MCA 501 : BIG DATA AND ANALYTICS FOR BUSINESS INTELLIGENCE

UNIT-I
What is Big Data - Varieties of Data - Unstructured data – Trends in Data Storage-Industry Examples of Big Data.

UNIT-II
Big data Technology – New and older approaches- Data Discovery – Open source technologies for Big Data Analytics- Cloud and Big Data –Big Data Foundation-Computation-Limitations- Big Data Emerging Technologies

UNIT-III
Business Analytics- Consumption of Analytics- Creation to Consumption of Analytics-Data visualization by Organizations – 90/10 rule of critical thinking – Decision sciences and analytics-Learning over knowledge-Agility-Scale and convergence-Privacy and security in Big Data.

UNIT-IV
Predictive Analytics –Linear Regression – Decision trees-Neural networks-Classification trees-Ensemble methods-Association Rules-Segmentation, Sequence Rules, Social Network analytics.

UNIT-V
Hadoop – Components of Hadoop – Hadoop File System –Hadoop Technology Stack-Dataware housing Hadoop Concepts-Applications of Hadoop using PIG,YARN,HIVE.

Text Book:
1. MichealMinnelli,AmbigaDhiraj,Chambers, *Big Data and Big Analytics*, Willey and Sons Inc,.

Reference Books
1. Bart Beasens, *Analytics in Big Data World,* Willey and Sons Inc
2. Sameer Wadker,MadhuSidhalingaiah and Jason Winner,*ApacheHadoop, APress*

MCA 502 - Cloud Computing

UNIT I
CLOUD ARCHITECTURE AND MODEL Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models: Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public Vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

UNIT II
VIRTUALIZATION Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

UNIT III
CLOUD INFRASTRUCTURE Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV
PROGRAMMING MODEL Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim

UNIT V
SECURITY IN THE CLOUD Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Text Book:
1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

REFERENCES

1. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

3. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011.

4. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

5. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

6. Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer.

7. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.

8. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, 'Mastering Cloud Computing", TMGH,2013.

9. GautamShroff,Enterprise Cloud Computing,Cambridge University Press,2011

10. Michael Miller, Cloud Computing,Que Publishing,2008

11. Nick Antonopoulos, Cloud computing,Springer Publications,2010

MCA 503 A: USER INTERFACE DESIGN

UNIT – I
Human factors of interactive software goals of system engineering and user-interface design, motivations, accommodation of human diversity goal for out profession. Theories, principles, and guidelines – High-level theories, object-action interface model Principles, guide links for data display and data entry, balance of automation and human control. Managing design processes – Usability, design pillars, development methodologies, ethnographic observation, usability testing, surveys, and continuing assessments – expert reviews, usability testing and laboratories, surveys acceptance tests, evaluation during active use, and controlled psychologically oriented experiments.

UNIT – II
Software tolls – Specification methods, interface- building tools and evaluation and critiquing tools. Direct manipulation and virtual environments – examples, explanations, programming, visual, thinking and icons Home automation, remote direct manipulation, visual environments. Menu selection, form fillin, and dialog boxes – Task – related organizations item presentation sequence, response time and display rate, fact movement through menus, menu layout, form fill in, and dialog boxes. Command and natural languages – Functionality to support users tasks, command – organization strategies, the benefits of structure, naming and abbreviations, command menus, natural language in computing.

UNIT – III
Interaction Devices – Keyboards and function keys, pointing devices, speech recognition digitization and generation. Image and video displays, printers. Response time and display rate-Theoretical foundations, expectations and attitudes, user productivity, variability. Presentation styles: Balancing function and fashion – error messages, No anthropomorphic design, display design, color, Printed manuals, Online Help and tutorials – Reading from paper versus form displays, preparation of printed manuals, and preparation of online facilities.

UNIT – IV
Multiple – Window strategies – Individual – Window design, multiple-window design, Coordinator by tightly – coupled windows. Image browsing and tightly – coupled windows, personal role management and elastic windows. Computer-supported cooperative work-goals of cooperation, Asynchronous Interaction: Different time and place, Synchronous Distributed: Different place, same time, face to face: same place, same time, Applying CSCW to Edition, Information search and visualization – Database
Query and phrase search in textual documents, multimedia document searches, information visualization. Advanced filtering. Hypermedia and the world wide web (www).

UNIT – V
Introduction to Dot Net technology c#.Net Language – Control structures – GUI controls – Database GUI Controls and its connectivity to databases – ASP.Net Fundamentals and Web pages Interface designing.

Text Books:

1. Ben Shriderman, Designing the user Interface, strategies for effective human-Computer introduction Third Edition, Pearson Education, 2004, (For UNITs I, II, III and IV).

2. Beginning .NET 2.0 by wrox publications (For UNIT V).

Reference Books:

1.   Hix, Deborah and Hartgon, H.RR X; Developing use Interfaces, John Wiley,1993

2.   2. Galitz, Wilbert O., It's Time to Clear Your Windows: Designing GUIs that Work, John Wiley and Sons, New York(1994)

3.   ASP.NET 2.0 Black Book ,Dreamtech publications.

4.   VB.NET 2.0 Black Book, Dreamtech publications.

MCA 503 B: Cryptography and Network Security

UNIT I

Cryptography – Terminology, Conventional Encryption Model, Steganography, Classical Encryption Techniques, DES Data Encryption Standard, Block Cipher Design principles and Modes of Operation.

UNIT – II

Conventional Encryption Algorithms: Triples DES, International Data Encryption Algorithm, Blowfish, RC5, Characteristics of advanced symmetric Block Ciphers, Confidentiality using Conventional Encryption.

UNIT – III

Public-Key Cryptography, Introduction to Number Theory: Prime Numbers, Modular Arithmetic, Euler's Theorem, Primary and Factorization, Discrete Logarithms; Message Authentication and Hash Functions – Hash and MAC algorithms.

UNIT- IV

Digital Signatures and authentication Protocols, Digital Signature Standard, Network Security Practice, Authentication Applications. Basic overview of Electronic Mail Security: pretty Good Privacy's/MIME: IP Security, Web Security – Intruders, Viruses and Worms –Firewalls.

UNIT – V

Mobile Security, Risk Model, EcoSystem, Service Risks, App Risks, Countermeasures- Cloud Computing Security- Threats-Security in Cloud-Security at service layers.

Text Books

1. "Cryptography and Network Security" by John Wiley, Edn,.2001
2. Neil Bergman(Author), Mike Stanfield (Author), Jason Rouse (Author), Joel Scambray "Hacking Exposed Mobile: Security Secrets &Solutions",McGraw hill Ltd.
3. James RittingHouse,Ransome,Cloud Computing, Implementation,Management and security,CRC Press

REFERENCE BOOKS:

1. Bruce Schneier, Applied Cryptography, John Wiley, Second Edn,2001.

2. Charke Kaufman, Rodia Perlman and Mike Speciner, Network Security

3. R.Bragg, Markphodes-ousley, Keith Staasibers, Network security, TataMcGraw Hill.2004

4. Cheswick, Wand Bellovin,S.Fire walls and InternetrSecurity,Addison-Wisley,1994.

MCA 503C - Mobile App Development

UNIT I

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II

BASIC DESIGN 8 Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III

ADVANCED DESIGN 8 Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV

TECHNOLOGY I - ANDROID Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V

TECHNOLOGY II - IOS Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.

Text Book:

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

2. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012

REFERENCES:

1. http://developer.android.com/develop/index.html

2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS

3. Development: Exploring the iOS SDK", Apress, 2013.

MCA 503D: IT in Forensic Science

UNIT-I
Justice and Science-evidence origins types and admissibility-Crime scene, Blood stain patterns

UNIT-II
Forensic Death investigation-forensic anthropology-Entomology

UNIT-III
Forensic biology- Identification of Blood body fluids-DNA typing -Forensic Chemistry-Seized drug analysis -Arson fire explosives

UNIT-IV
Pattern and impression evidence-Finger prints - Tread impressions-Trace evidence-questioned documents

UNIT-V
Engineering and computing -forensic engineering and Forensic computing.

Text books:
1. Stuart H James,JonNordy,Suzzane Bell, Forensic Science, An introduction to scientific and Investigative Techniques-, Tayler and Francis Group

MCA 504 A: IMAGE PROCESSING

UNIT-I
Digital image Processing-The Origins of Digital Image Processing-Example Fields that use digital image processing- Fundamental Steps in Digital Image Process Components of an image processing system summary-Elements of Visual Perception- I and the Electromagnetic Spectrum-image Sensing and Acquisition-Image Sampling Quantization-Some Basic Relationships between Pixels-Linear and Nonlinear Operation.

UNIT-II
Background-Some Basic Gray level Transformations-Histogram Processing-Enhancer Using Arithmetic/ Logical Operations- Basis of spatial filters – smoothing spatial Filters – smoothing spatial filter sharpening spatial filters-Combining spatial Enhancement Methods. Color Fundamental color Models-pseudo color image processing – Basis of full-color image processing- Transformations smoothing and sharpening – color segmentation – noise in color image color image compression.

UNIT – III
Fundamentals – image compression Models – Elements of information theory – Error- Compression – image Compression Standards.

UNIT-IV
Detection of Discontinuities – Edge Linking and Boundary Detection – Threshold-Regarding based Segmentation- Segmentation by morphological watersheds-the Use of Motion Segmentation.

UNIT – V
Representation – Boundary Descriptors – Regional Descriptors – Use of Principal – Common for Description – Relational Descriptors – Scope and relevance Handwriting – Finger Print – 1 Other state – of the art Technologies.

Text book:
1. Gonzalez and Woods, Digital Image Processing, Second Edition, Pearson Education.

REFERENCE BOOKS:
1. Introductory Computer Vision & Image Processing, McGraw Hill.

2. Ramesh Jani et al, Machine Vision, McGraw Hill.

3. B.Chandra, D.DuttaMajmlar, Digital Image Processing PHL

4. 4. G.W.Awlock&R.Thomas, Applied Degital Image Processing, McGraw Hill.

5. Picks, Digital Image Processing, John Wiley.

6. M.Sonka, Image Processing Analysis & Machine Design, Thomson Learning.

7. Anil K Jain, Fundamentals of Digital Image Processing, Pearson Education, 2004.

MCA 504B - MULTIMEDIA SYSTEMS

UNIT-I

Introduction to Multimedia: media and Data Streams: Medium Main Properties of Multimedia System-Multimedia-Traditional data streams Characteristics-Data streams Characteristics for continuous Media – Information UNITs-Sound/Audio: Basic Concepts-Computer Image Processing.

UNIT-II

Video and Animation: Basic Concepts-Television-Computer based Animation-Data Compression: Storage Space-Coding Requirements-Source, Entropy and Hybrid coding-some Basic Compression Techniques-JPEGH.261-MPEG_DVI.

UNIT-III

Optical storage media: Basic Technology-Video Disks and other WORMs Compact Disk Read Only Memory-CD-ROM Extended Architecture-Further CD-ROM Technologies-Computer Technology: Communication Architecture-Multimedia Workstation.

UNIT-IV

Multimedia Operating Systems: Real Time-Resource management-Process Management-File Systems-Additional Operating System issues-system Architecture.

UNIT – V

Multimedia Communication Systems: Application Subsystem – Transport Subsystem-Quality subsystem Quality of service and Resource Management-Database Systems: Multimedia Database Management System-Characteristics of MDBMS-Data Analysis – Data Structure*Operations on Data Integration in a Database Model.

Text Book:

1. Ralf Steinmetz and KlaraNahrstedt, Multimedia: Computing, Communications and Applications, pearson Education Asia.

REFERENCE BOOKS:

1. Tay Vaughan, Multimedia Making it work, Tata McGraw-Hill, Edition, 2001

2. Jeffcoate, Multimedia in practice Technology and Application, Prentice Hall, 1995

3. John F. Koeel Buford, Multimedia systems, Addison Wesley, 1994.

4. Fred Halsall, Multimedia communications, Pearson Edition 2001.

5. Prabhat K Andleigh and KiranThatkar, Multimedia systems Design, PHI 2005.

MCA 504C Natural Language Processing

UNIT I

Introduction and Overview Natural Language Processing, hands-on demonstrations.Ambiguity and uncertainty in language.The Turing test.Regular Expressions Chomsky hierarchy, regular languages, and their limitations.Finite-state automata.Practical regular expressions for finding and counting language phenomena.A little morphology.Exploring a large corpus with regex tools. Programming in Python An introduction to programming in Python. Variables, numbers, strings, arrays, dictionaries, conditionals, iteration. The NLTK (Natural Language Toolkit) String Edit Distance and Alignment Key algorithmic tool: dynamic programming, a simple example, use in optimal alignment of sequences. String edit operations, edit distance, and examples of use in spelling correction, and machine translation.

UNIT II

Context Free Grammars Constituency, CFG definition, use and limitations. Chomsky Normal Form. Top-down parsing, bottom-up parsing, and the problems with each. The desirability of combining evidence from both directions Non-probabilistic Parsing Efficient CFG parsing with CYK, another dynamic programming algorithms. Earley parser. Designing a little grammar, and parsing with it on some test data. Probability Introduction to probability theory Joint and conditional probability, marginals, independence, Bayes rule, combining evidence.Examples of applications in natural language. Information Theory The "Shannon game"--motivated by language! Entropy, cross-entropy, information gain.Its application to some language phenomena.

UNIT III

Language modeling and Naive Bayes Probabilistic language modeling and its applications.Markov models.N-grams. Estimating the probability of a word, and smoothing. Generative models of language. Part of Speech Tagging and Hidden Markov Models , Viterbi Algorithm for Finding Most Likely HMM Path , Dynamic programming with Hidden Markov Models, and its use for part-of-speech tagging, Chinese word segmentation, prosody, information extraction, etc.

UNIT IV

Probabilistic Context Free Grammars Weighted context free grammars.Weighted CYK. Pruning and beam search. Parsing with PCFGs A tree bank and what it takes to create one. The probabilistic version of CYK. Also: How do humans parse? Experiments with eye-tracking.Modern parsers. Maximum Entropy Classifiers The maximum entropy principle, and its relation to maximum likelihood. Maximum entropy classifiers and their application to document classification, sentence segmentation, and other language tasks

UNIT V

Maximum Entropy Markov Models & Conditional Random Fields Part-of-speech tagging, noun-phrase segmentation and information extraction models that combine maximum entropy and finite-state machines. State-of-the-art models for NLP.Lexical Semantics Mathematics of Multinomial and Dirichlet distributions, Dirichlet as a smoothing for multinomial's. Information Extraction & Reference Resolution- Various methods, including HMMs. Models of anaphora resolution.Machine learning methods for co reference.

TEXT BOOKS:

1. "Speech and Language Processing": Jurafsky and Martin, Prentice Hall

2. "Statistical Natural Language Processing"- Manning and Schutze, MIT Press

3. "Natural Language Understanding". James Allen. The Benajmins/Cummings Publishing Company

REFERENCES BOOKS:
1. Cover, T. M. and J. A. Thomas: Elements of Information Theory. Wiley.

2. Charniak, E.: Statistical Language Learning. The MIT Press.

3. Jelinek, F.: Statistical Methods for Speech Recognition. The MIT Press.

4. Lutz and Ascher - "Learning Python", O'Reilly.

MCA 507 P: MINOR PROJECT WORK

1. Students shall be grouped into teams not exceeding three per team for pursuing Minor Project work.

2. Each team shall identify a real-life problem pertaining to a Manufacturing / Service / Trading System and offer a solution in the form of a Computer – Based system.

3. The team should put m a combined effort of 360 student-hours (i.e, 3 students x 120 hours per student) and submit their combined report. However, the reports should reflect the contributions or individuals.

4. The students shall select appropriate:
i. Analysis and Design Methodologies for the development of Computer Based System. Operating system platform, programming Languages/ Front-End and Back-End Tools/ Packages for implementation.

5. The team shall follow the guidelines given below while preparing their project Report:

6. The report should be given a title and it should have correlation with the contents of the report. Good quality A4 size papers shall be used of preparing the report and it shall be in the bound form. There shall be a front page depicting the Title of the Project Report, Authors Names and other information in the suggested format.

7. Minor Project Credits:
a) Project Presentation and Project Report (2 Credits)
b) Project Execution and Project Viva Voice (2 Credits)

MCA 508S: SEMINAR

1. Every student shall give two seminars of 30 minutes of duration each. The seminar topics should be outside the syllabus and from the emerging areas of computer Applications.

2. The student shall submit the seminar material in type written form to the teacher concerned at least two days in advance of seminar presentation date.

3. The student shall use LCD Projector for seminar presentation. He shall not use Black Board except for answering the questions after the seminar presentation, if any.