Third Semester

Python Programming (MCA-211)

Professional Core (PC); 4 Credits (3-1-0)

Unit	Contents	No. of Lectures
	PYTHON	
Unit 1	Installation working with python, Understanding python variables, Python basic operations, Understanding python blocks	**8**
Unit 2	Python Data Types and Flow Control, Declaring and using numeric data, Defining list and loop, Use of while loop, pass, continue and break, Learn Python function and understanding packages.	**10**
Unit 3	Python File operation: Working log files in python, Manipulating pointers, Programming using file operations, Constructors and destructors, Programming using oops support, Classes, abstraction, encapsulation, inheritance in python. String operations, operations on list, tuples, and dictionaries.	**12**
	MATLAB	
Unit 4	MATLAB as a sophisticated calculator, Arrays, Matrices and related operations: addition, subtraction, multiplication and element by element operations, Visualization: XY- plotting functions, Subplots and Overlay plots. Variables, loops, selection, Functions, scripts.	**6**
Unit 5	Package handling: adding packages and use of inbuilt functions and file I/O: reading and writing files. Loading and processing Image files. Solving equations and curve fitting. Probability and Statistics: Interpolation ,Statistics, Histogram and probability, The Normal Distribution, Random number Generation, Interpolation.	**6**
		42

Big Data Analytics (MCA-214)

Professional Core (PC); 4 Credits (4-1-0)

Objectives:

The objective of the course is to present an overview of Big Data Analytics principles and approaches. Develop a basic understanding of the building blocks of Big Data as presented in terms of kinds of data and analytical languages

Unit	Contents	No. of Lectures
Unit 1	**Introduction to big data analytics:** Big data overview, Data pre-processing, concepts of supervised and unsupervised learning, Differences between Big data and statistics, Key disciplines for Big Data, Big Data problem, What is Big Data Analytics? What Big Data Analytics Isn't? Why this Sudden Hype Around Big Data Analytics? Classification of Analytics. Greatest Challenges that Prevent Businesses from Capitalizing on Big Data. Top Challenges Facing Big Data. Why Big Data Analytics is Important? Kind of Technologies are we Looking Toward to Help Meet the Challenges Posed by Big Data?	**09**
Unit 2	**Basics of R programming for Data Analytics:** Why learn R? How to install R / R Studio? How to install R packages? Basic computations in R, Data Types and Objects in R, Control Structures (Functions) in R, Useful R Packages **,** Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, What is Big Data? Volume, velocity and variety. Why big data? A typical data warehouse environment. A typical Hadoop environment. What is new today? What is Changing in the Realms of Big Data?.	**12**
Unit 3	**Algorithms for Data Analytics:**Basic statistics: mean, median, standard deviation, variance, correlation, covariance, Linear regression: simple linear regression, introduction to multiple linear regression, Classification: logistic regression, decision trees, SVM, Clustering: K-means, K-medoids, Hierarchical clustering, X-means.	**10**

Unit 4	**Exploratory Data Analysis in R:** Basic Graphs, Treating Missing values, working with Continuous and Categorical Variables, Feature Engineering, Label Encoding / One Hot Encoding.Haddoop: Features of Hadoop, Key Advantages of Hadoop, Versions of Hadoop. Overview of Hadoop Ecosystems, Hadoop Distributions, Hadoop versus SQL	**09**
Unit 5	**NoSQL Database with R:**R with Relational Database management system, R with non-relational database management system, What We Miss With NoSQL. Use of NoSQL in Industry, NoSQL Vendors, SQL versus NoSQL, New SQL, Comparison of SQL, NoSQL, and New SQL Future of R. In-Memory Analytics, In—Database Processing, Symmetric Multiprocessor System (SMP), Massively parallel Processing, Difference Between Parallel and Distributed systems, Shared Nothing Architecture.	**5**
		45

Reference/Text Books:

1. Data Analytics Made Accessible, A. Maheshwari.

Data Mining and data warehousing (MCA-213)
Professional Core (PC); 4 Credits (3-1-0)

Objectives:

The objective of the course is to present Design data warehouse with dimensional modelling and apply OLAP operations. Identify appropriate data mining algorithms to solve real world problems ,Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining.

Unit	Contents	No. of Lectures
Unit 1	Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata	**9**
Unit 2	Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet	**7**
Unit 3	introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.	**12**
Unit 4	Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.	**9**
Unit 5	Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.	**8**
		45

Reference/Text Books:

1. Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.

Cloud Computing (MCA-215)
Professional Core (PC); 4 Credits (3-1-0)

Objectives:

1. The ultimate goal of Mobile Cloud Computing is to enable execution of rich mobile applications on a plethora of mobile devices, with a rich user experience.

Unit	Contents	No. of Lectures
Unit 1	Introduction: History of Centralized and Distributed Computing – Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network-based systems- System models for Distributed and cloud computing- Software environments for distributed systems and clouds.	**06**
Unit 2	Virtualization: Introduction to Cloud Computing- Cloud issues and challenges – Properties – Characteristics – Service models, Deployment models. Cloud resources: Network and API – Virtual and Physical computational resources – Data-storage. Virtualization concepts – Types of Virtualization- Introduction to Various Hypervisors – High Availability (HA)/Disaster Recovery (DR) using Virtualization, Moving VMs.	**06**
Unit 3	Service Models: Infrastructure as a Service (IaaS) – Resource Virtualization: Server, Storage, Network – Case studies. Platform as a Service (PaaS) – Cloud platform & Management: Computation, Storage – Case studies. Software as a Service (SaaS) – Web services – Web 2.0 – Web OS – Case studies – Anything as a service (XaaS) – Microservices.	**10**

Unit 4	Cloud Programming and Software Environments: Cloud Programming and Software Environments – Parallel and Distributed Programming paradigms – Current technologies – Programming support of App Engines – Emerging Cloud software Environment.	**06**
Unit 5	Cloud Access: authentication, authorization and accounting – Cloud Provenance and meta-data – Cloud Reliability and fault-tolerance – Cloud Security, privacy, policy and compliance- Cloud federation, interoperability and standards.	**08**
		36

Reference/Text Books:

1.Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, "Distributed and cloud computing from Parallel Processing to the Internet of Things", Morgan Kaufmann, Elsevier, 2012.

2. Barrie Sosinsky, "Cloud Computing Bible", John Wiley & Sons, 2010. 2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'Reilly, 2009.

8. Eligibility Criteria

The students admitting in MCA must have a B.C.A./B.Sc. degree with Mathematics as one of the subjects at 10+2 level or at graduation level.

9. Career Path student can choose after the course

Students after completing their degree have many rewarding options. Below are some options one can choose

- Software Developer
- Database Administrator
- Computer Hardware Engineer
- Computer Systems Analyst
- Computer Network Architect
- Web Developer
- Project Manager
- Computer Science Blogger
- Content Developer
- Author For Programming Books

- Online Marketer
- Web Designer
- Startups
- Marketing And Sales
- Tech Support and Repair
- Professors of programming language
- PCB Designer
- Network Architect
- Mobile Expert