syllabus

Introduction to Networking (26 hrs)

Goals, Applications & Types of Networking, OSI Layers, TCP/IP, Planning the Network, LAN topologies, Cabling considerations, Understanding, Internetworking devices – hubs, switches, bridges, routers etc, Structured UTP cabling.

Windows Server 2016 (54 hrs)

Part 1: (14 hours) Deploying windows server 2012, Preparing for Installation, Installing windows installing server 2012, Introduction to Administering Accounts and Resources, The Windows Server 2012 Family, Logging on to Windows Server 2012, Installing and Configuring Administrative Tools, Creating User Accounts, Creating Computer Accounts, Creating an Organizational Unit.

Managing User and Computer Accounts

Modifying Users and Computer Account Properties, Enabling and Unlocking User and Computer Accounts, Creating a User Account Template, Locating User and Computer Accounts in Active Directory, Saving Queries, Resetting User and Computer Accounts, Moving Domain Objects.

Managing Groups

Creating Groups, Managing Group Membership, Strategies for Using Groups, Modifying Groups, Using Default Groups, Best Practices for Managing Groups.

Part 2: (8 hours)

Implementing & Managing Printing, File, Mail Installing and Sharing Printers, Managing Access to Printers Using Shared Printer Permissions, Managing Printer Drivers, Implementing Printer Locations, Changing the Location of the Print Spooler, Setting Printer Priorities, Scheduling Printer Availability, Configuring a Printing Pool, Sharing files, folders etc

Part 3: (12 hours)

Networking windows server 2012, Windows Server 2012 Networking Environment, Setting up and managing a Network, The Architecture of Active Directory, Using Active directories and domains, How Active Directory Works, Examining Active Directory, The Active Directory Design, Planning, and Implementation Processes, Managing Virtual Private Networks, Managing Advanced Network Services, Using Network Monitor, Managing Routing and Remote Access Services, Managing the Internet Authentication Service.

Part 4: (8 hours)

Communication and the Internet, Networking with TCP/IP, Managing the Domain Name System Service, Managing the Windows Internet Name System Service, Managing Internet Information Services, Managing Web Sites, Managing Routing and Remote Access Services, Managing the Internet Authentication Service, Managing the Dynamic Host Configuration Protocol, Communication and Internet Service.

Part 5: (12 hours)

Administrating Windows Server 2012, Managing windows server 2012, Controlling windows server 2012 security, Overview of Security in Windows Server 2012, Monitoring Server Memory, Preparing for Disaster Recovery, Backing Up Data, Using Security Templates to Secure Computers, Testing Computer Security Policy, Configuring Auditing, Managing Security Logs.

Introduction to Linux OS administration and configuration (48 hrs)

Overview of Linux Architecture, Using Linux (commands and utilities), NFS and NIS installation and configuration, Configuring Networks, Shell programming, User Management, Backup and Recovery, Troubleshooting, Security, Perl scripting.

Basic Configuration of Routers and Switches using Simulation Tool (16 hrs)

Introduction to Routers, Switches Hands on BOSON Router Simulation Hands on Cisco ConfigMaker tool.

PG–Diploma in Advanced Computing

The course is targeted towards engineers and IT professionals who wish to venture into the domain of advanced computing. This course covers domain of MEAN Stack, Java and MS NET development.

Duration : 900 Hours

Fee : PKG ---

Eligibility : Graduate in Engineering in IT/
Computer Science/ Electronics/
Telecommunications/ Electrical/
Instrumentation or B.Sc in
Mathematics/ Statistics/ Computer
Science/ Physics.

NSQF Level : 8

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

After completion of course students will be able to acquire the following skills:

- Use technologies to access and interpret information effectively.
- Apply their analytical skills to investigate unfamiliar problems Web technologies like HTML 5.0, CSS, Java Script, JQuery, Angular JS,

- Use quantitative data confidently and competently,
- Use communication technologies competently.
- Understand the multi-tier architecture of web-based enterprise applications using. Enterprise JavaBeans. Integrate Servlets, JSPs with EJB and Databases in J2EE application.
- Understand .net architecture, develop and maintain the application.

After doing this course students can work as Software Engineer / Developer / Database designer. Candidate can mentor team and sole responsible for team work. Student will be able to use software engineering principles.

Course Content

SL No	Modules	Hours
1	OOPs with C++ Programming	60
2	Algorithm & Data Structures	70
3	Advanced Software Development Methodologies	90
4	Operating Systems Concepts	60
5	Advanced Web Programming	50
6	MEAN Stack	60
7	Database Technologies	60
8	Java Technologies-I (Core Java)	70
9	Java Technologies-II (Web Based Java)	90
10	Microsoft.Net Technologies	70
11	Effective Communication	50
12	Aptitude & General English	50
13	Project	120

Detailed Syllabus

OOPs with C++ Programming (60 Hrs)

Revision of C Programming, Pointers, Functions (Call by value and reference), Recursion, Arrays using Pointers, Structures, Union, Enumeration and Typedef, File handling, Discussion on Object oriented concepts: Classes and Objects, Access Specifiers, Overloading, Inheritance, Polymorphism, Beginning with C++, C++ Tokens, Initialization, C++ Operators, Static Members, Constant Members, Expressions, Control Structure, Functions in C++, Constructors, Encapsulating into an object, Destructors, Associations, Inner Classes, Memory Management and pointers, Inheritance, Virtual Functions.

Polymorphism, Interfaces, Exception Handling, Managing Console I/O operations, Working with files, Advance Topics in C++ : Object Design and Templates.

Advanced Typecasting, new data types, new operators, class implementation, namespace scope, operator keywords, new headers, C++ Containers.

Algorithm & Data Structures (70 Hrs)

Define the problem, Identify the problem, Introduction to Problem Solving, Problem solving basics, Defining creativity v/s innovation, Find Creative Solutions using creativity tools.

Effective problem solving approaches, Critical thinking and information analysis, Brainstorming, Reverse Brainstorming, Imagineering, Mind Mapping, Six Thinking Hats: A Tool to Strengthen Critical Thinking, Collaboration.

Evaluate and Select solution : Pro's and Con's, Force field analysis, Feasibility/Capability Analysis, Decision analysis, evaluating problems, Choosing among alternatives, Qualitative analysis, discussing qualitative analysis techniques, Establishing objectives.

Algorithm & Data Structures: Introductory Concepts, Algorithm Constructs, OO design: Abstract Data Types (ADTs).

Basic Data Structures: Arrays, Stacks, Queues, Linked lists, Introduction to trees, Abstract trees, Tree traversals, Binary trees, Search trees Searching & sorting algorithms: Objectives of Searching, The Sequential Search, The Binary Search, Introduction to sorting, Insertion sort, Bubble sort, Heap sort, Merge sort, Quick sort
Graph algorithms: Introduction to graph theory, Graph data structures, Graph traversals, Algorithm design: Greedy algorithms, Divide-and-conquer algorithms, Dynamic programming, Backtracking algorithms, Branch-and-bound algorithms, Application of Data structures.

Advanced Software Development Methodologies (90 Hrs)

Software Development Life Cycle, Design and Architectural Engineering, Object Oriented Analysis and Design, Introduction to Agile development model, Introduction to Atlassian Jira, Introduction to DevOps, Microservices, Fragmentation of business requirement, Containerisation, docker, Container life cycle, YAML, Docker Swarm and Docker Stack, Kubernetes,

Istio Service Mesh, delivery pipeline, Jenkins, Selenium integration with Jenkins, Developing an application in a team, code versioning system, Introduction Git, Introduction Git repository and git structure, Adding code to git, Introduction to GitHub, Creating pull requests, Introduction to software testing, Verification and validation, Principles of software testing.

Introduction to STLC and V Model, Tools used for automation testing, Introduction to testing methods, Introduction to functional testing, Introduction to non-functional testing, Introduction to Selenium, Introduction to TestNG, TestNG annotations, HTML test result reporting, Introduction to Cloud, Introduction to Virtualization, Containerisation, Cloud Computing, Cloud SPI Model, Cloud Computing Types, Cloud Security, Virtualization, Hardware Virtualization, Para-Virtualization, Cloning, Snapshot and Template, Containerization, Operating System Virtualization, Cloud architecture, Deployment models, Services provided by Cloud, Cloud development best practices, Introduction to AWS.

Operating Systems Concepts (60 Hrs)

Linux Commands, Vi editor, Shell Scripting, Overview of OS, Processes, Scheduling & Synchronization, Memory management, File Systems, Case Study with Linux System Programming: Process, Signals, Semaphores & Mutex, Inter – Process Communication, POSIX Threads.

Advanced Web Programming (50 Hrs)

HTML 5: Elements, Objects, Events, Canvas, Audio & Video Support, Geo-location Support

CSS: Styling HTML with CSS, Inline Styling (Inline CSS), External Styling (External CSS), CSS Fonts, The CSS Box Model, The id Attribute, The class Attribute, HTML Style Tags,

PHP: Introduction to PHP, Working with arrays, Functions, Forms, Handling date and Times, Working with Files, Session and state management, Database operations from PHP.

XML & Web Security :XML: Introduction to XML, XML Validation, Reason for XML, XML Tree Structure, XML DOM, XML DTD, XML Schema, XML style language, XML and XSLT, XML Parsing, XML parsers (DOM & SAX), XML WSDL, RSS Feed, Web Security: SQL Injection, Cross-Site Scripting (XSS), Security standards (OWASP),

AJAX: Introduction to Ajax, Web services and Ajax, Ajax using HTML, CSS, JavaScript, Ajax Framework and DOM, XMLHttpRequest, Ajax Architecture,

JSON: Introduction, Need of JSON, JSON Syntax Rules, JSON Data – a Name and a Value, JSON Objects, JSON Arrays, JSON Uses JavaScript Syntax, JSON Files, JSON & Security Concerns.

Responsive Web Design: Introduction, The Best Experience for All Users: Desktop, Tablet,

Mobile Bootstrap : Overview of Bootstrap, Need to use Bootstrap, Bootstrap Grid System, Grid Classes, Basic Structure of a Bootstrap Grid, Typography, Tables, Images, Jumbotron, Wells, Alerts, Buttons.

MEAN Stack (60 Hrs)

Introduction to JavaScript Variable, statements, Operators, Comments, constructs, Functions, expressions
JavaScript consoleScope, Events, Strings, String Methods, Numbers, Number Methods, Dates, Date Formats, Date Methods
Arrays, Array Methods, Object Oriented Programming: Method, Constructor, Inheritance, Encapsulation, Abstraction, Polymorphism, Javascript Validations, Document Object Model, Document and Events (DOM Manipulation), Security in Java Script

Jquery: Basics of jQuery, jquery selection and events, jQuery Effects, jquery traversal and manipulation, Data

attributes and templates, jQuery Plugins, JQuery / Google Web Toolkit.
 Node.js: Introduction to Node.js, Node modules, Developing node.js web application, Event-driven I/O server-side JavaScript, Express: Introduction to Express, First Express Application, Application, Request and Response Objects, Implementing MVC Pattern, Express application configuration, Rendering Views.
 AngularJS: Introduction to AngularJS, Structuring AngularJS application, MVC in AngularJS, AngularJS routing, AngularJS services, Testing Web Applications: Introduction to JavaScript Testing, Testing Express Applications, Testing AngularJS Applications.

Database Technologies (60 Hrs)

Database Concepts: Client/Server Computing, RDBMS Technologies, Codd's Rules, Data Models, Normalization Techniques, ER Diagrams, SQL : Overview of OORD, Introduction SQL*Plus, DDL, DML and DCL, Tables, Indexes and Views, Clusters, Sequences and Snapshots, Cursors, Stored Procedures, Triggers, Packages, Introduction to No SQL, MongoDB (Virtual DB).

Java Technologies-I(Core java) (70 Hrs)

Data Types, Operators and Language, Constructs, Inner Classes and Inheritance, Interface and Package, Exceptions, Collections, Threads, Java.lang, Java.util, Java.io, Java Persistent, Servlets, Java Virtual Machine.

Java Technologies-II (Web-based java) (90 Hrs)

Java Server Pages, JDBC, JavaBeans, Java Security, Naming Services, Java Annotations, Java Mail, Java Messaging Services, Transactions, Apache maven, Introduction to hibernate, HQL, Hibernate, Spring Framework, Hands on Web services – JSON/XML/oData (data format conversation).

Microsoft.Net Technologies (70 Hrs)

Introduction to NET 4.5 Frameworks: Application Domain, Language Interoperability, .NET Framework Class Library.

Assemblies, Introduction of Windows Presentation Foundation, Introduction of Windows Communication Foundation. C# .NET 4.5: Need of C#, Operators, Namespaces & Assemblies, Arrays, Preprocessors, Delegates and Events, Boxing and Unboxing, Regular Expression, Collections, Exceptions Handling, Introduction to win forms.

ASP .NET 4.5: Building .NET components, ADO.NET 4.5, Querying with LINQ, Custom Control, Master Pages, Themes and skins, Introduction to Web Services, MS.NET MVC Framework, Enterprise Services, Personalization and Localization, Deployment.

PG-Diploma in IT Infrastructure, Systems and Security

The course explores the fundamental concepts of Cyber Security, Ethical Hacking, Data Centre Management and cloud computing, accessing resources and services needed to perform functions with dynamically changing needs.

Duration	: 900 Hours	Fee	: PKG ---
Eligibility	: Graduate in Engineering in IT/ Computer Science/ Electronics/ Telecommunications/ Electrical/ Instrumentation or B.Sc in Mathematics/ Statistics/ Computer Science/ Physics.	NSQF Level	: 8

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

Students will be trained to analyze threats detection techniques, in-depth knowledge and understanding in the Intrusion Detection and Prevention domain. , applications security implementation and various cloud platforms to implement real time cloud applications.

- To analyze and solve problems conceptually and practically from diverse industries, such as government, manufacturing, retail, education, banking/ finance, healthcare and pharmaceutical.
- To use advanced tools/ decision-making tools/ techniques to analyze the complex problems and get ready to develop such new techniques for the future.
- To use cloud computing, accessing resources and services needed to perform functions with dynamically changing needs.
- To use the cloud privacy and security concepts to create secure cloud environment.
- To develop industrial research projects for the development of future solutions in the domain of Information Security to make an impact in the technological advancement.

They can start a career as a System Administrator, Network Security Professional, Web Security Tester or Information Security Analysts.

Course Content

SL No	Modules	Hours
1	Fundamentals of Computer Networks	80
2	Concepts of Operating System and Administration	210
3	Security Concepts	170
4	Network Defense and Countermeasures (NDC)	70
5	Cyber Forensics	30
6	PKI	50
7	IT Infrastructure Management	90
8	Effective Communication	50
9	Aptitude & General English	50
10	Project	100

Detailed Syllabus

Fundamentals of Computer Networks (80 Hrs)

Introduction to communication system, issues in Computer Networking, Overview of Transmission Media, OSI Layers, TCP/IP Models, Overview of LAN (local area networks), VLAN (virtual local area network), Overview of VXLAN, Overview of STP, VARP, Overview of WAN (wide area networks), Discussion of Networking Protocols, Access List, IP Addressing (Fixed Length Subnet Masking, Variable Length Subnet Masking, Classless Inter Domain Routing), Static Routing and Dynamic Routing (RIP, RIPv2, EIGRP, OSPF), Introduction to NAT and PAT, TCP, UDP, IP, ICMP, Bridge, Network TAP, Hub, Switch, Router, Introduction to IPv6, Introduction Software Defined Network, Overview of SDN Controller, Virtual Networking, Open Daylight.

Concepts of Operating System and Administration (210 Hrs)

Concepts of OS : Architecture of Operating System, Process Management, Memory Management, File system Management, Network Operating System

Windows Operating System and Security Issue : Overview of windows operating system, Overview of Administrative Tasks and Tools.

Installation of windows operating system, Windows 10/ server 2016 core, Deploying Windows with WDS, Network Configuring, Implementation of infrastructure of windows networks, File system and disk management, Managing disks with Distributed File System (DFS), Securing file systems with EFS & Biometric configuration, DHCP & DNS server, System center configuration management, Introduction to Systems Management & Service Delivery, System Center Configuration management, System Center Endpoint Protection, Implementation, planning and maintaining of active directory infrastructure, Configuration of IIS SQL server, web server and Exchange server, Implementing and administering Active Directory, User accounts and groups in an Active Directory Domain, Implementing WINS and Dynamic Host, Registry settings, System Configuration Settings, Introduction to Performance Tuning, Maintenance and troubleshooting, Introduction to Microsoft Windows 10/ server 2016 security, Security issues at the Active Directory level, Authenticating users and clients, Planning the administrative structure for security groups, Using smart cards for network authentication, Evaluating and analyzing workstation security, Securing network services: DNS, DHCP, RIS, SNMP and TS, Microsoft Azure Cloud Integration/Backup, Microsoft Windows os Licensing model, Power shell Scripting, Windows Power Shell Technology Background and Overview, Power shell Error Handling and Debugging, Windows Administration using power shell, Background Jobs and Remote Administration, Windows Power Shell Tips & Re-Using Scripts and Functions.

Linux Operating System and Security Issue (100hrs) : Systems Concepts, Startup Files, Linux boot process, Installation of Linux, A hands-free method of installation, Understanding the boot procedure, Configuring the GRUB boot loader, Disk partition, Controlling and managing Services, Repository configuration, User administration of Linux, Network Configuring, Network Teaming/Load balancing, Define network route, Using SSH for network communications, Using VNC for remote management, Network Authentication, Patches & updates, System Configuration Files, Perform System Management, X configuration server, Setting up an NFS server, Setting up an FTP server, The Samba Server: networking with Windows system, Configuring a DHCP server, Configuring a DNS server, Configuring the Apache web server, Configuring the Squid web proxy cache, Using send mail server, Dovecot: an IMAP and POP server, Performance Tuning and system hardening, Maintenance and troubleshooting, SE LINUX/ APParmor, Basic Service Security, Log Management and NTP, BIND and DNS Security, Network Authentication: RPC, NIS and Kerberos, Apache security(SSL), Overview of Linux versions/releases, KVM / xen, Bash Scripting, Introduction to BASH Command Line Interface (CLI) Error Handling Debugging & Redirection of scripts, Control Structure, Loop, Variable & String Conditional Statement Regular Expressions, Automate Task Using Bash Script Security patches, Logging & Monitoring using script.

Security Concepts (170 Hrs)

Application Security

MySQL : Introduction to MySQL, Installing and Configuring MySQL, Queries in MySQL Database Security Principles, Authentication Bypass, Data Extraction, Advanced Identification/Exploitation, Order by/group by, Encoding/decoding Injection in Insert/Update, Other HTTP fields, Injection in stored procedures
Web Application Security : Web application Security Risks, Identifying the Application Security Risks, Threat Risk Modeling, OWASP Top 10 Concepts

Python : Introduction to Python, Python basics, Data Types and variables Operators, Looping & Control Structure List, Modules Dictionaries, string Regular Expressions, Functions and Functional Programming, Object Oriented Linux Scripting Environment, Classes, Objects and OOPS concepts, File and Directory Access Permissions and Controls Socket, Libraries and Functionality Programming, Servers and Clients Web Servers and Client scripting, Exploit Development techniques, Writing plugins in Python, Exploit analysis Automation Process, Debugging basics, Task Automation with Python.

Ethical Hacking : Basics of Information System, Classification of Threads and attacks, Protecting Information System Security, Cyber Laws, Security in mobile and Wireless Computing, Security Policies and Measures in Hand Held Devices, Security Policy, Standards, Social engineering, Information Security risk analysis, Data Privacy Fundamentals, Penetration Testing fundamentals, Foot printing and scanning, Enumeration and Step-by-Step vulnerability finding, Linux and Automated Security Assessment Tools, Trojans and Backdoors, Viruses and worms, Sniffers, session Hijacking and Denial of Service, System Hacking, Web Server Hacking, Web application Vulnerabilities, Honey pots, Google dorks, Phishing.

Network Defense and Countermeasures (NDC) (70 Hrs)

Security Fundamentals, Firewalls, Types of Firewalls, Overview of NextGen Firewall, Limitations of firewall, Intrusion Detection And Prevention, Intrusion risks, Security policy, Monitoring and reporting of traffics, Traffic shaping. Investigating and verifying detected intrusions, Recovering from, reporting and documenting intrusions, Define the Types of intrusion Prevention Systems.

Intrusion prevention system basics, Limitations of Intrusion Prevention System, Spoofing Detection & Prevention, DDos & Dos mitigation techniques, Qos Policy, Introduction of Web Application Firewall, Packet Signature and Analysis, Virtual Private Networks, Deploy and managing VPN, VPN Performance tuning and error handling, DMZ and virtual host, Introduction of Reverse proxy and policies.

Cyber Forensics (30 Hrs)

Introduction to Cyber Crime and Cyber Forensics, Basic Forensic Principles, Computer Forensics, Types of Cyber Forensics Techniques, Cyber Forensics Procedures, Detecting Incidents, Handling Evidence, Encoding and Encryption, Cyber Forensics Tools: Sysinternals Suite, FTK Forensics Tool kit, FTK Imager, OSF, Hex, Cyber check Suite.

PKI (50 Hrs)

Understand Basic Encryption Concepts, Attacks Against Encryption, Understand Private Key Encryption, Understand Public Key Encryption, Cryptography, Fundamentals, Cryptographic Algorithm and protocols, Symmetric Key Encryption Algorithms, Public Key Algorithms, Cryptographic issues, Strong Authentication, Digital Signatures, PKI Standards, PKI Fundamentals, Implementing Security, Cryptographic Attacks and Defenses, Understand Key Management, Understand Trust in the System, Secure E-Mail Implementation, File Encryption Solutions.

IT Infrastructure Management (90 Hrs)

Introduction to ITIL

Service Strategy, Service Design, Service Transition, Service Operation, Continual Service Improvement
Data Center Management Introduction to DCM, Data Center design, Data Center Security Procedure, Server Security, Storage area network, Virtualization, LXC Docker Vagrant kvm Hyper v, kubernetes, Introduction of Vmware Vsphere cluster, Introduction of Virtual Private Cloud (VPC), Private Cloud Setup, Automation Using Cloud API, Server Orchestration, Cloud Logging and monitoring, DevOps.

Effective Communication (50 Hrs)

Official & General Conversation, Official Letter Writing, Official Emailing, Essay Writing, Event Reporting, Formal Speaking (Telephone, Face-to-Face, Public Speaking), Oral & Digital Presentation Skills, Listening Skills, Cross-Cultural Communication, Technology-enabled Communication, Confidence Building, Formal Etiquettes, Body Language,

Developing Positive Attitude, Personal Goal Setting & Career Planning, Job Search Process, Resumes & Applications / Cover Letters, Handling Interviews, Group Discussions, Audio Synthesis, Mock Interviews.

Aptitude & General English (50 Hrs)

Aptitude: Analogy, Series Completion (Number, Alphabet, Letter Series), Coding/Decoding for Number, alphabet and Letter, Blood Relations, Puzzle Test, Classification Type questions, Alphabet test, Order of words, Letter words problems, Logical sequence of words, Number, Ranking and time Sequence Test, Mathematical operations, Arithmetic reasoning, Logical reasoning, Statement Arguments, Statement Assumptions, Statement courses of Action, Statement Conclusions, Deriving conclusion from passages, HCF and LCM, Fraction, Number system, Permutation & combination, Ratio & Preparation, Partnership, Average, Percentage, Clock, Probability, Pipes and cisterns, Problem on streams, Time and work, Work and Wages, Problem on Trains, Problem on Speed and Velocity, Problem on Ages, Profit and loss, Simple Interest, Compound Interest

General English: The Sentence, Subject and Predicate, Phrase and Clause, Parts of Speech, The Noun: Kinds of Nouns, The Adjective, Articles, The Verb, Mood, The Adverb, Comparison Of Adverbs, Formation Of Adverbs, Position Of Adverbs, The Preposition, Words Followed By Prepositions, The Conjunction, Some Conjunctions And Their Uses, The Interjection, The Same Word Used As Different Parts Of Speech, Composition, Analysis, Transformation and Synthesis, Analysis of Simple Sentences, Phrases, Clauses, Sentences: Simple, Compound and

Complex, More about Noun Clauses, More about Adjective Clauses, More about Adverb Clauses, Analysis of Complex Sentences, Analysis of Compound Sentences, Transformation of Sentences, Transformation of Sentences, Synthesis of Sentences, Synthesis of Sentences, Synthesis of Sentences, The Sequence of Tenses, Direct and Indirect Speech, Agreement of The Verb With The Subject, Nouns and Pronouns, Adjectives, Verbs, Adverbs, Preposition, Conjunctions, Order of Words, Synonyms & Antonyms, Punctuation, Spelling Rules, The Formation of Words, Figures of Speech Exercise, Verb Patterns, Question Tags, Words of Idioms & phrases, Sentence Construction, Fill up the blanks.

PG-Diploma in Big Data Analytics

The course explores the fundamental concepts of big data analytics, visualization techniques, and hands on advanced analytical tools/ decision-making tools/ operation research techniques to analyze the complex problems.

Duration	: 900 Hours	Fee	: PKG ---
Eligibility	: Graduate in Engineering in IT/ Computer Science/ Electronics/ Telecommunications/ Electrical/ Instrumentation or B.Sc in Mathematics/ Statistics/ Computer Science/ Physics.	NSQF Level	: 8

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

After the completion of the course, students shall be expert in following things: Big Data tools, Big Data Querying Tools such as Pig, Hive and Impala, park.

- Integration of data from multiple data sources
- NoSQL databases, such as Hbase, MongoDB
- Knowledge of various ETL techniques and Implementing ETL Process Monitoring performance and advising any necessary infrastructure changes
- Developing reports, dashboards using D3 & Tableau
- Understanding on the applications using Map Reduce Concepts

Student can start a career as a big Data Developer/Business Analyst.

Course Content

SL No	Modules	Hours
1	Linux Programming and Cloud Computing	80
2	Python Programming and Advanced Analytics	90
3	Object Oriented Programming with Java 8	80
4	Statistical Analysis with R	70
5	Data Collection & DBMS Principles, Tools & Platforms	40
6	Big Data Technologies	130
7	Data Visualization – Analysis and Reporting	40
8	Practical Machine Learning	100
9	Effective Communication	50
10	Aptitude & General English	50
11	Project	100

Detailed Syllabus

Linux Programming and Cloud Computing (80 Hrs)

Linux History and Operation, Installing and Configuring Linux, Shells, Commands, and Navigation, Common Text Editors, Administering Linux, Introduction to Users and Groups, Linux shell scripting

Introduction to Cloud Computing: Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and other Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud. Comparison among SAAS, PAAS, IAAS, Cloud computing platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure Utility Computing, Elastic Computing, SLA, clusters, cloud analytics, challenges of cloud environment, HPC in the cloud.

Parallel Processing Concepts: Physical Organization and building blocks of High Performance Computing Systems, Processors and Multi Core Architectures, Vector processing, Super-scalar, In-order execution, Instruction-Level Parallelism etc., FMA, 32 and 64 bit types, ISA, Accelerators such as GPGPUs and Xeon Phi. Threads and Processes, Multi-processing OS, Parallel I/O, General concepts.

Parallel Programming Models and Parallel Algorithms Design: Application domains of HPC, Decomposition Techniques: Data parallelism, Functional parallelism, Divide and Conquer etc., Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Granularity of parallelism, Programming OpenMP.

Python Programming and Advanced Analytics (90 Hrs)

Introduction to Python, Basic Syntax, Data Types, Variables, Operators, Input/output, Flow of Control (Modules, Branching), If, If- else, Nested if-else, Looping, For, While, Nested loops, Control Structure, Break, Continue, Pass, Strings and Tuples, Accessing Strings, Basic Operations, String slices, Working with Lists, Introduction, Accessing list, Operations, Function and Methods, Files, Modules, Dictionaries, Functions and Functional Programming, Declaring and calling Functions, Declare, assign and retrieve values from Lists, Introducing Tuples, Accessing tuples, Visualising using matplotlib, seaborn.

Advanced Python: Object Oriented, OOPs concept, Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, Operations Exception, Exception Handling, Except clause, Try-finally clause, User Defined Exceptions, Data wrangling, Data cleaning

Python Libraries – pandas, numpy, scipy, scrapy, plotly, selenium, beautiful soup.

Advanced Analytics: Introduction to Business Analytics using some case studies, Making Right Business Decisions based on data, Exploratory Data Analysis Visualization and Exploring Data, Descriptive Statistical Measures, Probability Distribution and Data, Sampling and Estimation, Statistical Interfaces, Predictive modeling and analysis, Regression Analysis, Forecasting Techniques, Simulation and Risk Analysis, Optimization, Linear, Non linear, Integer, Decision Analysis, Strategy and Analytics, Text analytics, NLP, Social network analysis, web scrapping, Dimensionality issues, Ridge & lasso regression, bias/variance trade off, density, PCA, FA, feature selection, Bagging and boosting, Simulation

: Monte carlo.

Overview of Factor Analysis, Directional Data Analytics, Functional Data Analysis.

Object Oriented Programming with Java 8 (80 Hrs)

Oops Concepts, Data Types, Operators and Language, Constructs, Inner Classes and Inheritance, Interface and Package, Exceptions, Collections, Threads, Java.lang, Java.util, Java.awt, Java.io, Java Persistent, Servlets, Java Virtual Machine, Lambda Expressions, Introduction of JDBC API.

Statistical Analysis with R (70 Hrs)

Probability & Statistics: Introduction to Statistics– Descriptive Statistics, Summary Statistics Basic probability theory, Statistical Concepts (uni-variate and bi-variate sampling, distributions, re-sampling, statistical Inference, prediction error), Probability Distribution (Continuous and discrete– Normal, Bernoulli, Binomial, Negative Binomial, Geometric and Poisson distribution), Bayes' Theorem, Central Limit theorem, Data Exploration & preparation, Concepts of Correlation, Regression, Covariance, Outliers etc.

R Programming: Introduction & Installation of R, R Basics, Finding Help, Code Editors for R, Command Packages, Manipulating and Processing Data in R, Reading and Getting Data into R, Exporting Data from R, Data Objects–Data Types & Data Structure. Viewing Named Objects, Structure of Data Items, Manipulating and Processing Data in R (Creating, Accessing, Sorting data frames, Extracting, Combining, Merging, reshaping data frames), Control Structures, Functions in R (numeric, character, statistical), working with objects, Viewing Objects within Objects, Constructing Data Objects, Building R Packages, Running and Manipulating Packages, Non parametric Tests ANOVA, chi-Square, t Test, U Test, Interactive reporting with R markdown, Introduction to Rshiny.

Data Collection and DBMS (Principles, Tools & Platforms) (70 Hrs)

Database Concepts (File System and DBMS), Database Storage Structures (Tablespace, Control files, Data files), Structured and Unstructured data, SQL Commands (DDL, DML & DCL), data collection, the tools And how data can be gathered in a systematic fashion, Dataware Housing concept, No SQL, Data Models: XML, working with MongoDB), Cassandra– overview, architecture, comparison with MongoDB, graph databases, in memory databases. Tools: OLTP and OLAP, data preparation and cleaning techniques.

Cloud Computing & HPC Applications (40 Hrs)

Introduction to Cloud Computing: Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and other Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud. Comparison among SAAS, PAAS, IAAS, Cloud computing platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure Utility Computing, Elastic Computing, SLA, clusters, cloud analytics, challenges of cloud environment, HPC in the cloud.

Parallel Processing Concepts: Physical Organization and building blocks of High Performance Computing Systems, Processors and Multi Core Architectures, Vector processing, Super-scalar, In-order execution, Instruction Level Parallelism etc., FMA, 32 and 64 bit types, ISA, Accelerators such as GPGPUs and Xeon Phi. Threads and Processes, Multi-processing OS, Parallel I/O, General concepts.

Parallel Programming Models and Parallel Algorithms Design: Application domains of HPC, Decomposition Techniques: Data parallelism, Functional parallelism, Divide and Conquer etc., Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Granularity of parallelism, Programming OpenMP.

Big Data Technologies (140 Hrs)

Introduction to Big Data: Big data definition, enterprise / structured data, social / unstructured data, unstructured data needs for analytics, What is Big Data, Big Deal about Big Data, Big Data Sources, Industries using Big Data, Big Data challenges.

Hadoop: Introduction of Big data programming Hadoop, History of Hadoop, The ecosystem and stack, The Hadoop Distributed File System (HDFS), Components of Hadoop, Design of HDFS, Java interfaces to HDFS, Architecture overview, Development Environment, Hadoop distribution and basic commands, Eclipse development, The HDFS command line and web interfaces, The HDFS Java API (lab), Analyzing the Data with Hadoop, Scaling Out, Hadoop

event stream processing, complex event processing, MapReduce Introduction, Developing a Map Reduce Application, How Map Reduce Works, The MapReduce Anatomy of a Map Reduce Job run, Failures, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features, Real-World MapReduce, Hadoop ETL: Hadoop ETL Development, ETL Process in Hadoop, Discussion of ETL functions, Data Extractions, Need of ETL tools, Advantages of ETL tools.

Introduction to HIVE, Programming with Hive: Data warehouse system for Hadoop, Optimizing with Combiners and Partitioners (lab), Bucketing, More common algorithms: sorting, indexing and searching (lab), Relational manipulation: map-side and reduce-side joins (lab), evolution, purpose and use

Map Reduce: Overview and concepts, interface to HDFS (HTTP, CLI and Java API), high availability and Name Node federation, Map Reduce developing and deploying programs, optimization techniques, Map Reduce Anatomy, Data flow framework programming Map Reduce best practices and debugging, Introduction to Hadoop ecosystem, integration R with Hadoop

HBase: Overview, comparison and architecture, java client API, CRUD operations and security

Programming Pig: Engine for executing data flows in parallel on Hadoop: Overview, comparison and architecture, Latin scripting and statements, data types, UDF's, built in functions and use cases

Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, Security in Hadoop, Administering Hadoop, HDFS Monitoring & Maintenance, Hadoop benchmarks, Hadoop in the cloud.

Introduction to Apache Spark and Use Cases: Apache Spark APIs for large-scale data processing: Overview, Linking with Spark, Initializing Spark, Resilient Distributed Datasets (RDDs), External Datasets, RDD Operations, Passing Functions to Spark, Working with Key-Value Pairs, Shuffle operations, RDD Persistence, Removing Data, Shared Variables, Deploying to a Cluster Spark Streaming, Spark MLlib and ML APIs, Spark Data Frames/Spark SQL, Integration of Spark and Kafka, Mapreduce, mongodb with spark.

Data Visualization (Analysis & Reporting) (50 Hrs)

Business Intelligence: requirements, content and managements, information Visualization, Data analytics Life Cycle, Analytic Processes and Tools, Analysis vs. Reporting, Modern Data Analytic Tools, Visualization Techniques, Visual Encodings, Visualization algorithms, Data collection and binding, Cognitive issues, Interactive visualization, Visualizing big data structured vs unstructured, Visual Analytics, Geomapping, Dashboard Design.

Practical Machine Language (100 Hrs)

Supervised and Unsupervised Learning, Uses of Machine learning, Clustering, K means, Hierarchical Clustering, Decision Trees, Classification problems, Bayesian analysis and Naïve bayes classifier, Random forest, Gradient boosting Machines, Association rules learning, Apriori and FP growth algorithms, Support vector Machines, Linear and Non liner classification, ARIMA, Neural Networks and its application, Neural Net & its applications, deep learning algorithms, KNN, NLP, NLTK, ML modeling using Scikit learn, AI and its application.

Project (120 Hrs)

Software: A Process, Various Phases in s/w Development, Software life cycle agile model (Self Study of other models), Introduction to Coding Standards, Software Quality Assurance.

PG-Diploma in Artificial Intelligence

This course will focus on AI platform, framework, infrastructure and AI based services and will give enough opportunities to the learner for business modeling, solution development, architecting automated applications, data science, coding etc

Duration : 900 Hours

Fee : PKG ---

Eligibility : Graduate in Engineering in IT/
Computer Science/ Electronics/
Telecommunications/ Electrical/
Instrumentation or B.Sc in
Mathematics/ Statistics/ Computer
Science/ Physics.

NSQF Level : 8

Course Prerequisite

Sound knowledge of Computing Fundamentals and Fundamentals of Programming.

Outcome

PG Diploma in Artificial Intelligence (PG-DAI) comprehensive programme that combines Data Science, Machine Learning and Deep Learning to prepare candidates for the roles of Applied AI Scientists, Applied AI engineers, AI architects, Technology architects, Solution Engineers, Technology Consultants.

Course Content

SL No	Modules	Hours
1	Fundamental of Artificial Intelligence	80
2	Advanced Programming using R & Python	120
3	Mathematics & Statistics for Artificial Intelligence	80
4	Machine Learning	100
5	Data Analytics	80
6	Reinforcement Learning	50
7	Deep Neural Networks	70
8	Natural Language Processing & Machine Vision	60
9	AI Compute Platforms, Applications & Trends	40
10	Effective Communication	50
11	Aptitude & General English	50
12	Project	120

Detailed Syllabus

Fundamental of Artificial Intelligence (80 Hrs)

Introduction to AI, Evolution & Revolution of AI, Introduction of Applications in various Domains (Scientific including Health Sciences, Engineering, Financial Services and other industries), Intelligent Agents, Uninformed Search, Constraint Satisfaction Search, Combinatorial Optimization Problems, Heuristic & Meta-heuristics, Genetic Algorithms for Search, Adversarial Search, Parallel Search, Search Engines, Game Theory, various problems, Game Trees, Knowledge

Representation and Automated, Propositional and Predicate Logic, Inference and Resolution for Problem Solving, Rules and Expert Systems, Artificial Life, Learning through, Emergent Behavior, Genetic Algorithms, Planning & Planning Methods, Advanced Knowledge Representation, Fuzzy Logic.

Advanced Programming using R and Python (120 Hrs)

R Programming: Introduction & Installation of R, R Basics, Finding Help, Code Editors for R, Command Packages, Manipulating and Processing Data in R, Reading and Getting Data into R, Exporting Data from R, Data Objects, Data Types & Data Structure. Viewing Named Objects, Structure of Data Items, Manipulating and Processing Data in R (Creating, Accessing, Sorting data frames, Extracting, Combining, Merging, reshaping data frames), Control Structures, Functions in R (numeric, character, statistical), working with objects, Viewing Objects within Objects, Constructing Data Objects, Building R Packages, Running and Manipulating Packages, Non parametric Tests ANOVA, chi Square, t Test, U Test, Introduction to Graphical Analysis, Using Plots(Box Plots, Scatter plot, Pie Charts, Bar charts, Line Chart), Plotting variables, Designing Special Plots, Simple Linear Regression, Multiple Regression, Interactive reporting with R markdown.

Python Programming: Introduction to Python, Basic Syntax, Data Types, Variables, Operators, Input/output, Flow of Control (Modules, Branching), If, If else, Nested if else, Looping, For, While, Nested loops, Control Structure, Break, Continue, Pass, Strings and Tuples, Accessing Strings, Basic Operations, String slices, Working with Lists, Introduction, Accessing list, Operations, Function and Methods, Files, Modules, Dictionaries, Functions and Functional Programming, Declare, assign and retrieve values from Lists, Introducing Tuples, Accessing tuples, matplotlib, seaborn.

Advanced Python: Object Oriented, OOPs concept, Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, Operations Exception, Exception Handling, Python Libraries, Data migration and visualization: Pandas and Matplotlib, Database Interaction in Python.

Case Studies: Mathematical computing with Python, Data migration and visualization: Pandas and Matplotlib, Pycharm, Anaconda, Data manipulation with Pandas.

Mathematics & Statistics for Artificial Intelligence (80 Hrs)

Mathematics

a. Probability

Basic rules and axioms, events, sample space, frequentist approach, dependent and independent events, conditional probability, Random variables, continuous and discrete, expectation, variance, distributions– joint and conditional, Bayes' Theorem, MAP, MLE, Popular distributions– binomial, bernoulli, poisson, exponential, Gaussian, Conjugate priors

b. Linear Algebra

Vectors, definition, scalars, addition, scalar multiplication, inner product (dot product), vector projection, cosine similarity, orthogonal vectors, normal and orthonormal vectors, vector norm, vector space, linear combination, linear span, linear independence, basis vectors.

Matrices definition, addition, transpose, scalar multiplication, matrix multiplication, matrix multiplication properties, hadamard product, functions, linear transformation, determinant, identity matrix, invertible matrix and inverse, rank, trace, popular type of matrices symmetric, diagonal, orthogonal, orthonormal, positive definite matrix

Eigenvalues & eigenvectors, concept, intuition, significance, how to find Principle component analysis, concept, properties, applications

Singular value decomposition, concept, properties, applications

c. Calculus

Functions, Scalar derivative, definition, intuition, common rules of differentiation, chain rule, partial derivatives, Gradient, concept, intuition, properties, directional derivative.

Vector and matrix calculus, how to find derivative of scalar valued, vector–valued function with respect to scalar, vector, four combinations Jacobian.

Gradient algorithms, local/global maxima and minima, saddle point, convex functions, gradient descent algorithms batch, mini–batch, stochastic, their performance comparison.

d. Miscellaneous Topics

Information theory, entropy, cross entropy, KL divergence, mutual information

Markov Chain, definition, transition matrix, stationarity.

Statistics : Descriptive Statistics, Summary Statistics Basic probability theory, Statistical Concepts (uni variate and bi variate sampling, distributions, re-sampling, statistical Inference, prediction error), Probability Distribution(Continuous and discrete Normal, Bernoulli, Binomial, Negative Binomial, Geometric and Poisson distribution), Bayes' Theorem, Central Limit theorem, Data Exploration & preparation, Concepts of Correlation, Regression, Covariance, Outliers etc.

Machine Language (100 Hrs)

Introduction to machine learning and need, The Learning Problem, Terminology, Canonical Learning Problems, Supervised Learning, Unsupervised Learning, Reinforcement Learning, ML applications in the real world, A key ML concept, Uses of Machine learning, Introduction to feature engineering, raw data to feature, Data Preparation, feature creation, Data cleaning & transformation, Data Validation & Modelling, Feature selection Techniques, Dimensionality reduction, PCA, Ensemble methods, Bagging & Boosting, ML Algorithms, Decision Trees, Oblique trees, Random forest, Bayesian analysis and Naïve bayes classifier, Support vector Machines, KNN, Gradient boosting, Association rules learning, Apriori and FP growth algorithms, Linear and Non linear classification, linear and logistic Regression, Clustering, K means, Overview of Factor Analysis, ARIMA, ML in real time, Algorithm performance metrics, ROC, AOC, Confusion matrix, F1 score, MSE, MAE.

Machine Learning Tools: introduction to the basic data science toolset

Case Studies: Usage of ML algorithms, Algorithm performance metrics (confusionmatrixsensitivity, specificity, ROC, AOC, F1score, Precision, Recall, MSE, MAE), Implementation of case studies will be using R / Weka, Implementation of ML algorithms using high level api like Scikit learn. Credit Card Fraud Analysis, Intrusion Detection system, Implement basic gradient descent in Tensor Flow.

Data Analytics (80 Hrs)

Introduction to Data Analytics, Descriptive Statistical Measures, Probability Distribution and Data, Sampling and Estimation, Predictive modelling and analysis, Regression Analysis, Forecasting Techniques, Simulation and Risk Analysis, Optimization, Linear, Non linear, Integer, Decision Analysis, Making Right Business Decisions based on data, Exploratory Data Analysis, Visualization and Exploring Data, Text analytics, Social network analysis, web scrapping, Dimensionality issues, Ridge & lasso regression, bias/variance trade off, density, PCA, FA, Directional Data Analytics, Functional Data Analysis, Data Analysis & visualization using numpy, matplotlib, scipy, Advanced python packages.

Reinforcement Learning (50 Hrs)

Introduction to reinforcement learning as an approximate dynamic programming problem, Overview of reinforcement learning: the agent environment framework, successes of reinforcement learning, Bandit problems and online learning, Markov decision processes, Returns, and value functions, Solution methods: dynamic programming, Solution methods for learning, Solution methods for temporal difference learning, Eligibility traces, Value function approximation Models and planning (table lookup case), Case studies: successful examples of RL systems, simulation based methods like Q-learning.

Deep Neural Networks (70 Hrs)

Introduction to Deep Neural Network, RNN, CNN, LSTM, Deep Belief Network, semantic Hashing, Training deep neural network, introduction to Tensorflow, building deep learning models, building a basic neural network using Keras with Tensor Flow, Troubleshoot deep learning models, building deep learning project. (Alog model), Transfer Learning, Inductive, unsupervised Transductive, Deep Learning Tools & Technique.

Natural Language Processing & Machine Vision (60 Hrs)

Understanding Language, NLP Overview, BNF, Grammars, Parsing, Introduction to Language Computing, language models, text classifications, Information retrieval & extraction, Basics for Computational Linguistics, Morphology, Parsing, shallow & deep parsing, semantic interpretation, POS Tagging, chunking, semantic aspects, Pragmatics, Deep Processing for NLP, Statistical Approaches, Methods for NLP, Phonetics, Application domains, MT, IR, Speech, NLG, Syntactic Analysis, Semantic Analysis, Machine Translation, Information Retrieval, Machine Vision Human Vision, Image Processing, Interpreting Motion, Face Recognition, Robotics, chat bots.

AI Compute Platforms, Applications & Trends (40 Hrs)

Hardware as AI compute platform, Parallel Programming models: Parallel Python, Scaling Learning models on HPC platform, Deep learning using HPC/Data Centre/Hadoop, Deployment of Models on distributed platform. AI latest trends and future.

Effective Communication (50 Hrs)

Oral & Digital Presentation Skills, Listening Skills, Cross Cultural Communication, Technology enabled Communication, Confidence Building, Formal Etiquette, Body Language, Developing Positive Attitude, Personal Goal Setting & Career Planning, Job Search Process, Resumes & Applications / Cover Letters, Handling Interviews, Group Discussions, Audio Synthesis, Mock Interviews.

Aptitude & General English (50 Hrs)

Aptitude: Analogy, Series Completion (Number, Alphabet, Letter Series), Coding, Decoding for Number, alphabet and Letter, Blood Relations, Puzzle Test, Classification Type questions, Alphabet test, Order of words, Letter words problems, Logical sequence of words, Number, Ranking and time Sequence Test, Mathematical operations, Arithmetic reasoning, Logical reasoning, Statement Arguments, Statement Assumptions, courses of Action, Statement, Conclusions, Deriving conclusion from passages, Fraction, Number system, Partnership, Average, Percentage, Clock, Probability, Pipes and cisterns, Problem on streams, Time and work, Work and Wages, Problem on Trains, Problem on Speed and Velocity, Problem on Ages, Profit and loss, Simple Interest, Compound Interest.

General English : The Sentence, Subject and Predicate, Phrase and Clause, Parts of Speech, The Noun: Kinds of Nouns, The Adjective, Articles, The Verb, Mood, The Adverb, Comparison Of Adverbs, Formation Of Adverbs, Position Of Adverbs, The Preposition, Words Followed By Prepositions, The Conjunction, Some Conjunctions And Their Uses, The Interjection, The Same Word Used As Different Parts Of Speech, Composition, Analysis, Transformation and Synthesis, Analysis of Simple Sentences, Phrases, Clauses, Sentences: Simple, Compound and Complex, More about Noun Clauses, More about Adjective Clauses, More about Adverb Clauses, Analysis of Complex Sentences, Analysis of Compound Sentences, Transformation of Sentences, Transformation of Sentences, Synthesis of Sentences, Synthesis of Sentences, Synthesis of Sentences, The Sequence of Tenses, Direct and Indirect Speech, Agreement of The Verb With The Subject, Nouns and Pronouns, Adjectives, Verbs, Adverbs, Preposition, Conjunctions, Order of Words, Synonyms & Antonyms, Punctuation, Spelling Rules, The Formation of Words, Figures of Speech Exercise, Verb Patterns, Question Tags, Words of Idioms & phrases, Sentence Construction, Fill up the blanks.

Project (120 Hrs)

Along with project following module will be conducted. Artificial Intelligence in Production (20hrs) Deployment & Maintenance of AI Applications, AI application testing, AI model, interoperability, problem solving approaches.

Case studies: AI applications in Financial Services including Insurance banking, stock markets & other financial markets like Forex and Artificial Economics, AI applications in Health Sciences & other Scientific Applications, AI in Cloud Environment.

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Web : www.upng.ac.pg

CEIT:

Centre of Excellence in IT
First Floor, Student Service Building,
Waigani Campus, The University of Papua New Guinea,
P.O. Box 320, Port Moresby Papua New Guinea
Tel : +675 3567424
Email : ceit@upng.ac.pg
Web : www.ceit.upng.ac.pg

CDAC:

Centre for Development of Advanced Computing
H.O.: Pune University Campus, Ganesh Khind,
Pune – 411 001 INDIA
Tel : +(91) 20 25704100
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